2007-2026 Highway System Plan

Working Draft

Washington State Department of Transportation

I-405 in Bellevue, WA

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Overview

2007-2026 Highway System Plan

High Benefit Low Cost

The HSP will address each of the WTP priorities as follows:

» Definition of the issue
» Needs & criteria used
» Strategy to address the needs
» Performance Measures
» Maintenance – where applicable
» Emergency Plan – where applicable

The Washington State Highway System Plan (HSP) is the element of Washington's Transportation Plan (WTP) that addresses current and forecasted highway needs. The HSP plan identifies all needs consistent with the WTP; it is constrained to available revenue projections.

The Washington State Transportation Commission and Washington State Department of Transportation (WSDOT) developed goals and objectives based on agency and public input and included them in the WTP. This plan includes multiple investment options to implement these goals and objectives. The Commission requested public comment on these options and selected specific investment strategies for each set of goals and objectives.

The HSP is a living document with each biennial update building on the last and eventually covers all issues related to the state's highway system as results from ongoing analysis become available. Updated versions are published every two years.

Starting with the WTP goals, priorities and investment guidelines adopted by the Transportation Commission, WSDOT began the process of identifying the needs, strategies, and performance measurements associated with those goals. The investment guidelines are:

- Preservation, including Maintenance & Operations
- Safety
- Economic Vitality
- Mobility
- Environmental Quality and Health

The rest of this summary will briefly touch on each of these WTP priorities, their respective needs, and WSDOT strategies for addressing these needs. The 2007-2026 HSP Update document will further expand this discussion and include constrained lists of identified needs, specific prioritized strategies for addressing them, and performance measurements to determine the effectiveness of these strategies.

I. Preservation, including Maintenance & Operations

Pavement ... need quote here

Use of the State highway system continues to grow while the system ages. Periodic rehabilitation is necessary in order to ensure reliable movement of people and goods essential for a vibrant economy. The challenge facing state decision makers is to strike a balance between system improvement and rehabilitation.

In this HSP update these challenges and our preservation strategies to address them will be discussed under the following sections: Pavement, Structures, and Other Facilities.

PAVEMENT

WSDOT maintains approximately 20,000 lane miles of highway. Pavement Preservation requires periodic rehabilitation to keep the driving surface smooth and prevent failure of the underlying sub-structure. WSDOT policy is to resurface specific highway segments when it is most economical to do so using one of the following pavement types: flexible or rigid.

Washington uses several methods to evaluate state pavement conditions and develop a cost effective rehabilitation schedule. These methods are incorporated into the Pavement Management System used to develop a list of locations that are due for rehabilitation by year. Field investigations confirm these assessments.

STRUCTURE

WSDOT owns 3,596 structures statewide. The table in the Structrues section shows these structures by type. WSDOT's policy is to maintain 95% of its bridges at a structural condition of at least fair, meaning all primary structural elements are sound.

This HSP update will include investment levels and strategies to address the bridge preservation needs in each of the following categories:

- Replacement or major rehabilitation of structurally deficient or functionally obsolete bridges
- Improving seismic strength of bridges
- Painting steel bridges
- Preserving bridge decks
- Protecting against scour
- Special bridge repair

Bridges...

WSDOT safety rest areas ...

OTHER HIGHWAY ASSETS

These assets include the following elements:

- **Unstable Slopes** – Roadside slopes that pose a risk to motorists due to falling rocks or slope failure are evaluated based on the degree of risk.
- **Rest Areas** – Rest areas are inspected every two years to determine the condition of water, sewer, buildings and site conditions. Water quality and sewage disposal have the highest priority. Buildings and site work come next.
- **Weigh Stations** – WSDOT works with Washington State Patrol identifying facilities needed in order to weigh and inspect trucks to minimize wear and tear of Washington's pavements and bridges, improve safety and freight movement.
- **Major Drainage & Electrical Rehabilitation** – WSDOT is in the process of inventorying drainage systems, signals, and illumination systems. The information will be used to determine long term needs, and set priorities.

Safety

MAKING STATE HIGHWAYS SAFER

Collisions cause approximatey 600 fatalities each year on state, county, and city roads. Approximately 270 of those fatalities occur on the State Highway System. Despite recent progress to improve safety conditions on our highways (see chart on p.XX) the number of fatalities is still unacceptable and we continue to look for ways to achieve further reductions.

Fatalities and injuries on all Washington's roadways result in a $5.3 billion annual cost. Sharply reducing fatalities and severe injuries will require more than improved vehicle and road engineering. Increased enforcement and a focus on public education are necessary to combat the greatest contributors to the problem: speeding and impaired driving. These two factors combined lead to 60% of all traffic fatalities. Eliminating these human behaviors is essential to reach the goal of zero fatalities by 2030 as indicated in Washington State Strategic Highway Safety Plan – Target Zero.

While all projects address safety, the objective of the Safety program is focused on projects reducing and preventing fatalities, decreasing the frequency and severity of disabling injuries, and minimizing the societal costs of accidents on the state highway system. Implementing these collision prevention and reduction measures not only focuses on motor vehicle drivers and passengers, but also on pedestrians and bicyclists.

Special safety initiatives are proving to be a low cost/high benefit way to make the statewide highway system safer for the traveling public. Accident reduction and prevention measures, using low cost fixes, being addressed on a statewide level include:

Crossover accidents

- Centerline rumble strips to alert motorists
- Cable median barrier to prevent crossover accidents on multilane highways with divided medians
- Passing lanes on two way rural highways

Cable median barriers prevent crossover accidents.

Run off the road accidents

- Fixed object – remove or protect vehicles from sudden stops
- Upgrade non-standard guardrail and Bridge Rail
- Guardrail infill

The WTP and this HSP update have a safety and investment target of approximately $3.3 billion over 20 years. These funds will be expended on medium and high priority safety projects targeting risk, interstate standards, behavioral programs, pedestrian and bicycle facilities, rural two lane roads, county roads, and city streets.

Economic Vitality

ECONOMIC VITALITY IMPROVEMENTS

Freight Strategies identify highly productive investments that Washington State can make to generate overall economic prosperity and wealth to citizens in the state.

These improvements are necessary to support Washington's role as a global gateway, our own state's manufacturers and agricultural growers, and the state's retail and wholesale distribution systems.

Economic vitality strategies include:

- Address freight constraints in the Interstate 5 corridor from Everett to Olympia.
- Improve Interstate 90, east of and over Snoqualmie Pass, to prevent severe weather closures.

The WTP identified $4.5 billion for projects addressing improvement in Freight & Goods movement on the State Highway System.

Improvements to Interstate 90, east of and over Snoqualmie Pass will help prevent severe weather closures.

Freight strategies improve economic vitality.

MAJOR FACTORS CONTRIBUTING TO CONGESTION

Travel growth and unconstrained demand during peak hours have caused many of the highways in Washington State to operate less efficiently. Recurring congestion decreases roadway operation efficiency and further consumes the limited capacity of our highways (see figure 8). Non-recurring congestion resulting from weather, roadway construction, collisions, and vehicle breakdown also reduces the operating efficiency of the highway system.

As travel demand grows, the imbalance between travel demand and capacity will also grow. The excess roadway capacity in major urban areas built decades earlier has been consumed. The primary effects will be increased congestion and longer travel times, leading to reduced productivity, higher costs for goods and services, and the significant burden of time lost in people's lives (see graph on p.XX.)

Excess roadway capacity in major urban areas, built decades earlier, has been consumed.

Mobility

CHOKEPOINTS AND BOTTLENECKS

Chokepoints are locations where recurring delay occurs because of traffic interference and/or the roadway configuration (examples: freeway interchanges; lack of left turn lanes at intersections; seasonal road closures). Bottlenecks are locations where roadways physically narrow, causing congestion (examples: reduced number of lanes; narrowing shoulders). Observed congestion must be supported with traffic data and analysis models.

Criteria for identifying chokepoints and bottlenecks:

- The congestion problem impacts the flow of mainline through traffic.
- The impact on mainline traffic flow is measured as peak hour speeds equal to or less than 70 percent of the posted speed.
- Traffic flow criteria for ramps will also be considered to determine if the congestion is caused by on/off ramp traffic.

The WTP identified funding targets for a statewide list of chokepoint and bottleneck locations. This list will be used to create strategies to address congestion in these specific locations.

INCIDENT RESPONSE

WSDOT's Incident Response Team has shown positive results in reducing non-recurrent congestion. Although the number of incidents WSDOT responded to has doubled since July 2002, the average clearance time for all incidents has remained constant.

SYSTEM EFFICIENCY

In this HSP update, recurring congestion was determined by identifying locations operating below 70% of the posted speed during the peak-hour, as shown in Figure 10. The HSP also considered areas operating efficiently during the peak-hour, 70%-85% of the posted speed (typically, the maximum throughput of vehicles on a freeway, about 2,000 vehicles per lane per hour, occurs at speeds of 42-52 miles per hour or about 70%-85% of posted speed). These conditions do not reflect the impact of congestion associated with local roads, additional impacts related to ramps, interchanges, weather, special events, construction, collisions or incidents.

Future recurring congestion and the locations projected to operate less efficiently during the peak-hour are shown in Figure 11. These projected future conditions reflect the completion of the mobility projects included in both the 2003 "Nickel" funding package and the fully funded projects included in the 2005 Revenue Package. These projections do not reflect the impact of congestion associated with local roads and additional impacts related to ramps, interchanges, weather, special events, construction, collisions or incidents (see charts on p.XX).

Implementation Plan for Mobility

The 2003 "Nickel" funding package and the 2005 funding package approved by the Washington State Legislature will generate over $11 billion towards mobility projects over the next 16 years. This additional revenue will complete many projects and will begin or continue work on the projects listed (see Figure 12). By doing this, the Legislature sets the priority for future projects and direction for transportation investments. Therefore the completion of these projects is seen as a high priority for WSDOT's future program.

A new approach to improve congested conditions on state corridors has been developed for inclusion in this update of the 2007-2026 HSP. There are three tiers of investment strategies that could be implemented incrementally over the life of the 20-year plan to maximize every dollar invested.

- System Operation (Healthy System)
- System Efficiency (Efficient System)
- System Expansion (Bigger System)

SYSTEM OPERATION (Healthy System)

System Operations promote a "healthy system" through continual performance measurement and monitoring to ensure capital investment decisions are made at the right time in the right locations. A healthy system also must be preserved to protect current and future assets. Another critical component of a healthy system is continual improvement in providing safer highways.

Environmental Quality & Health

ENVIRONMENTAL QUALITY IMPROVEMENTS

Investing in our transportation system can help address citizens' goals for a healthy environment. Environmental elements are considered part of every project's design, construction, operation and maintenance.

Highway construction projects are designed to:

- Treat stormwater by removing sediments and metals
- Protect the quality of groundwater
- Control erosion of banks and reduce surface run-off
- Provide fish passage and enhance habitat connections
- Build barriers to reduce noise on neighborhoods
- Replace and improve wetland functions
- Protect cultural and historic resources
- Minimize air pollution
- Allow habitat connectivity for animals
- Provide Bicycle/Pedestrian Facilities as needed

WSDOT plans to continue investing in stand-alone environmental retrofit projects to fix problems along the existing highway system.

These projects are funded to:

- Remove culverts that keep fish from reaching upstream habitat
- Reduce highway noise in areas not addressed by past construction projects

WSDOT has removed 180 barriers and gained over 411 miles of stream habitat for fish use.

The effort to fix barriers to fish passage continues and is a high priority in the HSP.

- Treat stormwater
- Fix stretches of highway that suffer repeated flooding or streambank erosion
- Provide pedestrian crossings near schools, senior centers, and parks
- Provide bicycle connections near schools and in urban areas

Barriers such as this one constructed in Everett reduce freeway noise in neighborhoods.

WSDOT works with Department of Fish and Wildlife (WDFW) to inventory, identify, and prioritize fish passage barriers that should be removed along the state highway system. The agencies have found 1,500 fish passage barriers among more than six thousand stream crossings on the state-owned highways.

To date, WSDOT has removed 180 of these barriers and gained over 411 miles of stream habitat for fish use. The effort to fix barriers continues and is a high priority in the HSP.

2007-2026
Highway System Plan

I. System Preservation

Pavement

WSDOT owns and maintains approximately 20,083 lane miles of highway, including mainline, spur, couplet, reversible, alternate, grade-separated HOV, ramps, collectors and special use lanes (slow vehicle, two way turn, chain up, transit, climbing, bike, holding, weaving/speed change, and HOV lanes).

Basically, all hard surfaced pavement types can be categorized into two groups, flexible and rigid.

Bituminous Surface Treatment (BST) or Chip Seal

Hot Mix Asphalt (HMA) Pavement

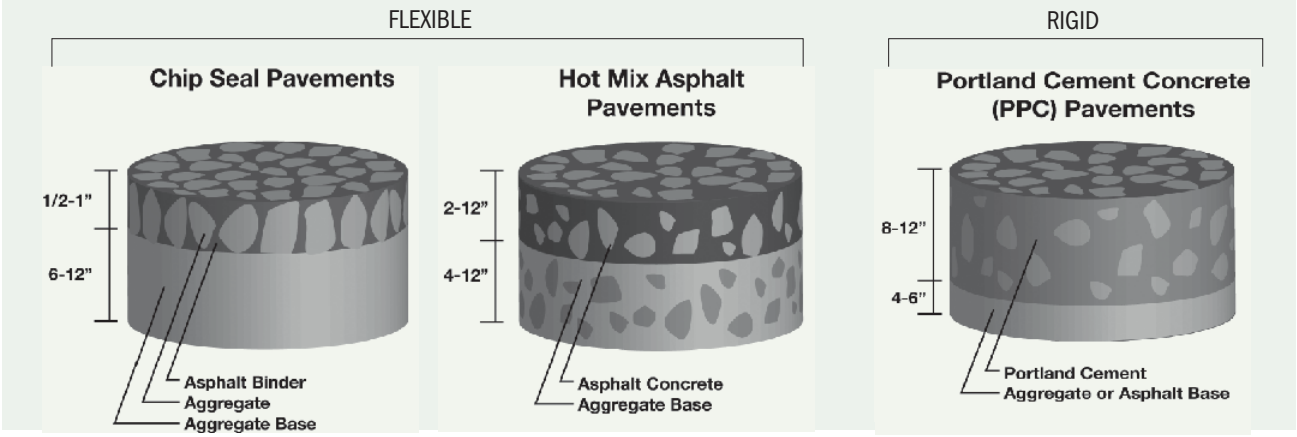
Flexible Pavements

Flexible pavements are those that are surfaced with bituminous (or asphalt) materials. These can be either in the form of a chip seal, which is generally found on lower volume (lower traffic) roads or hot mix asphalt pavements which are typically used on medium to high volume roadways.

Bituminous Surface Treatment (BST) or Chip Seal

Chip seal is generally used on lower volume local roadways and has an expected life of 6 to 8 years.

Hard Surfaced Pavement Types



Hot Mix Asphalt (HMA)

Hot mix asphalt pavement is typically designed for 20 to 50 year lives with routine overlays every 10 to 15 years (Photo 2). An average statewide pavement life is 15 years.

Rigid Pavements

Rigid pavements are composed of a Portland Cement Concrete surface course (Figure 3). Portland Cement Concrete Pavement (PCCP) generally serves 30 to 50 years with little to no maintenance (Photo 3).

Portland Cement Concrete Pavement (PCCP)

Pavement type selection is based on pavement design criteria (materials, traffic, etc.), life cycle cost analysis and engineering evaluation.

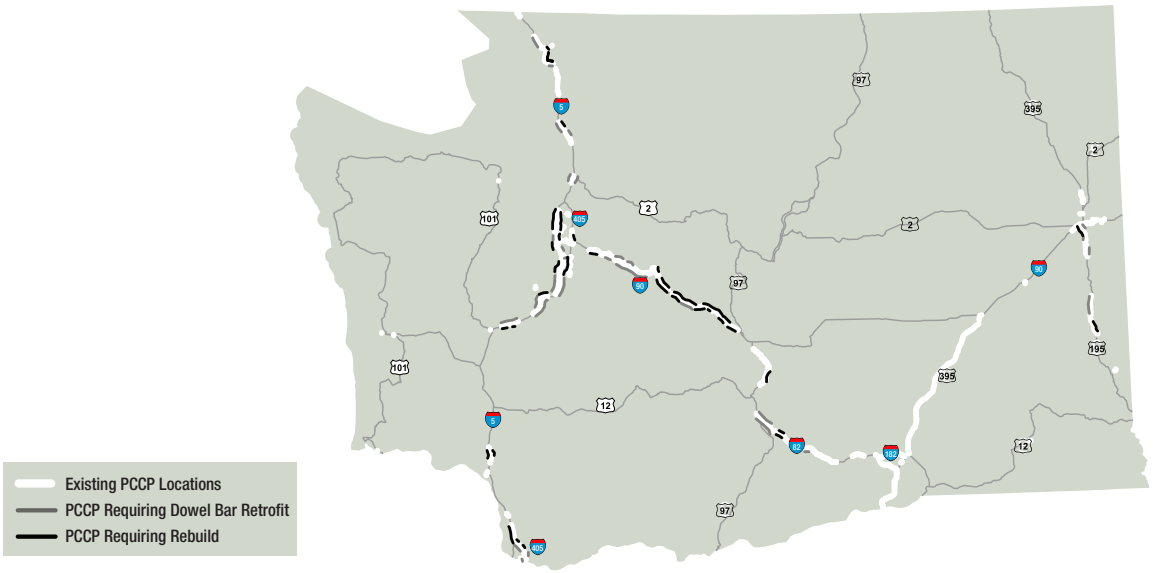
Currently, the state highway pavement network is composed of approximately 87.4 percent of flexible pavements and 12.6 percent rigid pavements

Annual Vehicle Miles Traveled in 2005

(in billions)

Pavement Type	Lane Miles	% Lane Miles	Miles (billions)	%
Chip Seal (Flexible)	4,332	21.6%	1.1	3.5%
Hot Mix Asphalt (Flexible)	13,214	65.8%	21.7	68.7%
Portland Cement Concrete (Rigid)	2,537	12.6%	8.8	27.8%

Roadways require periodic rehabilitation to keep the driving surface smooth and safe and to prevent failure of the underlying substructure. Identifying the optimal time for rehabilitation is crucial to efficient pavement management. If rehabilitation is done too early, pavement life is wasted. Rehabilitation that is done too late requires additional costly repair work and increases the risk of subsurface structural failure.



Needs

There is no more fundamental transportation capital investment than system preservation—keeping the physical infrastructure in good condition. As transportation facilities age and are used, a regular schedule of rehabilitation, reconstruction, and replacement is needed to keep the system usable. Timing is important: if preservation investment is deferred, costs increase dramatically, leading to the saying "pay me now, or pay me more—lots more—later" (Figure 6).

WSDOT's objective is to preserve roadways at the lowest cost per year of pavement life. Heavy traffic (especially slow), studded tires and extreme weather create wear and tear on pavement surface leading to its deterioration. Regular roadway preservation benefits traveling public safety as it prevents hydroplaning in wet weather, minimizes rough drive, helps to reduce skidding during stops, and restores worn out basic safety features including signing, guardrail, striping.

Age to Rehabilitation

In Years

The Department uses a process to identify needs to preserve the existing state highway system, which gives considerations to lowest life cycle costing (RCW 47.05.051 (1)).

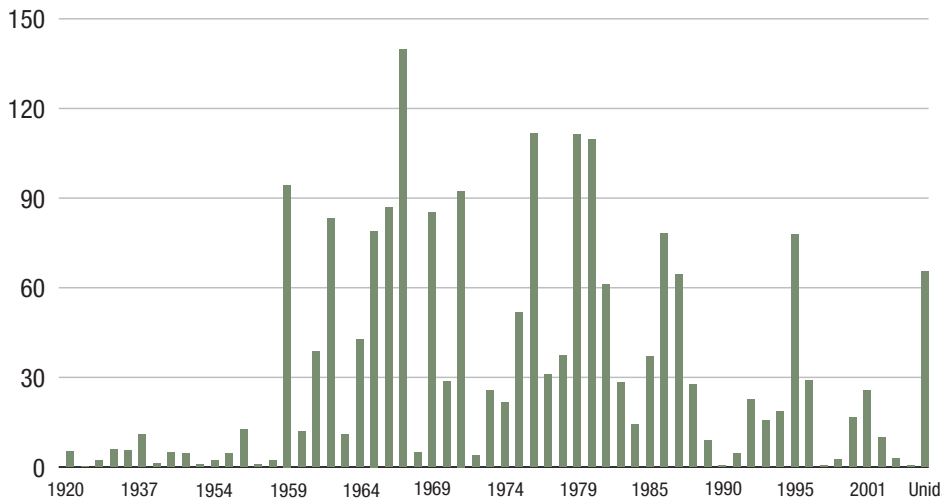
For the 2005-07 budget, the legislature placed additional emphasis on preservation of asphalt pavements using lowest life cycle cost principles by inserting the following language in the budget bill:

> *"The department of transportation shall continue to implement the lowest life cycle cost planning approach to pavement management throughout the state to encourage the most effective and efficient use of pavement preservation funds. Emphasis should be placed on increasing the number of roads addressed on time and reducing the number of roads past due."*

WSDOT HQ Pavements Management Division uses three types of measures to evaluate pavement condition at the network level for rehabilitation scheduling. These include surface distresses (cracking, patching etc.), rut depth and roughness as characterized by international roughness index (IRI). An automated pavement condition survey vehicle, traveling at highway speeds, collects high-resolution digital images (for subsequent distress rating), profile (for rough-

Concrete by Year Built

by lane miles



ness) and rutting data annually on all state highways. Trained technicians play back the digital images on special workstations at slow speeds and identify surface distresses. We apply Quality Assurance/Quality Control processes throughout the rating process to verify and validate the accuracy of the distress data. The surface distress, roughness and ride data are then added o the Washington State Pavement Management System (WSPMS) historical database.

Strategies to Preserving Highway Pavements

Washington uses a lowest life cycle methodology to carefully evaluate the states chip-seal highways and to develop a roadway rehabilitation schedule. WSDOT incorporates this methodology into the pavement management system to develop a list of roadways that are due, already past due, or will be due at some point in the future. Field investigations confirm these assessments. This methodology is not as accurate for predicting PCCP rehabilitation cycles.

The Washington State Pavement Management System (WSPMS) plays a pivotal role in our ability to identify and prioritize roadway preservation needs and projects. As part of this process, we annually collect, rate and analyze pavement surface condition data for the entire state highway system. The three types of condition measures used for evaluation are shown below.

Pavement Structural Condition (PSC). This measure is based on cracking, patching, etc. A roadway should be considered for rehabilitation when PSC is between 40 and 60.

Rutting is caused by heavy traffic or studded tire use. Ruts greater than 1/3 inch deep require rehabilitation.

Roughness is characterized by international roughness index (IRI). A roadway should be rehabilitated when IRI is between 170 and 220 inches per mile.

Each segment of state highway is assigned a year where the cost is projected to be the "lowest cost" for rehabilitation. This is known as the **"due year"**. If the highway segment is not rehabilitated during its due year it becomes **"past due"**. The Department uses the WSPMS information to determine when the roadway pavement sections have reached the "due" year and need to be rehabilitated to prevent additional deterioration which may result in either increased maintenance costs or added rehabilitation costs. Some roadway segments may actually be in the "past due" category for a few years without accruing significantly higher rehabilitation costs, but other segments may experience higher costs within one to two years, depending on climate and traffic volumes.

The **chip seal pavements** are maintained at the lowest life cycle cost in the pavement preservation program. These pavements generally require rehabilitation every 6 to 8 years and provide a very durable surface for low volume roadways (less than 4,000 vehicles per day with typically less than 15 percent truck traffic) where adequate sub-base exists.

For **hot mix asphalt pavements**, a range in pavement life of 8 to 18 years is typical in Washington State. On average, western Washington hot mix asphalt pavement life is 16.5 years, eastern Washington life is 11.3 years, and the statewide average is 14.7 years. The range in pavement life between eastern and western Washington is primarily due to the severe winter cold and extreme summer heat experienced in eastern Washington. Hot mix asphalt pavement is susceptible to aging, cracking and rutting caused by temperature extremes.

High volume intersections with stop and go traffic provide a different challenge. Typically stop and go conditions, extreme weather, heavy traffic, and downhill grade cause severe damage to the hot mix asphalt pavements on those intersections. Using of **PCCP in high volume intersections** has shown to be cost effective over the pavements life, as well as eliminating the need for periodic overlays.

Ramps and auxillary lanes are similar to the HMA intersections but these have longer life.

WSDOT has an enormous task at hand with its **PCCP**. Originally, PCCP was designed for only a 20-year life. To date, approximately 80 percent of the PCCP in Washington State are more than 20 years old (Figure 7 and Table 2). In addition, the PCCP has carried much more traffic (two to five times more) than their original design anticipated.

Statewide PCCP Age*

Age (yrs)	Total lane miles
0-10	87.51
11-20	318.91
21-30	541.19
31-40	540.37
41-50	375.91
51-60	12.35
61 or more	36.07
Not identified	65.39
Total	**1977.69**

*Note: The PCCP lane miles total does not include special use, grade-separated HOV, PCCP intersections, or ramps.

Over the last 40 or more years, a number of PCCP design and performance issues have been evaluated. WSDOT believes that with today's technology it is possible to construct a PCCP that will perform for 50 or more years with minimal rehabilitation. We envision that future rehabilitation will be required to repair the damage caused by studded tires. Banning studded tires would not only lengthen pavement life, improve pavement ride and reduce pavement noise but would also reduce costs and future traffic disruptions due to pavement rehabilitation.

Another complication with PCCP is that the majority of this pavement is on the more heavily traveled interstate highway system. Pavement rehabilitation work inconveniences the traveling public and creates high traffic management costs while construction is underway. A PCCP that is faulted, but not cracked, can more than likely be rehabilitated by dowel bar retrofit and diamond grinding.

On the opposite end of the scale, a pavement that is severely cracked may be beyond simple rehabilitation and may require complete reconstruction. WSDOT has not needed to rehabilitate PCCP over the last 20 to 30 years (which certainly has benefited both chip seal and hot mix asphalt pavements). Unfortunately that luxury no longer exists. It will take time and a considerable dedicated funding source to bring the PCCP to the same level of service that WSDOT strives to obtain for our other roadways.

Over the past three years HQ WSDOT System Analysis and Program Development Office worked extensively

with the HQ Materials Laboratory Pavement Management Office and the WSDOT regions to implement an improved pavement management methodology that is more efficient, cost-effective and consistent with the Revised Code of Washington, passed by 2003 Legislature that emphasized the lowest life cycle cost principles. Pavement Management's work has been supported by years of experience and research as well as collaboration with national and international professional technical organizations such as the University of Washington, AASHTO, World Bank, and FHWA. The strategies discussed in the following pages of this section came about as a result of this intensive coordination and collaboration. Two key goals emerged as a result of this work for new flexible pavement methodology:

- Reducing the annualized cost of a pavement by optimizing the pavement design.
- Applying BST on some roadways traditionally paved with HMA by alternating cycles of chip seals followed by HMA surfacing. This does not affect WSDOT's policy regarding paving within city/town limits as city and town streets will be continued to be paved with the HMA.

A few critical areas requiring further research include:

- Refining the selection criteria for cost-effective methodologies using BST and HMA in alternating paving cycles.
- Predicting the life of concrete pavement including the development/refinement of the concrete performance curve will enable WSDOT to estimate the number of lane miles of concrete pavement needing replacement in the next 20 years.

As funds become tighter, WSDOT continues to the search and analyze better, more cost-effective pavement management methodologies consistent with current legislation.

If there are not enough funds to rehabilitated all the required lane miles according to the lowest life cycle cost averages, we rank the rehabilitation needs in the following order to minimize additional deterioration and potential future cost increases:

- Construction in progress
- Chip seal
- Emergent concrete (based on HQ WSDOT Materials Lab approval)
- Due HMA
- Pave due HMA miles with chip seal on identified sections. Apply savings to:
  - Past due HMA
  - Ramps and/or concrete (based in HQ WSDOT Materials Lab approval)
  - Intersections
- Concrete (non emergent) replacement/ rehabilitation

Chip seals are prioritized first because of their low cost per mile to pave when "due", compared to a rehabilitation project when "past due". The additive cost of deferring chip seal "past due" pavement can be very high as it may exceed ten times the cost of project when is due.

There is an emerging need for rehabilitation/reconstruction of PCCP – these pavements are disproportionately represented in future poor pavement miles. The current funding allocations are adequate to cover asphalt and chip seal repaving needs, but fall far short of funding PCCP rehabilitation/reconstruction needs.

Therefore, it is WSDOT's intent to evaluate each heavily traveled intersection and determine the appropriateness and life cycle cost to reconstruct these intersections with concrete. WSDOT has estimated that approximately 130 intersections may be appropriate for PCCP at an estimated cost of $500,000 per intersection.

How will performance improve?

In the next 20 years, the WSDOT Pavement Management will be focused on three main categories i.e.:

- Asphalt pavement preservation
- Pavement strengthening
- PCCP rehabilitation

It will include the following improvements:

- Eliminate backlog of past-due asphalt pavements and maintain a lowest life-cycle cost schedule for those pavements.
- Maintain chip seal paving at lowest life-cycle cost.
- Strengthen pavement structure where warranted, due to heavy truck loads, including intersections.
- Rehabilitate high priority interstate PCCP sections.

- Rehabilitate high priority non-interstate highway PCCP.

In the long term, the costs of pavement preservation in the state will be reduced and the traveling public will benefit from smoother rides and shorter travel times as there will be less closures due to maintenance.

Maintenance and Operation

As inventory of paved lane miles, ramps, and other paved surfaces are added to the highway system through the construction program, they will need to be maintained in order to keep them in good, working condition. This typically includes patching potholes, digging out and patching area of distressed pavement, and sealing pavement cracks.

Certain maintenance treatments on pavements will help hold the road together between preservation treatments and reconstruction jobs. Some maintenance treatments will be more focused on immediate traveler safety (i.e. patching potholes) while others focus on extension of the pavement life (i.e. crack sealing). Through improved information management and decision making, the selection and timing of maintenance treatments will be better coordinated with the pavement preservation program.

Bridges and Structures

Structures Overview

Preservation is a statewide goal to keep transportation facilities in sound operational condition. The objective is to achieve the best long-term financial investment for a transportation facility and prevent failure of the existing system. In addition, the bridge preservation program aims to "perform the right work on the right bridge at the right time."

WSDOT is responsible for managing an inventory of nearly 3,500 bridges and structures. These structures carry vehicle and pedestrian traffic over or under other roadways or natural features. There are approximately 18 new bridges that carry vehicle traffic added yearly to this inventory.

WSDOT manages all state-owned bridges using the Washington State Bridge Inventory System (WSBIS). It is WSDOT policy that structural condition of 95% of its bridges rate fair or better, meaning that all primary structural elements are sound. The condition rating is based on the structural sufficiency standards established in the FHWA "Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges." This rating relates to the evaluation of bridge superstructure, deck, substructure, structural adequacy and waterway adequacy.

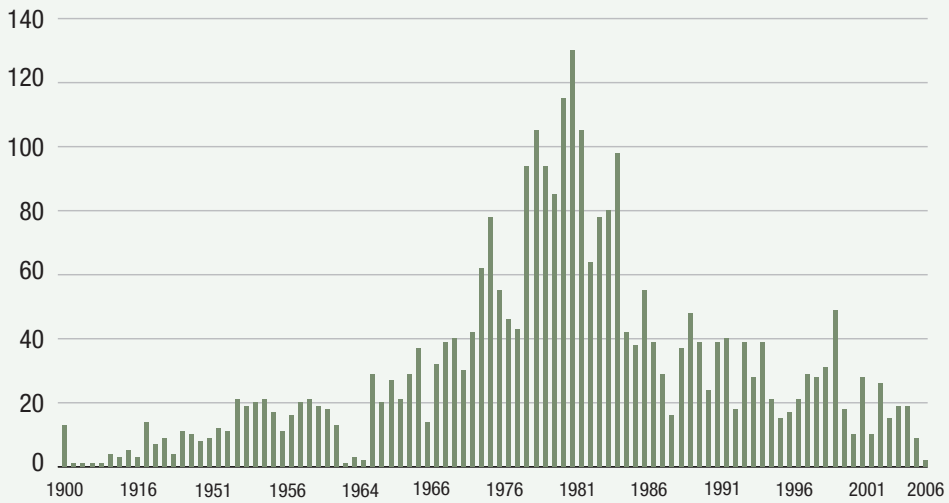
When a bridge is built, it is given a design life of 75 years. The average age of the state-owned vehicular bridges is now 40 years. WSDOT built a significant number of bridges built during the Interstate Program

State Owned Structures Inventory

Structure	No. of Bridges	Square Feet
Vehicular Bridges (over 20 ft. long)	2,978	43,564,680
Structures less than 20 ft long	263	n/a
Border Bridges (maintained by border state)*	6	n/a
Culverts greater than 20 ft in length	90	n/a
Pedestrian Structures	57	249,730
Tunnels and Lids	38	739,381
Ferry Terminal Structures	45	248,443
Railroad Bridges	5	n/a
Buildings (I-5 Convention Center)	1	n/a
Total	**3,483**	**44,802,234**

*Maintenance and preservation costs are shared by the states
Source: WSDOT Bridge and Structures Office - October 2006

Number of Bridges by Year Built



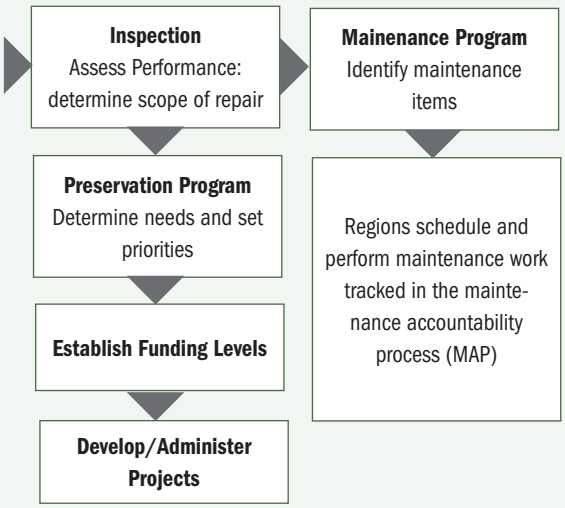
in the 1950's and 1960's and many of these bridges are now over 50 years old. Most of these bridges are in good to fair condition which is a testimony to sound engineering practices and durable materials; however, age alone is not an indicator of overall bridge condition.

Bridge inspections provide the information needed to determine the condition of a bridge and if any repairs are necessary. The frequency of the inspection and the information gathered during the inspection is defined by the Federal Highway Administration (FHWA) in the 1995 "Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges," also known as the NBIS guide.

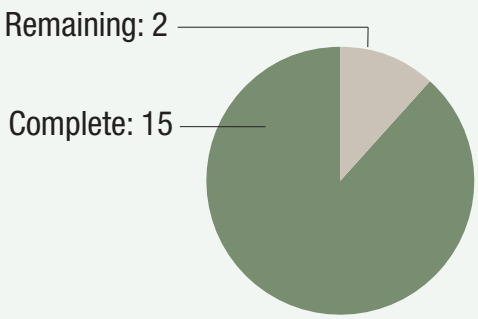
Most bridges are inspected every two years. Some bridges are inspected every year due to their condition and design type. A few structures require a more frequent inspection cycle, such as the Alaskan Way Viaduct which is inspected every six months. Inspections include all vehicle-carrying bridges, ferry terminals, cables on floating bridges, sign bridges and any structure that has been damaged by a vehicle or vessel. If a repair is deemed necessary then engineers review the repair options a put together a scope of work. If the repair is within the parameters of maintenance activities, then the maintenance program will repair the damage. For each bridge, the preservation need is prioritized and ranked against all bridge needs statewide according to degree of risk and damage. This prioritization process occurs every two years.

WSDOT's Bridge and Structure Preservation Program is addressed in three distinct categories: Bridge Preservation, Catastrophic Reduction, and Bridge Replacement and Major Rehabilitation. Preservation is further defined into more refined sub-categories: Special Repair, Bridge Deck, Scour, Painting, and

Bridge Preservation Cycle



Movable Bridge Status



Bridge Repair

SR 153 Methow River Bridge

US 101 Mud Bay Bridges

Miscellaneous Structures. All categories consist of implementing cost-effective investments that extend the service life of the structure.

Bridge Preservation

Special Bridge Repair/Major Repair/Movable Bridge Repair

Objective

Our goal is to address major bridge repair needs that are beyond routine maintenance in a timely manner to ensure public safety and avoid costly future rehabilitation. Maintenance repairs will maintain the operating integrity of a bridge between preservation treatments and reconstruction jobs. Through information sharing and decision making, maintenance treatments are coordinated with the bridge preservation program.

Needs

This work differs from rehabilitation in that major repair projects are not intended to address all the deficiencies of a bridge. Major bridge repairs address specific bridge elements such as deteriorated concrete columns, replacing rusty anchor cables on floating bridges, and repairing or replacing expansion joints. This category also includes any work performed on moveable bridges.

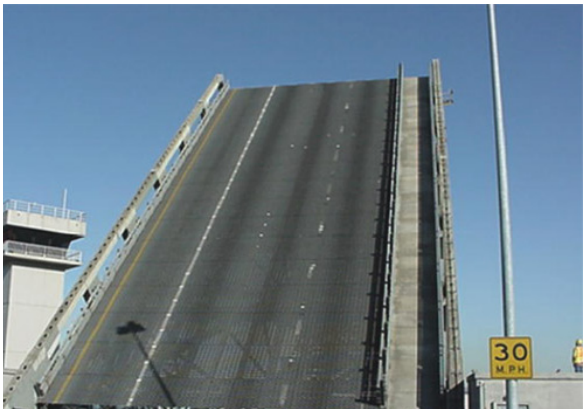
Strategies

These types of repairs are prioritized based on engineering analysis and evaluation performed by WSDOT bridge engineers. They consider a multitude of criteria to assist in their decisions for which bridges are to be repaired. They consider safety to the public, continued maintenance costs, life expectancy of the bridge and replacement costs if the bridge is to be replaced earlier than anticipated.

The state owns and maintains 17 movable span bridges and shares the funding responsibility for three additional bridges with Oregon and Idaho. Most of these structures are over 50 years old and have obsolete mechanical and electrical systems. Over the past 10 years, we have been upgrading these bridges to ensure that the lift spans do not fail and impede either roadway or waterway traffic. Fifteen movable bridges have been overhauled with two remaining.

Moveable bridges receive a comprehensive inspection on a five-year cycle. These inspections are performed by a consultant that specializes in these types of bridges. The findings and recommendations are then reviewed by bridge engineers dedicated to movable bridges.

Movable Bridge



SR 99, 1st Avenue Bridge, Seattle

A plan is developed for each structure to determine the short term (maintenance) and long term rehabilitation needs. A key element in determining whether a bridge is to receive funding for repairs is the reliability and user needs of the bridge. As part of determining a solution for these unique bridges, a replacement alternative for high-level fixed span bridges may be considered. This cannot be a viable solution at all the locations due to topographic constraints and funding restraints. Since it is not feasible to replace all of these bridges, it becomes imperative to extend the service life of the bridge and to minimize the frequency of roadway closures due to mechanical or electrical malfunctions. The goal is to keep the electrical and mechanical components of these bridges in sound operational condition. From this effort all but two bridges have been overhauled. The two remaining bridges in this category that have not been overhauled are:

- US 101 Hoquiam River at Simpson Ave.
- US 101 Hoquiam River at Riverside

Steel Bridge Painting

Objective

Protective paint coatings on steel bridge elements are essential to prevent corrosion and loss of structural load carrying capacity needed for freight movement. Our goal is to preserve the load carrying capacity of steel bridges by maintaining properly functioning paint systems that provide protection against corrosion.

Steel Bridge Painting

US 101 Calawah River

Columbia River , Bridgeport WA

Needs

A three part paint system is used to overcoat the existing paint on steel. Some other states, like Oregon, prefer to remove all the existing paint before adding a new paint system. This process tends to be 2-3 times more expensive than WSDOT's over coating method.

Strategy

Our policy is to repaint steel bridges when approximately 2% to 5% of the existing steel surface area is exposed. The amount of time it takes a bridge to reach this condition depends on the type of paint, bridge type, and geographic location of the bridge. Generally a paint system will last 15 to 20 years before repainting is required. Since 1991 new steel bridges have been painted with a three part zinc-moisture cured polyurethane paint system that will last longer than previously used paint systems.

WSDOT maintains 282 painted steel bridges on the state highway system. There are also four steel bridges that are owned by Oregon and cross over the Columbia River. These bridges are classified as "Border Bridges" since they cross a state border. The cost to repaint Border Bridges is shared equally between Oregon and Washington.

The department has 19 unpainted weathering steel bridges. Weathering steel bridges were originally designed to resist corrosion and not require painting. Some of these bridges have experienced unacceptable levels of corrosion and will need to be addressed in the next 20 years. A single coat of clear rust penetrating sealer is used to prevent further corrosion. A sealer has been applied to four of the our weathering steel bridges to date.

WSDOT uses environmentally sound practices to contain debris generated from the bridge painting process. We have an agreement with the Washington Department of Ecology and Department of Fish and Wildlife to use a filter fabric tarp during pressure washing of a bridge. This process is used on a majority of bridges depending on the amount of water flow in the river. Bridges over lakes and low water flow will require full containment and off site disposal of all wash water.

WSDOT also ensures worker safety on Bridge painting jobs by following new regulations and using new procedures to protect bridge workers from excessive lead paint exposure.

Bridge Deck Preservation

Objective

WSDOT's goal is to insure safe, long-lasting roadway riding surfaces on all reinforced concrete bridge decks by timely repair and application of durable protective bridge deck overlays. This will enable free movement of freight by maintaining the load carrying capacity of bridges.

Needs

For years, concrete bridge deck deterioration has been the largest single bridge-related problem in the country. Using salt in past winter deicing practices has caused premature deterioration of many of the state's concrete bridge decks. WSDOT has been working since the early 1980's on a systematic

program aimed at preventing concrete deterioration by using epoxy-coated rebar in new bridges, and by repairing deteriorated and traffic related damaged rebar with durable protective overlays on bridge decks. Repairing and overlaying deteriorated bridge decks is very cost effective compared to more costly total deck replacements.

The timing for replacing a concrete deck is related to the amount and condition of previous deck repairs and the amount and nature of the traffic. Failure in previous repaired areas can eventually cause debonding, cracking, and potholes in the concrete overlay.

Strategy

A modified (latex, micro silica, or fly ash) concrete overlay is the preferred protection system for bridges that meet the requirements for protective overlay. An alternative three-quarter inch thick polyester or one and one-half inch thick Rapid Set latex modified concrete overlay may be used if rapid construction is needed. These alternatives can cure in four hours compared to 42 hours for a modified concrete overlay. We have overlaid 552 bridges with a modified concrete overlay.

Bridge deck testing has been completed on all of our concrete bridge decks. This testing has determined the amount of chlorides, the location and size of any delaminations, and the concrete cover over the reinforcing steel. Deck repair and a protective overlay are required if any of the following deck testing results is found:

- 2% or more of the total deck area is delaminated
- The deck has exposed rebar on the surface
- A concrete overlay with 5% or more of the total overlay area is delaminated or has wheel ruts over a half inch in depth.

Miscellaneous Structures

Objective

This is the smallest category within the bridge preservation category. These projects are usually dependant on larger projects for funding. They receive stand alone funding if they become a hazard to the public.

Needs

Miscellaneous structures include sign support structures; high mast luminaries; standard and special design retaining walls; bridges less than twenty feet long (mainly culverts) and tunnels.

Strategies

Bridges under 20 feet and tunnels will be given precedence over all other miscellaneous structures when determining the biennial priority array.

Sign structures are prioritized by groups based on their physical condition. Section loss in the primary load bearing members is considered for complete replacement. Other considerations given are fatigue cracking, foundation instability and inadequate design capacity.

Catastrophic Reduction

Seismic Retrofits

Objective

A study performed by the Federal Emergency Management Agency in 2001 found that Washington has the second highest risk for economic loss in the nation due to earthquakes. California has the highest risk. Washington has several geological faults that influence the western part of the state. The largest earthquakes in recent history occurred in 1949, 1965 and 2001 and killed 15 people. The most recent Nisqually earthquake killed one, injured 320 and caused over $2 billion dollars worth of damage.

The objectives of the seismic retrofit program are to:

- Minimize the risks of complete bridge collapse
- Minimize loss of life and disruption of commerce
- Accept moderate damage

Needs

The seismic program prioritizes bridge projects based on essential lifelines that need to remain in service following a seismic event, and where the bridges are located in the seismic risk zones. All bridges within the highest risk zone and those on Interstates in the moderate risk zone will have a higher priority and will be retrofitted first. Those bridges with single columns located in the low-moderate range will also be retrofitted after the higher risk areas have been completed.

Strategy

WSDOT's Bridge and Structures Office has changed the prioritization philosophy for identifying seismic needs. In the past, major bridges along with the superstructure of certain bridges were the first to receive retrofits, followed by bridges with single columns. Multiple column bridges and bridge foundations were the last to receive retrofits. This plan to retrofit bridges for seismic movement has reached a point where a newer strategy was needed. Therefore, more emphasis is now placed on bridge location with respect to seismic zones and design. The highest risk zone and the moderate risk zones were the first to be targeted with the TPA funds in 2005. The highest risk zone is located in central Puget Sound. All bridges that are not part of another funded project will receive funding in this high risk zone along with bridges that are in moderate risk zone on major routes. Those routes are I-405, I-90 and I-5. In addition to the bridges located in these two zones, there are approximately 20 bridges that have single columns that could sustain significant damage during an earthquake. They will remain on the priority list for retrofit until they are completed.

Our goal is to finish those bridges identified for seismic retrofit work in the high risk zone and the moderate zone on major routes first. Then the selection of bridges will begin to radiate outward from the high risk zone. The remaining bridges in the moderate risk zone with multiple columns will come next and will be based on average daily traffic (ADT). The higher the ADT, the higher the bridge will rank in priority. The last targeted zone is the bridges in the low to moderate risk zone. Bridges on I-5 in the low-moderate risk zone may have a higher priority than some smaller routes in a higher risk zone. The intent is to make key routes strong enough to withstand an earthquake so that access is maintained for emergency responders and supplies, and to evacuate people.

In the case of "the big one", an earthquake with a magnitude of 9.0 or greater, WSDOT has accepted that there will be damage. WSDOT designs to the most current standards for seismic strengthening on new bridges and retrofits its older bridges; however, it is unknown how bridges will perform in a very large earthquake.

Scour Protection

Objective

Scour is defined as the removal of material from a streambed by high water flows. Scour can cause a bridge foundation to become unstable if an excessive amount of material under the foundation is removed.

The amount of scour can be estimated by calculating how deep the waterway channel could become based on high water flows and channel conditions. A bridge is classified as "scour critical" when the calculated depth of the potential scour is below the bridge foundation.

Needs

Scour has been the cause of over one-half the bridge failures in Washington since 1923. Of the 70 documented failures, 43 of these are a direct result of foundation scour due to flooding. In 1995, WSDOT began to identify and repair scour damaged foundations.

Strategy

The Scour program has been successful in finding a way to preserve the integrity of bridges during large storm events and is sensitive to the environmental concerns around the bridge. WSDOT evaluates the bridges identified as scour critical on a biennial basis. Bridge engineers in collaboration with hydraulic engineers determine the risk associated with each bridge by calculating the critical depth of scour using FHWA guidelines and the software, "HYRISK." If a bridge is found to be at considerable risk for a catastrophic failure during a large storm event, the bridge is programmed for repair. On occasion a bridge becomes critical between the evaluation periods. If this happens, then the bridge may receive emergency funds to repair or partially repair the scour damage. When the emergency repair is a partial repair, the Department returns the following summer during the fish window to finish the work.

To assist in delivering scour projects on time and on budget, a new approach to scoping scour projects was developed with input from all internal participating support offices. This process was presented to WSDOT executives and was approved in 2005. This process calls for scour specialists to perform more upfront work in order to present a defendable and permitable project to the resource agencies. This also gives clear guidance to the regional offices on

the scope of work and decreases the amount of time it takes to deliver a quality project. Project costs have been difficult to estimate in the past because of increasing environmental regulations and a misunderstanding regarding compensatory mitigation. This process establishes a baseline estimate that correlates to the collaborative efforts of the scour team.

Bridge Replacement/Major Rehabilitation

Objective

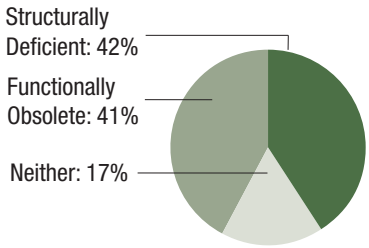
The objective of the bridge replacement and major rehabilitation program is to perform necessary work when continued maintenance and preservation strategies are no longer cost effective to provide safe, continuous movement of people and goods. WSDOT has developed three strategies to prioritize bridges that require replacement or major rehabilitation. Those three strategies are structurally deficient bridges, weight restricted bridges, and narrow bridges. When looking at replacement or rehabilitation, bridges should have a sufficiency rating of 50 or less and be classified as structurally deficient or functionally obsolete in order to qualify for federal bridge replacement funds.

Needs

Many bridges are reaching the end of their functional lifespan. Many were not designed for the heavy loads, high traffic volumes or speeds that exist today. Bridges are replaced when continued maintenance and preservation strategies are no longer cost effective to provide safe, continuous movement of people and goods. In order to qualify for Federal Bridge

Bridge Replacement/Major Repair Needs

Region	SR	Bridge No.	Bridge Name
Eastern	21		Keller Ferry
Southwest	97	97/1	Biggs rapids (deck replacement - WA 1/2)
Northwest	2	2/6N	Ebey Island Viaduct Stage 1
Northwest	2	2/7N	
Northwest	2	2/6N	Ebey Island Viaduct Stage 2
Northwest	2	2/7N	
Northwest	2	2/6S-W	Ebey-W Ramp AL Ramp
Northwest	2	2/6W-N	W-Ebey Ramp DL Ramp
Olympic	303	303/4	Manette
Northwest	99	99/538	Spokane Street OC - Timber
Olympic	509	509/5A	City Waterway/Murray Morgan - Removal
South Central	97	97/106	Satus Creek
Olympic	101	101/420	Purdy Creek
Olympic	107	107/5	Slough Bridges
Olympic	107	107/6	Slough Bridges
Olympic	101	101/263	Walker Creek
Northwest	548	548/10	Dakota Creek
Southwest	508	508/23	Alder Creek
Southwest	506	506/106	Lacamas Creek
Northwest	20	20/265	Gulch Bridge
Southwest	508	508/25	Creek Bridge
Southwest	508	508/26	Creek Bridge
Olympic	12	12/12S	Heron Street (Wishkah River)
Northwest	5	5/670W	Stillaguamish River
Southwest	5	5/36E	E Fk Lewis River
Southwest	508	508/12	S Fk Newaukum River
South Central	10	10/143	Bristol Fill



Bridge Structural Condition Ratings

Category	Description	2000	2001	2002	2003	2004	2005	2006
Good	A range from no problems to some minor deterioration of structural elements.	84%	85%	87%	86%	87%	89%	88%
Fair	All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.	11%	11%	10%	11%	10%	9%	9%
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.	5%	4%	3%	3%	3%	2%	3%

Source: Gray Notebook, June 30, 2006

replacement funds, a bridge must meet the following four criteria.

- Bridge must be on the National Bridge Inventory (NBI) list
- Have a sufficiency rating of less than 50 to be eligible for replacement or less than 80 for major rehabilitation
- Must be structurally deficient or functionally obsolete
- Bridge cannot have been worked on in the past 10 years for either rehabilitation or replacement (new bridge) regardless of funding source.

Strategies

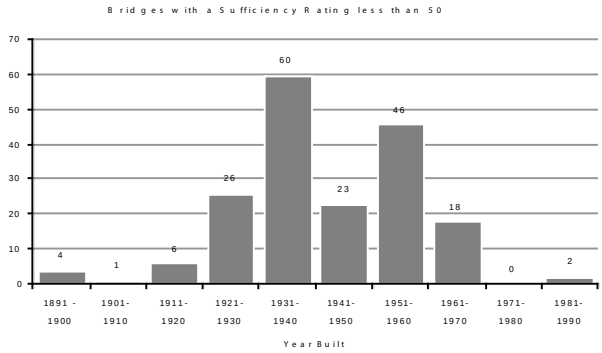
The sufficiency rating of a bridge is one of the first criteria that is measured to determine eligibility for major rehabilitation or replacement. If the bridge scores 50 or less, it has the potential to be placed on a replacement list. If the rating is below 80, then it has the potential to have a major rehabilitation to structural elements of the bridge. Cost does play a role in whether a bridge is placed in the major rehabilitation strategy or in the preservation strategy. For example, if a bridge deck is in need of a complete overhaul and the cost exceeds more than a half of the biennial target for bridge deck work, then it may be placed in major rehabilitation where there is more available funding.

Rating Bridges

■ **Sufficiency Rating.** This is a qualitative value that measures the bridges relative capability to serve its intended purpose. The value is generated from a formula that uses inspection data required by the NBIS program. A sufficiency rating will vary from 0 to 100, with a smaller value indicating a lower sufficiency and therefore a higher need of either repair or replacement.

■ **Structurally Deficient.** The bridge is in a deteriorated condition and does not adequately carry its intended traffic loads. Structurally deficient bridges have a deck or substructure code of "4" or less meaning it is in "poor" condition or a waterway adequacy code of "2" or less.

■ **Functionally Obsolete.** The bridge does not have adequate approach alignment, geometry or clearance to meet the intended traffic needs and is below accepted design standards. Functionally obsolete bridges have an inspection code of "3" or less for the alignments, geometry or clearances.



Structurally Deficient Bridges

Bridges that are targeted for replacement or rehabilitation are not chosen on their sufficiency rating alone. There are several factors that are considered when choosing to perform the right work on the right bridge at the right time. Those bridges that are structurally deficient and have a combination of the following: on a key state route, on a significant freight route (T1, T2 routes), and of community significance are placed on a potential replacement list. This list is then prioritized based on bridge condition, accident history, and when the repair should be made to gain the highest potential of the investment. As structurally deficient bridges continue to deteriorate they will eventually become weight restricted or posted with weight limits.

Bridge condition can be assessed by many factors, one of which is the designation of structurally deficient or functionally obsolete. Another tool we use to determine the condition of the bridge is the bridge inspection report. These reports are prepared every two years unless conditions make it necessary for more or less frequent inspections.

The aging of our timber bridges that are structurally deficient is an emerging trend that is of special concern. There are a total of 30 state-owned timber

Structurally Deficient Bridges

Ranking	State	Number of bridges owned by State	Total SD Bridges	Percent SD Bridges
1	Arizona	4,469	32	1%
2	Florida	5,295	56	1%
3	Texas	32,086	554	2%
10	**Washington**	**3,080**	**106**	**3%**
15	Arkansas	7,084	322	5%
20	Iowa	3,972	212	5%
25	Mississippi	5,537	379	7%
30	New Hampshire	1,285	110	9%
35	Hawaii	704	69	10%
40	Puerto Rico	1,812	208	11%
42	Oregon	2,661	314	12%
45	North Carolina	16,531	2,204	13%
50	Vermont	1,077	193	18%

source: 2005 FHWA National Bridge Inventory

bridges built with all timber components, or a combination of steel, concrete and timber, that are structurally deficient. These timber bridges are deteriorating and will need rehabilitation or replacement in the future. Of the 78 bridges that are designated as structurally deficient, 30 (38%) of them are timber or have timber elements.

There are other elements of a timber bridge that need to be identified in order to prioritize for rehabilitation or replacement. It is not our intent to replace a timber bridge just because it is timber. We analyze additional elements to determine priorities including the approach geometrics to the bridge, width of the bridge, weight restrictions if applicable, and other preservation needs, such as scour, paint or any other strategy. The more items that are deficient with a timber bridge, the higher the ranking on the replacement/rehabilitation list.

Weight Restricted Bridges

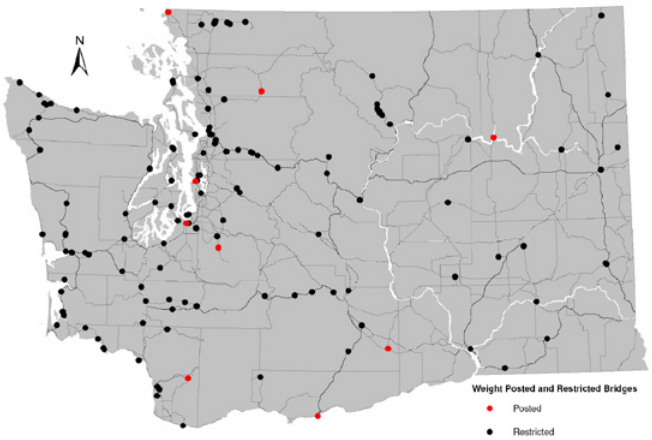
There are 155 bridges that have a weight restriction. Weight restricted bridges make it difficult for freight and goods to move about the state. The main strategy for identifying which bridges to replace in this category is route importance and community connectivity. Bridges that are on a major freight route (T1, T2 etc) are moved to the top of the priority list. If there are weight restricted bridges that hinder goods movement into or out of a community and there is no other feasible route to take, then these bridges are also placed on a list for replacement.

Narrow Bridges

Bridges targeted for replacement in the narrow bridge category are those that are 24-feet wide or less, have poor approach geometrics, poor stopping sight distance, of a safety concern, and have community importance. Narrow bridges usually fall into the functionally obsolete category. These bridges are no longer performing as they were intended and designed to because of changing traffic patterns. A majority of the functionally obsolete bridges have narrow lanes, narrow or no shoulders, poor sight distance and do not accommodate pedestrian or bicycle traffic. These bridges are usually older and built in the 1930's and 1940's using past design standards. There are 22 narrow bridges that should be replaced in the next 20 years.

The Chehalis River Bridge is a very good example of the types of narrow bridges that would receive funding for replacement. The bridge was built in 1925 and is 20 feet wide. As the picture shows, the bridge is so narrow that some people are reluctant to be on the bridge when a truck is crossing the bridge in the opposite direction. This particular bridge received TPA funding for replacement and will be replaced in 2009.

Weight Posted and Restricted Bridges

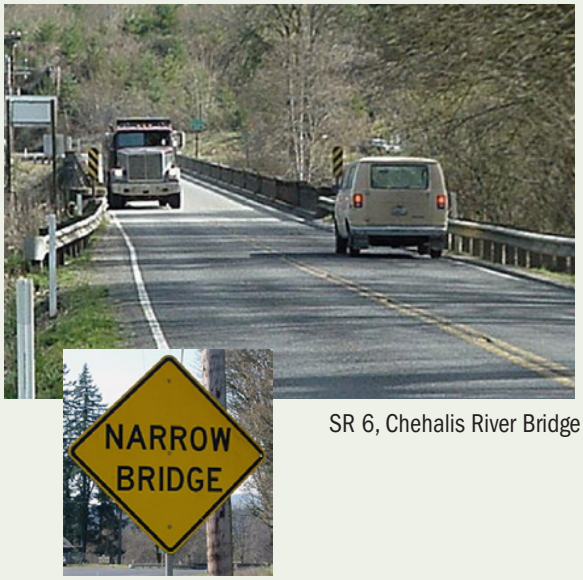


Structurally Deficient Bridges

SR 6, South Fork Chehalis

US 101 - Alder Creek

Narrow Bridges



SR 6, Chehalis River Bridge

Performance Measures

WSDOT reports the condition of its bridges to both the Federal Highway Administration (FHWA) and the State Office of Financial Management (OFM). The report follows the standards set forth by the Governmental Accounting Standards Board (GASB) and the bridge ratings follow the criteria set forth by the FHWA. WSDOT has establishes a goal to maintain 95% of its bridges at a structural condition of "Good" or "Fair". The 2006 assessment of bridges are within these parameters. Bridges rated as "poor" may have structural deficiencies that restrict the weight and type of truck traffic allowed. The 2006 assessment found 2.5% of all bridges (rounded to 3%) received a rating of "Poor." No bridge that is currently rated "poor' is unsafe for public use. Any bridge that is determined to be unsafe for public use is simply closed to all traffic.

WSDOT's Bridge and Structures Office is in the initial stages of developing individual performance measures for each of the three categories: bridge replacement/major rehabilitation, catastrophic reduction and preservation. Ongoing coordination and collaboration will be necessary to fully develop these measures. We anticipate that the performance measures will be adopted and included in the next Highway System Plan.

Security

WSDOT is involved in discussions with State Emergency Officials to determine what, if any, measures might be needed to insure the functionality of our transportation system during a statewide emergency.

Coordination and Involvement

Coordination is ongoing with the Bridge Management office to gain knowledge and information about the bridge preservation program for inclusion into various presentations, papers and folio's.

Bridge Structural Condition Ratings

Category	Description	2000	2001	2002	2003	2004	2005	2006
Good	A range from no problems to some minor deterioration of structural elements.	84%	85%	87%	86%	87%	89%	88%
Fair	All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.	11%	11%	10%	11%	10%	9%	9%
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.	5%	4%	3%	3%	3%	2%	3%

source: Gray Notebook, June 30, 2006

Other Highway Assets

This section contains several different types of projects. Each is unique and is treated differently for planning and budgeting.

These types of projects are:

- Safety Rest Area Preservation
- Major Drainage System Rehabilitation
- Highway Slopes and Embankments
- Major Electrical System Rehabilitation
- Weigh Station Replacement and Preservation

In each section that follows, we will define the issues, identify the need, describe strategies to address the needs, and discuss performance measures used to evaluate the effectiveness of the strategies. We will also provide a brief overview of the prioritization process and list projects included in the 07-09 Construction Improvement and Preservation Program (CIPP).

Maintenance Strategies and Goals

Our overall goal of maintenance is to "retain the highway system in a condition as near as possible to the condition of its initial construction or subsequent improvement." In addition, the February 2002 WSP/WSDOT "Joint Operating Policy Statement" was developed to stress the importance of the agencies' responsibility to do whatever is reasonable to reduce delays associated with incidents.

With these goals and the policy in mind, WSDOT's Maintenance will:

- clear roadways of rocks or other debris
- build up embankments
- maintain rest area facilities until they reach the point of failure
- temporarily patch pavement over failing culverts
- replace electrical parts
- patch weigh station pavements

These activities are done in an ongoing effort to reduce delay to the traveling public and until a permanent fix can be applied.

Toutle River Safety Rest Area (northbound Interstate 5)

Emergency Preparedness

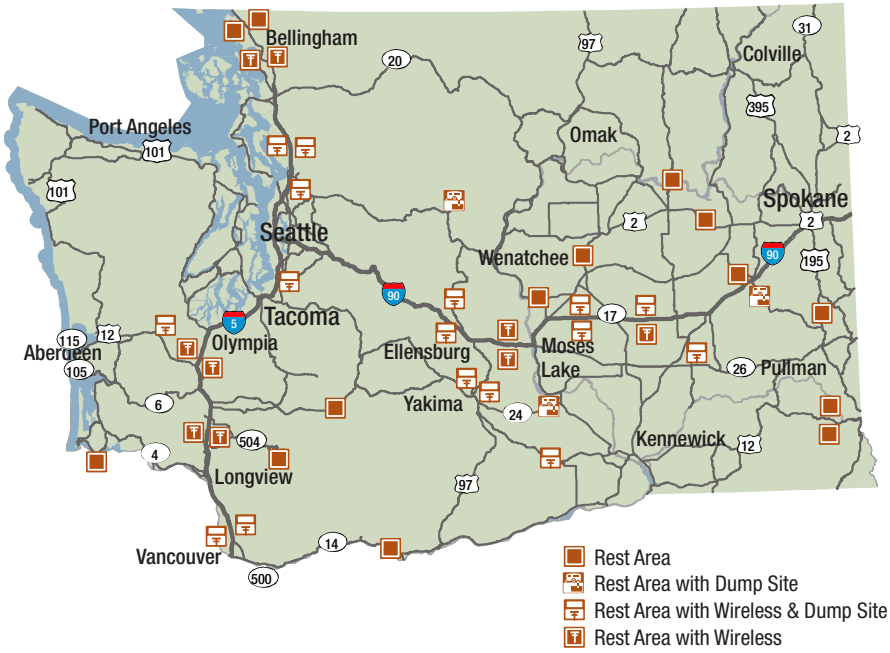
Emergency preparedness and response are important elements in the operation of the highway system. A key element of this is planning for traffic movement in the event that highways are damaged and unusable. For immediate response purposes, the designation of alternate routes and the development of evacuation plans are important issues. For longer term planning, any substandard structures on evacuation routes should be identified and targeted for improvements. Mitigation measures defined through the vulnerability assessment process should also be implemented to protect critical infrastructure across the highway system. For all of these issues, communication systems and equipment are critical.

Safety Rest Area Preservation

Washington's safety rest areas are conveniently located and provide the opportunity for traveler's to rest and take a much-needed breaks to ensure alertness and safety during long trips.

WSDOT strives to prioritize planned facilities based on locations where accidents due to fatigue are occurring, and where no nearby rest facilities (public or otherwise) are present. Sleepy driving and inattentive driving are two of the leading causes for car accidents in Washington State, together accounting for 20 percent of all fatal accidents from 1993 to 2001.

WSDOT Safety Rest Areas



Unfocused drivers are a danger to themselves, their passengers, and other drivers. Safety rest areas offer an opportunity for sleepy and inattentive drivers to get off the road and rest along highways that otherwise have no good stopping points such as all-night restaurants.

Over 20 million travelers stop at Washington's 42 safety rest areas annually. All safety rest areas are handicapped accessible and provide a wide range of motorist services with most providing car, truck, and recreational vehicle parking; clean restrooms; drinking water; traveler information; picnic areas; vending machines; and pet exercise areas.

Twenty-six of Washington's safety rest areas offer travelers a unique welcome service called the Free Coffee Program which allows non-profit organizations to provide travelers with coffee and light refreshments at no charge.

The Washington State Legislature established the Recreational Vehicle Program in 1980. The program annually collects $3.00 per recreational vehicle (camper, travel trailer, and motor home) licensed in the state of Washington. Funds are deposited into a dedicated account that supports construction, maintenance, and operation of recreational vehicle sanitary disposal systems at safety rest areas. WSDOT administers the Recreational Vehicle Program and works with the Recreational Vehicle Citizen's Advisory Committee to define and prioritize recreational vehicle owners' needs.

The RV Dump Program provides the traveling public with an environmentally safe repository for RV waste and potable drinking water in WSDOT safety rest areas. WSDOT owns, operates and maintains 19 RV Dump Stations within the 42 safety rest areas statewide.

Needs

Inventory of Safety Rest Areas

WSDOT is responsible for 42 safety rest areas; 27 of which are located on the Interstate system. These facilities contain a total of 555 acres, 83 buildings, 29 on-site public drinking water systems, 36 on-site sewage treatment/pretreatment systems and 19 recreational vehicle dump stations.

With the exception of two facilities requiring winter closures all are open 24/7.

- Dismal Nitch on SR 401 at milepost 1 in Pacific County (a water system upgrade will allow for year round use).
- Blue Lake on SR 17 at milepost 89 in Grant County.

WSDOT performs a building and site condition assessment biennially to identify functional component

deficiencies. We place a numerical rating based on guideline criteria on each functional component, and we give critical functional components a weighted multiplier in the overall evaluation. The combined total building and site ratings are used to define each facility's overall condition and helps with strategic planning and program prioritization.

Strategies

Approaches to Rest Area Preservation

Washington's safety rest area program began in 1967, with most of the construction completed by 1978. Many of these facilities are approaching 30 years of life. Some need to be updated for compliance with current sewer and water standards. Others need replacement because of high maintenance costs due to age and high usage.

We maintain rest areas between preservation treatments and reconstruction projects. As much as possible, our maintenance activities are conducted to maximize the lifespan of rest area facilities. As rest areas are added to the highway system through the facilities program, they will need to be maintained in order to keep them in good, working condition. This typically includes minor building repair, plumbing and electrical system maintenance, and janitorial and grounds-keeping activities.

Preservation of a Safety Rest Area consists of the following:

1. Utilities include replacing, refurbishing or rehabilitating sewer, water and electrical systems to meet regulatory requirements or reduce maintenance costs.
2. Building consists of replacing, refurbishing or rehabilitating building components (roof, doors, surfaces and fixtures) to meet regulatory requirements or to extend service life.
3. Site (parking, lighting, landscaping) includes replacing, rehabilitating or refurbishing site components and systems to meet regulatory requirements, meet demand, improve security and safety or minimize maintenance costs.

Prioritization Process for Selecting Projects

The life, health, and safety of the traveling public is WSDOT's highest priority. The safety rest area program has three primary deficiency groups. Emphasis is placed on utility (sewer, water, and electrical) needs first with building second and site work last.

In addition, maintenance and operational costs and the number of visitors are factors in the prioritization process.

Performance

For the 2003-05 (actual) and 2005-07 (planned) biennia, maintenance, operation, and preservation costs at safety rest areas average about $6.5M per year. With 21.3 million visitors to Washington State Safety Rest Areas in 2005, this works out to about $0.31 per visitor in 2005. By contrast, according to figures from the Federal Highway Administration, the cost to society per each fatal collision is $3.9 million, and $325,000 per each disabling injury collision.

WSDOT has maintained Interstate safety rest areas at a rating of "good condition" (LOS B) since 1999. The safety rest area is considered in good condition if all features (such as soap dispensers or RV dump stations) are in working order, landscaping is trimmed, with only a small amount of litter, weeds, or minor defects in sidewalks or parking areas present.

Safety rest areas close for varying reasons, some seasonal. Out of a total of 15,695 days (the number of rest areas multiplied by number of days, December 1, 2005 through November 30, 2006), rest area closures occurred on 546 days, or 3.5 percent of the time. Normal seasonal closures accounted for 468 days or 3 percent. The remaining 78 days (0.5 percent) of closures were due to various problems with water and sewer systems in the older facilities, and scheduled maintenance shutdowns of the Gee Creek and Toutle River rest areas.

20 Year Investment Plan

The 20-year target allocation for the Safety Rest Area Preservation Program is $50 million, of which $35 million is funded. Of this $50 million, half is needed in the first 10 years.

The investment plan is in three sections: Utilities, Building and Site. Utilities comprise 40 percent of the investment, Building is 50 percent and Site is the remaining 10 percent.

Several high priorities projects are: Interstate 5 – Maytown Sewer Rehabilitation at Maytown, Interstate 5 – Toutle River Water System Repair at Castle Rock, and added truck parking at Scatter Creek NB.

Major Drainage System Rehabilitation

A drainage control system is a complex system which may include:

- connected streams in the watershed
- wetlands
- culverts or other structures
- ditches
- manmade detention or retention basins
- pervious and impervious surfaces
- other means of controlling and mitigating stormwater runoff and impurities from roadway surfaces.

To improve safety, we design roadways to carry rainwater off the pavement where motorists travel. However, when stormwater flows off roads and through roadway drainage systems, it carries pollutants from motor vehicles, the atmosphere, and other sources into surface water bodies. Sediments and pollutants (nutrients, oil, grease, and metals) are carried into rivers and streams, affecting the quality of water. Controlling the amount of flow is also important as high flows can damage habitat, property, and transportation infrastructure. We manage stormwater flowing over and under transportation facilities through use of runoff treatment and flow control technologies and methods.

Stormwater management for WSDOT transportation facilities has two main objectives:

- protect the functions of the transportation facility
- protect ecosystem functions and the beneficial uses of receiving waters.

A drainage system as defined by this discussion is that portion of the overall system that lies within the roadway embankment.

Needs

Inventory of Drainage Systems at Risk of Failure

WSDOT is early in the process of developing a statewide inventory of drainage system conditions. With this information readily accessible, along with the tools described below, we will be able to more easily keep track of problem areas. Currently a short list of needed drainage rehabilitation work has been developed as shown in the table below.

Drainage Rehabilitation Needs

SR	MP	Description
2	188.30	0.75 Mi W of SR 17 S. Intersection
2	172.86	Moses Coulee Channel Lining
101	314.10	Stem Wall Failure
3	20.90	Rusted Culvert
3	25.20	Separation
16	20.10	Separation
16	24.85	Settlement

As we add drainage systems to the highway system through the construction program, we must also plan for their eventual replacement in order to keep the highway system in good working condition. Drainage system rehabilitation may also be addressed by other highway construction projects at that location.

Pipe Inspection by Rovver©

Envirosight Inc. Rovver© 900 pipe inspection crawler with lights and camera as purchased by WSDOT.

A photo of the first culvert to be inspected using the new crawler and camera.

Crew with motorized cable reel which is attached to the crawler and camera, supplying video feed to the monitor and recorder.

Drainage Projects

07-09 Construction Improvement and Preservation Program (CIPP)

SR	Project	Location
5	I-5 /MP 190.65 G – Line Drainage	Snohomish County
410	SR 410/Clay Creek – Outfall Washout Repair	E of Enumclaw
542	SR 542/ Bruce Creek – Culvert Replacement and Realignment	Glacier Vicinity
548	SR 548/ Terrell Creek – Major Drainage	E of Birch Bay
900	SR 900/ Storm Sewer Line – Replacement	King County
101	US 101/ NW of Salmon Ck Bridge – Drainage	North of Artic
20	SR 20/ Republic West City Limits – Slope Erosion	Republic

Strategies

Approaches to Preventing Drainage System Failure

WSDOT inspects drainage systems at least once a year. We may perform additional inspections during heavy storms and periods of high runoff in order to determine the effectiveness of the system. During an inspection, our staff examines the inlet and outlet condition, as well as the culvert interior as best they can with what equipment they have. Recently we purchased new camera equipment (see photo below) specifically for culvert inspection which will make the process more efficient.

Pavement failure above a culvert is an indicator of impending failure due to water getting around or through the culvert wall, washing soil out of the embankment and causing the settlement.

Flows from upstream may also overwhelm a structure, plugging it, and causing water to back up behind the roadway embankment. This can result in water running through or over the roadway, causing a washout. (This scenario is little controlled by WSDOT or others.) See the photo below.

Prioritization Process for Selecting Projects

In the past, WSDOT Region Maintenance would provide a list of drainage locations in need of rehabilitation or repair to Region Program Management who then proposed a project for programming. WSDOT Systems Analysis and Program Development would then work with HQ Hydraulics who reviewed the drainage needs in order to prioritize these projects.

WSDOT is currently in the process of collecting drainage location, kind and general condition in a Roadside Inventory database as mentioned above. In approximately one year, enough data should be collected to make the system functional. WSDOT Maintenance will be collecting data in the field and downloading into the database. WSDOT Systems Analysis and Program Development will continue to work with HQ Hydraulics to prioritize the locations in need. This should result in a more comprehensive list of needs that will reduce the incidence of sudden drainage failures.

Performance

The economic and societal impacts of drainage failure can be enormous. Road closures and detours are a direct result of pavement failure due to drainage failures, sometimes lasting several days to weeks. The Pyramid Creek failure, pictured above, lasted several days as it and multiple other locations along SR 20 were hit by slides and other culvert failures.

A single culvert failure can close a roadway for a day. Multiple failures such as happened on SR 20 in 2003

The culvert under the highway at Pyramid Creek (SR 20 – North Cascades Highway) plugged up in 2003. With nowhere else to go but through the road, the creek washed out a large chunk of highway leaving the guardrail suspended in the air.

could cause the roadway to be closed for several days but rarely if ever more than a week. Weeks or months long closures are attributed more to river washouts such as SR 123 within Mount Rainier National Park in 2006.

20 Year Investment Plan

$60 to 80 million is planned over 10 years (07-09 through 15-17) with $24 million to be spent in the next four years.

Table 2 below lists those Drainage projects as listed in the 07-09 Construction Improvement and Preservation Program (CIPP).

Overview of Highway Slopes and Embankments

WSDOT is responsible for 7,048 miles of roadway. To date, we have identified 2,630 slopes along these state highway miles that have the potential to adversely affect state highway travel. WSDOT's Unstable Slope Management System began in 1995 to collect information about and to mitigate unstable slopes that present potential hazards to the state highway system. The Unstable Slopes Preservation Sub-program (P3) funded by the Legislature provides funding for projects over a course of years to correct conditions and mitigate risks presented by such hazards.

Slope instability is determined from the problem type: rock fall, landslides, debris flow, settlement and slope erosion.

- Rock-fall is the fall of newly detached segments of bedrock of any size from a cliff or steep slope. The rock fall descends mostly through the air by free fall, bouncing or rolling. Movements are very rapid to extremely rapid, and may not be preceded by minor movements.
- Landslides are the vertical and horizontal displacement of a soil mass, under the influence of gravity, within a slope or embankment. Generally landslides can be divided into two categories based on failure geometry. Those landslide categories are circular and sliding block failures. The rate of movement of landslides can vary from very slow moving to very rapid and vary in size from small cut slope failures to large failures many miles in area.
- Debris flows are a rapidly moving fluid mass of rock fragments, soil, water, and organic material with more than half of the particles being larger than sand size. Generally debris flows occur on steep slopes or in gullies and can travel long distances. Debris flows may result from unusually high rainfall, or rain on top of snow events and are characterized by fluid mixtures of water, soils and vegetative matter including trees.
- Settlement is the vertical displacement of a soil mass not associated with a horizontal movement within a slope or embankment. Generally movement is slow. Soil piping occurs when erosion of the subsurface soil, associated with groundwater flow, causes failure of the soil. (Soil piping is a particular form of soil erosion that occurs below the soil surface. It is associated with levee and dam failure as well as sink hole formation.
- Slope erosion is the wearing away of a soil mass by the actions of running water. On slopes this process can result in the overland flow of water in an un-concentrated sheetwash, or the development of rills (e.g., small grooves or channels in soil slopes). Along streams or rivers the process can cause the near vertical undercutting of the adjacent stream or river bank.

A rockfall incident some years (1985) before WSDOT had an Unstable Slope Management program. This site is along SR 14 in the Columbia River Gorge.

WSDOT uses a database called the Unstable Slope Management System which helps manage all known unstable slopes. A numerical rating assigns a score from 33 (lowest) to 891 (highest). Slope rating is based on 12 variables as shown in the table.

Unstable Slope Numerical Rating System

Once geotechnical specialists complete the slope rating, we develop an approach to stabilizing the highest rated slopes. . We then prepare a cost estimate to mitigate the slope from which a benefit cost analysis can be performed. Unstable Slopes are prioritized statewide based on descending numerical rating by functional class highway categories, and benefit cost. The unstable slope must have a benefit cost ratio greater than one to be on the prioritized list.

What are the risks involved with a slope failure? As a comparison with other types of risk, between January 1, 1970 and September 30, 2005 there were 19 reported fatal motor vehicle collisions resulting in 21

Unstable Slope Numerical Rating System

Category	Points = 3	Points = 9	Points = 27	Points = 81
Problem Type: Soil	Cut or Fill Slope Erosion	Settlement or Piping	Slow Moving Landslides	Rapid Landslides or Debris Flow
Problem Type: Rock	Minor Rock fall Good Catchment	Moderate Rock fall Fair Catchment	Major Rock fall Limited Catchment	Major Rock fall No Catchment
Average Daily Traffic	< 5,000	5,000 to 20,000	20,000 to 40,000	> 40,000
Decision Sight Distance	Adequate Sight Distance	Moderate Sight Distance	Limited Sight Distance	Very Limited Sight distance
Impact of Failure on Roadway	< 50 Feet	50 to 200 Feet	200 to 500 Feet	> 500 Feet
Roadway Impedance	Shoulder Only	1/2 Roadway	3/4 Roadway	Full Roadway
Average Vehicle Risk	< 25% of the Time	25% to 50% of the Time	50% to 75% of the Time	> 75 % of the Time
Pavement Damage	Minor - Not Noticeable	Moderate - Driver Must	Severe - Driver Must Stop	Extreme - Not Traversable
Failure Frequency	No Failures in Last 5 Years	One Failure in Last 5 Years	One Failure Each Year	More Than One Failure
Annual Maintenance Costs	< $5,000 per year	$5,000 to $10,000 per year	$10,000 to $50,000 per year	> $50,000 per year
Economic Factor	No Detours Required	Short Detours < 3 Miles	Long Detours > 3 Miles	Sole Access No Detours
Accidents in Last 10 Years	0 to 1	2 to 3	4 to 5	> 5

deaths caused by falling or fallen rocks or trees. Of these, eight fatal collisions with a total of 10 fatalities were determined most likely to have involved falling or fallen rocks. To place this in context, 26,993 traffic fatalities occurred on all (state, local and other) roadways in Washington State during this same time frame. Of 13,722 traffic fatalities occurring on state highways, 21 people were killed in collisions with wildlife.

As a comparison, from January 1, 1970 to September 30, 2005, there were no reported fatal vehicle collisions involving snow slides. For the time period January 1, 1999 to September 30, 2005, there were two collisions, one Property Damage Only and one injury. Both occurred on US 2; one mile west of Stevens Pass (milepost 63.21), an injury, and seven miles west of Leavenworth (milepost 92.15), a Property Damage Only collision.

From this data it can be concluded that the overall risk of fatalities or injuries by a slope failure is small.

In addition to the targeted slope stabilization program, slopes are also addressed as part of other projects. For example if a highway is being widened to accommodate the traffic volumes, any unstable slopes within the project limits would be addressed as part of the widening project. A good example of this is the “I-90/Snoqualmie Pass East” project due to start in 2010.

Needs

Inventory of Unstable Slopes

Of the unstable slopes in the Unstable Slope Management System, 43 percent are rock-fall, 28 percent are slope erosion, 16 percent are landslides, nine percent are settlement and debris flow is four percent. The map below shows location of unstable slopes by type of deficiency.

Statewide map showing Unstable Slope locations by Deficiency Type

Strategies

Approaches to Slope Stabilization:

Mitigation measures vary for each type of failure:

- Rock fall - Scaling (removing rock), bolting or doweling, installing drainage, installing wire mesh fabric and constructing catchment ditches (enlarged ditch) or walls, or avoiding the area by realignment of the roadway.
- Landslide - Reducing driving forces by removing material from the upper portion of the unstable slide mass (slope flattening by regrading) and replacing with lightweight materials. Increase the resisting forces by construction in the toe area of shear keys, buttresses, berms or retaining walls with or without ground anchors. Improve surface and subsurface drainage by installing horizontal drains, or avoidance by realignment of the roadway.
- Debris Flow - Contain the flow using oversized drainage structures or avoidance by realignment of the roadway.
- Settlement - Excavate the fill material and replace with low density lightweight materials such as cellular concrete or polystyrene blocks or avoidance by realignment of the roadway.
- Slope erosion problems are not presently addressed within the unstable slope program but are included in the database. Bioengineering methods of mitigation (planting vegetation) are being implemented through research projects.

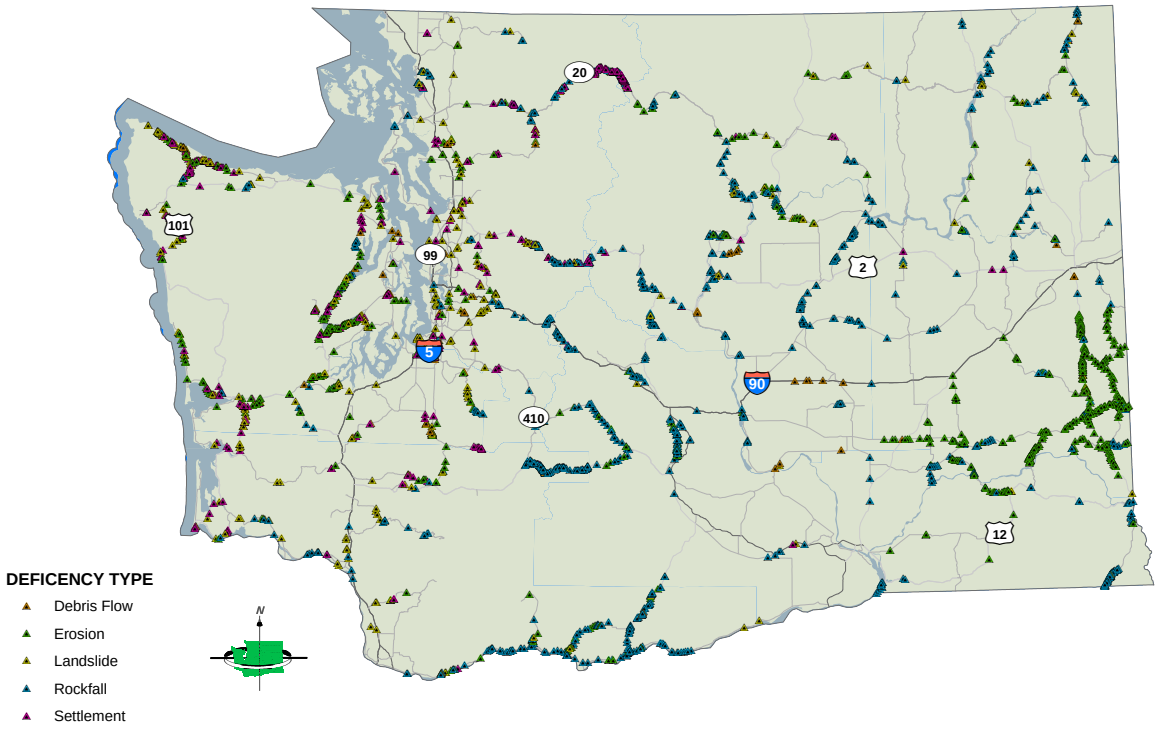
A large wedge failure involving up to 500 cubic yards occurred on September 11th, 2005 on Interstate 90 west of Snoqualmie Pass resulting in debris covering all three lanes and a single vehicle – triple fatality accident. In addition to the slope area from where the wedge failure initiated, similar wedge features in the adjacent slope areas were stabilized with slope scaling and rock anchors.

Prioritization Process for Selecting Projects:

One of our primary goals of priority programming is to maximize return on investment dollars. To ensure to the greatest extent possible that transportation dollars are being spent in those areas that have the highest return on investment, slopes are sorted and prioritized by rating. If there is a slope with a lower rating but is in the vicinity of a higher rated slope, it

Unstable Slope Locations

by deficiency type



may make sense to move the lower rated slope up in the list in order to fix it at the same time and save on construction costs.

Average Daily Traffic (ADT) is also used during this process to help refine the list. If the ADT is low, the risk is lower (fewer vehicles on the roadway, fewer vehicles within the limits of a slope and hence the chance of a slope failure while a vehicle is in the vicinity is smaller.)

WSDOT's senior geotechnical staff review a "first cut" slope to make sure the order of slopes makes sense and that no slopes were left out, and that any slope omissions are corrected.. If necessary, we conduct new field reviews to update slope ratings and refine the list of slopes.

With the slope rating complete, we can prepare a cost estimate to mitigate or fix the slope. The WSDOT Geotechnical Division develops the slope mitigation designs and the regions add on such things as traffic control, mobilization and other bid items. Using the slope rating and the estimate, a benefit/cost ratio can be calculated.

With this information we can assemble a list of slopes needing mitigation and their associated costs, and make decisions regarding programming.

Performance

The economic and societal impacts of slope failure are enormous. Since 1985 the state highway system has experienced 21 slope failures that resulted in roadway closures in excess of one week. The minimum closure was one week with the maximum closure of one year. Landslides typically cause the longest closures. The longest closure by a rock slide (two months) was the SR 20 – Newhalem occurrence in 2003.

The winter of 1998 and 1999 was an especially bad year. For over six months, western Washington experienced record-breaking rainfall. In February 1999, large scale landslides began to occur in much of the region. Six routes were closed that winter and spring for up to six months.

Performance is based on reduction in the risk of accidents and roadway closures due to slope instability.

20 Year Investment Plan:

The Unstable Slope Management Program has a historic expenditure level of $34 million per biennium over the last 10 years. Of this $34 million, $17.5 million has been for emergency relief work. Since emergency work is an unknown, $8 million per biennium is shown in the plan as a placeholder based on history. Based on risk, with an average expenditure over the last 10 years of $17 million, the investment plan is for $20 million per biennium to be expended for at-risk planned slope work for a total of $28 million per biennium.

A large wedge failure involving up to 500 cubic yards occurred on September 11th, 2005 on Interstate 90 west of Snoqualmie Pass resulting in debris covering all three lanes and a single vehicle – triple fatality accident. In addition to the slope area from where the wedge failure initiated, similar wedge features in the adjacent slope areas were stabilized with slope scaling and rock anchors.

Rock scaling (forcibly removing loose rock before it falls) is an inexpensive way to reduce risk. One and one-half million dollars per biennium has been reserved for the next three biennia to perform this work.

Since the majority of the slopes are in the mountains and the state receives substantial rainfall during the winter months, construction seasons for this type of work are short. Typically only a few slopes each year can be addressed due to weather and available funding.

A typical winter can include slope failure on slopes not currently scheduled for work. This results in dollars targeted for slopes high on the priority list getting reallocated to mitigate immediate slope failures. As such, every year the priority list needs to be updated.

Currently, we have 57 slopes prioritized for the 2007 construction season and beyond. Top priorities include Interstate 90 – Snoqualmie Pass, US 12 – White Pass, SR 101 – Hood Canal, US 2 – Stevens Pass, US 14 – Columbia River Gorge, US 2 – Pine Canyon Waterville and SR 97A – South of Entiat.

2007-09 CIPP Slope Projects

by project number

Project	SR	Beg SRMP	End SRMP	ProjectTitle	Location
100254C	002	36.78	36.85	US 2/Sunset Fall Slide - Slope Stabilization	Mt Baker NF Bny
102077E	020	114.90	126.80	SR 20/Emergency Repair - Slope Stabilization	Newhalem
120222S	202	24.77	25.08	SR 202/Tokul Creek Vicinity - Slope Stabilization	Snoqualmie Falls
200200V	002	63.00	64.10	US 2/Stevens Pass West - Unstable Slopes	W of Stevens Pass
200201N	002	91.20	94.40	US 2/W of Leavenworth - Unstable Slopes	W of Leavenworth
200201O	002	142.40	143.05	US 2/E of Orondo - Unstable Slopes	E of Orondo
202819A	028	11.01	12.10	SR 28/Rock Island Dam - Unstable Slopes	Rock Island Dam
209701Z	097	174.56	174.62	US 97/North of Blewett Pass - Unstable Slopes	North Side Blewett
209790C	97A	204.25	204.45	US 97A/N of Wenatchee - Unstable slope	N of Wenatchee
209790D	97A	203.00	203.20	US 97A/Rocky Reach Dam Vic - Unstable slope	Rocky Reach Dam Vic
209790E	97A	202.55	202.66	US 97A/0.5 Mile So of Rocky Reach Dam - Unstable Slope	Rocky Reach Dam Vic
310126B	101	326.78	326.84	US 101/Lilliwaup Vicinity - Stabilize Slope	Lilliwaup
310126C	101	326.78	341.00	US 101/Shelton Vicinity to Lilliwaup Vicinity - Stabilize Slopes	Lilliwaup
310186C	101	184.16	184.35	US 101/Bogachiel River Vicinity Slide - Stabilize Slope	Forks
400406C	004	45.92	45.95	SR 4/East of County Line Park - Rockfall Work	East of Cathlamet
401206A	012	165.32	165.37	US 12/Rimrock Tunnel Vicinity - Rockfall Prevention	East of Rimrock Dam
401206B	012	164.97	165.02	US 12/Rimrock Tunnel Vicinity - Stabilize Slope	East of Rimrock Dam
401206C	012	156.32	156.56	US 12/Clear Lake Vicinity - Rockfall Work	West of Rimrock Lake
401206D	012	145.61	145.70	US 12/7 Miles East of SR 123 - Rockfall Work	East of Packwood
401206E	012	164.55	164.86	US 12/Rimrock Lake Vicinity - Stabilize Slope	Rimrock Lake Vic
401207A	012	144.36	144.41	US 12/West Side White Pass - Stabilize Slope	East of Packwood
401207B	012	162.12	162.22	US 12/Rimrock Lake Vicinity Central - Stabilize Slope	Rimrock Lake Vic
401207C	012	161.93	162.05	US 12/Rimrock Lake Vicinity - Stabilize Slope	Rimrock Lake Vic
401207D	012	141.76	141.92	US 12/3 Miles East of SR 123 - Stabilize Slope	East of Packwood
401207F	012	142.99	143.12	US 12/4.4 Miles East of SR 123 - Stabilize Slope	East of Packwood
401207G	012	143.12	143.27	US 12/4.5 Miles East of SR 123 - Stabilize Slope	East of Packwood
401401C	014	53.80	54.10	SR 14/ 1.5 Miles East of Bergen Road - Rockfall Mitigation	East of Stevenson
401401E	014	63.55	63.60	SR 14/West of White Salmon - Rockfall Stabilization	West of White Salmon
401401J	014	59.07	59.14	SR 14/E of Little White Salmon River Bridge - Wire Mesh Slope Protection	East of Stevenson
450807R	508	7.25	7.45	SR 508/ 1 Mile West of Onalaska - Roadway Embankment Erosion Protection	West of Onalaska
501209N	012	176.68	176.78	US 12/Tieton River Vicinity - Unstable Slope	West of Naches
501212X	012	383.21	383.35	US 12/SR 261 Vicinity - Unstable Slope	East of Dayton

The following list represents the types of major electrical systems that WSDOT is responsible for maintaining and operating. In general, these items encompass the WSDOTs Illumination and Intelligent Transportation Systems (ITS). By definition, ITS refers to "electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system."[23 Code of Federal Regulations (CFR), Section 940.3] The "Major Drainage & Electrical" category is a subcomponent of "Other Facilities" of the Preservation Program, referred to as "P3". The Major Electrical System Items listed below are not entirely maintained and preserved by the P3 program. Facilities, structures, appurtenances or components that are necessary to keep those facilities or structures functioning are not part of "P3". The primary purpose of the Major Electrical System Rehabilitation program

is to keep the Systems functioning through complete system replacement or replacement of specific electronic components as necessary to maintain current operational levels.

Major Electrical System Items

- Traffic Signal Systems
- Ramp Metering Systems
- Illumination Systems
- Tunnel and Bridge Electrical Systems
- Dynamic Message Signs (DMS) Systems
- Highway Advisory Radio (HAR) Systems
- Closed Circuit Television (CCTV) Camera Systems
- Data Station Systems
- Permanent Traffic Recorder (PTR) Systems
- Animal Warning System
- Automatic Anti-Icing System
- Fiber Optic Communication Systems
- Communication Hubs
- Other Communication Systems, (Emergency Telephone, Ethernet, DSL, T1)
- Wireless Communication Systems
- Roadway Weather Information Systems (RWIS)
- Transit Signal Priority (TSP) Systems
- Commercial Vehicle Information Systems and Networks (CVISN) Program / Weight In Motion Systems
- Statewide Traveler Information Systems, (Web, 511, Traffic TV)
- Traffic Management Centers (TMC), (Electronic Equipment, Communication Media and Systems necessary to operate and obtain information from field devices)
- Tolling and Electronic Payment Systems
- ITS Systems for Freight Mobility (Ports / Border Crossings / On Board Trucks)
- Reversible Roadway System, (I5 & I90, Seattle Area)

WSDOT has applied ITS to transportation problems since the 1960s, when CCTV Cameras were installed during the construction of I-5. In the 1980s, freeway ramp meters were deployed to decrease urban freeway congestion, and in the 1990s, incident response teams, using and providing information to ITS systems began operating on I-5 in the Puget Sound area. Through experience and expertise gained over nearly 5 decades, WSDOT has become a national leader in implementing ITS solutions that ultimately save time, dollars, and lives.

The following section will briefly define each of the Major Electrical System Items. The purpose is to provide a high level scope of the existing system along with basic needs for preservation at current performance levels. The final sections will present the strategies performance monitoring efforts that are related to or affected by funding levels of the P3 program.

Traffic Signal Systems

WSDOT owns and is responsible for maintaining 965 traffic signals (including pedestrian signals, temporary signals and emergency signals) statewide. All signals use micro-processor based controllers with active vehicle and pedestrian detection. A portion of these signals are maintained and operated by others through agreement. In general, signals systems have a life expectancy of 25 years. Many components of a signal system must be replaced or upgraded more frequently during the overall life cycle due to changes in technology or as necessary to maintain system operational performance.

Ramp Meter Systems

Over 138 ramp meters monitor occupancy levels on freeway ramps and help smooth freeway traffic by regulating vehicle entrance rates. Metering rates are automatically adjusted by the system based on prevailing freeway traffic conditions. In general, ramp metering systems have a life expectancy of 25 years. Similar to a traffic signal, many components of a ramp meter system must be replaced or upgraded more frequently during the overall life cycle due to changes in technology or as necessary to maintain system operational performance.

Typical Ramp Meter – Seattle Area

Illumination Systems

WSDOT maintains approximately 2,933 illumination systems statewide. Most are in the vicinity of interchanges, intersections, chain-up areas, and transit flyer stops, with continuous illumination placed along some roadway sections as a result of congestion and safety issues. Some systems contain 1 or 2 lights while others may contain 100 or more lights on 40-50 ft light standards or 100 ft high mast poles. As part of the illumination system WSDOT maintains 199 sign-lighters statewide which provide increased visibility for overhead signs. In general, the life expectancy of an illumination system is 40 years. During this period, various preventative maintenance activities,

such as re-lamping luminaires and inspecting anchor bolts, are necessary to maintain performance and safety. These types of preventative maintenance activities are funded separately through the maintenance program.

The primary purpose of lighting a roadway at night is to increase the visibility of the roadway and its immediate environment, thereby permitting the driver to maneuver more efficiently and safely. The justification for highway lighting is in terms of cost savings due to accident reduction. Although estimates vary, the savings can be enough to pay for a lighting installation in a few years. Estimates by Box (1989) indicated that lighting can reduce the ratio of night-to-day accidents by as much as 14 percent of total accidents. In a more recent analysis by Griffith (1994), the safety benefit was found to be much higher, with an accident reduction of 32 percent (for property damage only accidents).

S. 317th HOV Direct Access & I-5

(Continuous High Mast & 50 ft Light Standard Illumination System)

Tunnels and Bridge Electrical Systems

Tunnel Systems

The systems in the tunnels can be either complex or simplistic depending on the system. Tunnel system may be as basic as only having roadway lighting systems. They also may be very complex and have some or all of the following systems:

- Fire Control, Alarm and Suppression
- Ventilation
- Air Quality (CO Sensors or other)
- Traffic Control (signals, electronic signs, etc.)
- Traffic Surveillance (CCTV)
- Traffic Detection (induction loops, video detection, radar, etc.)
- Lighting (roadway - day levels, night, emergency. faculty - day, night, egress)
- Power Distribution
- Emergency or Standby Power (generators, battery, redundant electrical services)
- Radio Re-broadcast. .
- Communication (phone, emergency phone, public address)
- Security

WSDOT currently operates and maintains many tunnel systems. Three of the most complex systems are on I-90 in Seattle and Mercer Island; and on I-5 under the convention center in downtown Seattle. In general, tunnels systems have a life expectancy of 20 years.

Bridge Systems

All mechanical and electrical preservation work on bridges that are directly related to opening and closing the spans are funded under the P2 subprogram. All other electrical items on bridges, such as roadway illumination, navigation lights, interior lighting, water sensors, intercom systems, fire systems...etc. are funded under the P3 subprogram.

Bridge Systems that fall under the P3 subprogram consist of the electronics, communication media, and equipment necessary to monitor and perform traffic operations functions; ventilation; fire protection, surveillance and security; navigation lighting; and roadway lighting.. WSDOT Northwest Region currently operates and maintains the following bridges:

Movable and Floating Span Bridges:

- I-90
- 90/25 N & S Homer Hadley & Lacey Murrow
- SR 99
- 99/530 E & W 1st Ave. So.
- SR 513
- 513/12 Montlake
- SR 520
- 520/8 Evergreen Point
- SR 529
- 529/10E & W Snohomish River
- 529/20 E & W Steamboat Slough
- 529/25 Ebey Slough
- SR 536
- 536/15 Skagit River (it's been mothballed since 1979)

Bridges with Navigation Lights

- SR 2
- 2/3S Snohomish River
- 2/5N Snohomish River
- I-5
- 5/570 Ship Canal
- 5/645 E & W Snohomish River
- 5/648 E & W Steamboat Slough

WSDOT also operates and maintains the Hood Canal movable bridge and 10 other bridges with navigation

lighting and bridge obstruction systems statewide.. In general, bridge systems have a life expectancy of 20 years.

SR 520 Floating Bridge in Seattle

(Midspan Opening)

Dynamic Message Signs (DMS)

Statewide, 185 dynamic message signs (DMS) are used on roadways to provide motorists with important information about traffic congestion, incidents, work zones, travel times, special events, or speed limits on a specific highway segment. They may also recommend alternative routes, limit travel speed, warn of duration and location of problem, or simply provide alerts or warnings. In general, the life expectancy of a DMS system is 20 years. Periodic DMS system upgrades are necessary. Upgrades include control software and electronic components upgrades as technology advances with more advanced communication protocol such as

National Transportation Communication for ITS Protocol (NTCIP).

Dynamic Message Sign (DMS)

(Displaying Travel Times)

Highway Advisory Radio (HAR) Systems

TMCs also operate highway advisory radio (HAR) systems at 64 locations statewide. HAR systems are licensed low-power AM radio stations installed along the roadway to provide alerts and general information regarding traffic and travel conditions. The presence of a HAR transmitter is marked by a roadway sign instructing the motorist to "Tune to 1610 AM". The 1610 frequency is one of several used by HAR radios and identified on the signs. In general, the life expectancy of a HAR system is 20 years.

Closed Circuit Television (CCTV) Camera Systems

TMCs depend on field devices such as the 502 closed-circuit TV cameras used to detect and respond to incidents and congestion as well as monitoring roadway conditions. The camera images are sent to the TMCs for operations monitoring, to the web for travelers and to the media for news broadcasts. In general, the life expectancy of a CCTV Camera system is 20 years.

Closed Circuit Television (CCTV) Camera

Data Station Systems

TMCs also depend on field devices such as the 479 traffic data stations which include Video, Radar and Loop detectors. Data stations provide critical volume, speed, and occupancy data which are used for planning, design, operations, construction, and maintenance activities. This information is also used for measuring performance and providing information to the traveling public, such as travel times. The information obtained through these data stations provides critical information for WSDOT initiatives and is used in benefit/cost analyses. In general, the life expectancy of a data station is 15 years. Depending upon the roadway condition at the data station location, periodic replacement of in-pavement loops may be necessary to maintain current performance.

Permanent Traffic Recorder (PTR) Systems

The WSDOT Transportation Data Office (TDO) has 162 permanent traffic reporting systems. These sites collect either (or a combination of) volume, classification, speed or weight traffic data depending on the type of sensors and traffic recorders installed at the site. PTR sites, which are managed by the TDO, work together with data stations to complete the picture for WSDOT managed roadways.

Due to Federal reporting requirements for PTR system collected data, the data quality standards for these systems are much higher than for data station systems. As a result, the life expectancy for a PTR system is estimated at ten years.

PTR Site on SR 16 near Burley

Animal Warning Systems (AWS)

WSDOT maintains six animal warning systems (AWS) installed or planned statewide. These systems are designed to inform drivers of animals entering or in the roadway along select rural roadway section. In general, the life expectancy of an AWS system is 10 years.

(Roadside Animal Warning System)

Automatic Anti-Icing System (AAIS)

WSDOT maintains eight Automated Anti-Icing Systems (AAIS) statewide with a life expectancy of ten years. The primary purpose of winter highway maintenance is to provide vehicular traffic with a roadway surface that can be safely traveled. Roadway geometrics and an icy surface may create specific locations that are particularly susceptible to snow and ice related accidents. Revisions to roadway geometrics are very expensive, so problem areas typically become the responsibility of highway maintenance to mitigate the hazard by winter maintenance operations. AAIS greatly improves WSDOTs ability to address icy roadway conditions at problems areas. A 2001 WSDOT study of an AAIS system on I-90 in North Central Region indicated the following: "The analysis indicates that the proposed automatic anti-icing system is a viable and cost

effective method of reducing the snow and ice related accidents in the Interstate 90 High Accident Location (HAC) under evaluation. Benefit cost ratio is greater than two (2.36) and the net benefit is over one million dollars ($1,179,274)."

Fiber Optic Communication Systems

The primary backbone of the WSDOT ITS communication network is fiber optics. WSDOT currently owns and maintains more than 220 miles of fiber optic cable. Fiber optic cable allows traffic information to be shared in a timely manner. Where these cables are not used, information travels over telephone lines at slower rates and higher costs. Fiber optics allow real-time streaming video of traffic cameras, images that help traffic managers make real-time decisions, rather than a delayed view which occurs when the information travels through telephone lines. Fiber Optic Cable has proven to be very reliable with an average life expectancy of 20 years. Periodic replacement of electronic equipment used to transmit and receive data along the fiber line, along with repair at splice points and patch panels, are necessary to maintain peak system performance.

Advantages of Fiber Optics

Why are fiber-optic systems revolutionizing video communications? Compared to conventional metal wire (copper wire), optical fibers are:

- Less Expensive - Several miles of optical cable can be made cheaper than equivalent lengths of copper wire.
- Thinner - Optical fibers can be drawn to smaller diameters than copper wire.
- Higher Carrying Capacity - Because optical fibers are thinner than copper wires, more fibers can be bundled into a given diameter cable than copper wires.
- Less Signal Degradation - Optical fiber signal loss is less than in copper wire.
- Light Signals - Unlike electrical signals in copper wires, light signals from one fiber do not interfere with those of other fibers in the same cable.
- Low Power - Because signals in optical fibers degrade less, lower-power transmitters can be used instead of the high-voltage electrical transmitters needed for copper wires.
- Digital Signals - Optical fibers are ideally suited for carrying digital information, which is especially useful in computer networks.
- Non-Flammable - Because no electricity is passed through optical fibers, there is no fire hazard.
- Lightweight - An optical cable weighs less than a comparable copper wire cable. Fiber-optic cables take up less space in the ground.

Installation of HDPE conduit for Fiber Optic Cable

Communication Hubs

Statewide there are approximately 30 communication Hubs that support the ITS communication systems. Communication Hubs are basically an above or below ground structure where ITS communications systems from multiple systems interconnect as information from field devices is brought back to the TMC and vice versa. These hubs house large amounts of electronic equipment and allow for fiber optic cable and other communication media to be spliced. Temperature and humidity control are critical for extend-

ing system life expectancy which is estimated at 20 years, although this kind of field environment is prone to periodic replacement of some electronic equipment due to failure.

Other Communication Systems

(Emergency Telephone, Ethernet, DSL, T1)

The WSDOT manages a large communication network primarily made of copper cable. Many of the ITS systems that are operated on the highways today communicate to TMCs through copper connections. The copper connections assist in the operation of Traffic Signals, HARS, DMS, Data Stations, Ramp Meters, Illumination, CCTV Cameras and other electrical devices. The installation cost for copper systems is less expensive than the fiber optic alternative; however, the operating costs is far more expensive over time. In general, the life expectancy of WSDOT's 250 miles of copper communication is 20 years with periodic equipment replacement.

Wireless Communication Systems

Microwave Tower and Communications Building Equipment Inside Skyline Lake

at Skyline Lake, 1.5 miles above Stevens Pass Communications Building

WSDOT provides wireless communications in support of the department's Intelligent Transportation Systems (ITS) and Traffic Management Centers (TMC). The Wireless communication system has two primary missions; to provide 24 hour emergency communications to the departments personnel via the TMC's, and to provide the traveling public with real time information on the conditions of the state's highway system via the ITS program.

There are over 125 communication sites included in the system statewide. The facilities used are a variety of owned, shared with sister agencies, and leased from private companies. These facilities have a life expectancy of 50 years. Within the facilities is a combination of support equipment that has a life expectancy of 15 years.

Roadway/Weather Information Systems (RWIS)

WSDOT maintains and operates 94 Road/Weather Information Systems (RWIS). These systems are installed along the roadway with instruments and equipment that provide weather and road surface condition observations. This information is used to facilitate decisions on maintenance strategies and to provide information to drivers.

A typical RWIS system may measure air and road surface temperature, barometric pressure, humidity, wind speed and direction, precipitation, visibility, and road surface condition (dry, wet, freezing). In general, the life expectancy of an RWIS system is 25 years although periodic replacement of select electronic components is necessary to maintain current performance.

(RWIS installation)

ARROWS (Automated Realtime ROad Weather System) takes current weather data received from RWIS systems and generates forecasts for roadway temperatures which allows WSDOT to anticipate de-icing needs. This system is also managed and maintained by two meteorologists at the University of Washington.

Transit Signal Priority (TSP) Systems

Transit Signal Priority (TSP) is a traffic signal control strategy to provide incremental benefits to public transit for the purpose of improving transit speed and reliability. Traffic signal timing is slightly modified to provide a benefit to the transit vehicle. Transit vehicle arrival times are estimated from on-street detection or from a Global Positioning System (GPS) based Automatic Vehicle Location (AVL) system.

WSDOT current operates and maintains ten TSP systems in the greater Seattle Area. In general, the life expectancy of a TSP system is ten years with periodic electronic component replacement.

Transit Signal Priority System

(Integration with City of Lynnwood Advanced Traffic Management System (ATMS))

CVISN Program / Weigh-In-Motion (WIM) Systems

As of July 1, 2006, the Commercial Vehicle Information Systems and Networks (CVISN) program is now providing electronic screening at ten weigh stations statewide to 4,539 trucking companies with 40,998 trucks equipped with transponders. These ten sites include weigh-in-motion (WIM) scales. In addition, there are three WIM sites that are under develop-

ment. In general, the life expectancy of a WIM system is ten years with periodic replacement of select electronic components.

CVISN / Weight in Motion (WIM)
Typical WIM Installation

(Deployment Site Map)
(Enlargement of Transponder in Truck)

Statewide Traveler Information Systems (Web, 511, Traffic TV)

The Washington State Department of Transportation (WSDOT) continues to provide valuable on-line traveler information to the public in creative and effective ways.

- Web - The current web site has information available on the following:

o CCTV Camera Images – Camera Images are updated every minute providing travelers with a visual or roadway conditions at most critical locations around the state.

o Travel Alerts & Slowdowns - which combines incidents, construction, events, and anything else that might impede or slow travel on the roads.

o Consolidated mountain pass information - with each major pass, such as Snoqualmie and Stevens passes, occupying its own page. These pages allow visitors to view camera images spanning the length of the pass, traction advisories, highway radio messages, and current and forecasted weather information.

- o Dedicated weather pages - WSDOTs weather page has led the country in using intelligent transportation systems data to provide travelers with real-time road and weather information.
- o Construction – provides travelers with information about ongoing construction activities around the state that may impact their travel plans.

- 511 - What is 511? Real time traffic and weather information is available by simply dialing 5-1-1 from most phones. The system builds upon the highly successful Washington State Highway hotline previously accessed through 1-800 toll free numbers. Updated every few minutes, 511 allows callers to get a variety of information:

- Puget Sound Traffic Conditions
- Statewide Construction Impacts
- Incident Information
- Mountain Pass Conditions
- Ferry System Information
- 800 numbers for passenger rail and airlines
- Weather

State-of-the-art speech recognition technology allows callers to verbally tell the system what they want, such as “traffic” or “mountain pass” information. The requested information is then “spoken” back to the user. Callers can use key words to quickly navigate the system to the specific road segment for the information sought.

What does 511 offer?

- Ease of use and convenience
- Real-time, accurate, quality road and traffic conditions
- Avoiding traffic congestion and road construction
- Information to help users make informed travel choices

Technology permits fully automated conversions of traffic congestion and incident data into everyday speech. Road sensors identify traffic volumes that are converted into levels of congestion for each highway section. Incidents are identified by video camera observations or information from the Washington State Patrol.

The traffic volume data are then converted into speech, and using voice recognition, traffic reports on a specific road segment are played back. In Washington State within the greater Seattle area, prerecorded speech is being used to provide real-time traffic congestion reports within a few minutes of their detection. Text to speech technology is being used to provide statewide incidents and construction reports. In these most sophisticated systems, a caller connects to 511 and can speak their request at any time, interrupting the prompts to receive specific information by route and direction.

- Traffic TV – Traffic camera images and the vehicle speed flow map for the Seattle area are available on select local cable channels.

Statewide Traveler Information Web Page

(www.wsdot.wa.gov/traffic/)

It goes beyond saying that the web site has been extremely popular with the traveling public, with the site receiving record visits during extreme weather. In general, the electronic equipment and software necessary to operate the statewide traveler information system has a life expectancy of ten years with more frequent replacement of select components to maintain peak performance.

Traffic Management Centers (TMC)

(Electronic Equipment, Communication Media and Systems necessary to operate and obtain information from field devices)

WSDOT operates seven regional TMCs; Seattle (Shoreline), Tacoma, Spokane, Vancouver, Yakima, Bellingham, Hyak (Snoqualmie Pass - winter season only) and Wenatchee. In addition, an Emergency Operations Center (EOC) is located in Olympia. This TMC provides a central location for WSDOT executives to help manage traffic operations, incident response, and maintenance during "emergency" events.

TMCs are the nerve centers for WSDOT's operations activities. Real-time information is gathered 24 hours a day, 7 days a week from many sources including traffic detectors, CCTV cameras, ramp meters, the Washington State Patrol (WSP), road crews, WSDOT's incident response teams, and media traffic reporters. WSDOT uses this information to coordinate responses to clear accidents, deal with other problems that occur, and notify the public and the media of these events.

Although the TMC facility itself is outside the scope of the P3 program, the extensive electronic equipment, media and software that is required to communicate with and operated the field ITS equipment is a critical component of the Major Electrical System portion of the preservation program. The life expectancy of these items is estimated at ten years in order to maintain current performance and maintain pace with technological advancements.

TMC Seattle at Regional Headquarters

Tolling and Electronic Payment Systems

In the near future WSDOT will begin maintenance and operations of two significant tolling and electronic payments systems for the new Tacoma Narrows Bridge and the SR 167 High Occupancy Toll (HOT) lanes pilot. In general, the life expectancy of the electronics, software and communication media portion of the Tolling and Electronic Payment System is estimated at ten years with periodic replacement of select components.

Good To Go! – Is the new, convenient, easy-to-use electronic toll collection program that gives motorists the power to pay tolls on the new Tacoma Narrows Bridge span and SR 167 HOT lanes without stopping.

Sample Windshield Pass

(Electronic Tolling Systems)

Tacoma Narrows Bridge Tolling Plaza
SR 167 HOT Lanes

(Good To Go – Pass Holders Bypass Plaza)

ITS Systems for Freight Mobility

(Ports / Border Crossings / On Board Trucks)

WSDOT has deployed a number of ITS Systems designed specifically to improve and monitor freight mobility. ITS transponder reading equipment located at the Ports of Tacoma and Seattle and at the Canadian border has been installed to monitor the movement of container and trucks. These systems use e-seals on container doors that are designed to reduce the number of customs inspection and paperwork for trucks crossing the border with British Columbia. The transponder readers from this system, along with data-only and weigh station CVISN readers along I-5, I-90 and I-82, can also be used to provide near real-time travel time estimates for trucks. This transponder based tracking information, along with GPS tracking devices in volunteer, probe trucks can provide significant information about freight mobility in Washington State. WSDOT, working with several Canadian transportation agencies has developed an Internet-based system that archives data from these devices. In general, these types of ITS Systems have

a life expectancy of ten years, with periodic replacement and updating of some electronic equipment.

Canadian Border Crossing E-Seal

(Transponder Readers)

Reversible Roadway System

(I-5 & I-90, Seattle Area)

WSDOT maintains two reversible roadway systems; one from downtown Seattle North along I-5; one from downtown Seattle East along I-90. The reversible roadway system consists of 129 gates, 17 gate control systems, and a large number of mechanical overhead drum signs that help regulate the flow and direction of traffic at different times each day. In general, the life expectancy of these systems is 25 years with periodic electronic equipment replacement.

Reversible Roadway - Center Lanes

(I-90 Floating Bridge - Seattle Area)

Needs

Continuous use of these major electrical systems; aging equipment; difficulties in acquiring older parts due to evolving technology; reduced safety of degrading insulation and corrosion due to environmental factors has presented WSDOT with the dilemma of how to plan for ongoing rehabilitation and the ultimate replacement of these systems as they approach their life expectancy. The traveling public and nearly every component of WSDOT planning, design, construction, operations and maintenance has become accustomed to and relies heavily upon the information and services these systems provide. As shown in Table 1, WSDOTs major electrical system inventory has an approximate replacement cost of $610 Million dollars. Planned rehabilitation and replacement of these systems helps maintain current performance. The current rehabilitation and replacement cost of these systems is estimated at $61 Million dollars per biennium in order to maintain current performance. This estimate does not take into account the front load costs for systems that are currently past their life expectancy. As presented in the strategies subsection, preventative maintenance actives are funded through the maintenance program NOT the preservation program. The current maintenance program is under funded to the point where multiple systems have failed and are currently offline. The overall picture of WSDOTs Major Electrical Systems will only continue to deteriorate, especially as additional systems are implemented, unless significant funding is allocated to this portion of the preservation program.

Over the past 12 years, Major Electrical System Rehabilitation funding through the preservation program has been well below the estimate of $61 Million dollars per biennium as outlined previously. Further system expansion, which is necessary to increase capacity or maintain efficiency of the existing infrastructure, will continue to amplify these issues.

Historical Major Electrical Systems Funding (Sub Component of P3)

- 1995 – 1997 $2 M
- 1997 – 1999 $6 M
- 1999 – 2001 $9 M
- 2001 – 2003 $28 M
- 2003 – 2005 $16 M
- 2005 – 2007 $7 M
- 2007 – 2009 $17 M (estimate)

Table 1

Major Electrical System Inventory / Funding Needs

Strategies

Preventative Maintenance

Preventative Maintenance (PM) activities are necessary for all Major Electrical Systems. However, PM is funded through the maintenance program, NOT the preservation program, P3. All electrical systems require periodic review in addition to non-scheduled maintenance caused by unpredictable events such as storms, accidents, and equipment failure. The intent of the preventative maintenance program is to diminish the possibility of an abrupt system failure and to allow for emergency or quick replacement of those systems in order to maintain an acceptable level of service to the public. In order to meet this objective it is sometimes necessary to replace select electronic components.

Identifying the Need

WSDOT is continuing to develop and refine the process for developing and documenting the statewide inventory of electrical system infrastructure. Having this information in one central database will greatly improve the efficiency of identifying and address-

ing problem areas along with defining future funding needs and priorities. By continuing to pursue a central inventory and maintenance activity tracking system, it will become more feasible to predict failures and prioritize preventative maintenance activities.

Prioritizing the Need

The number one priority of the P3 Major Electrical Systems program is to complete the development of our asset management system. In order to accomplish this objective, dedicated funding is required for a group of people with the primary responsibility of administering, maintaining, and operating the system.

At the request of Systems Analysis and Program Development WSDOT maintenance will compile a list of needs around the state. WSDOT Headquarters Traffic then reviews the list in the field with region maintenance staff and prioritizes a draft list. Systems Analysis and Program Development also requests that the regions provide estimates in order to develop a list of needs given available dollars.

Some portions of existing electrical systems may be replaced as part of other projects at that location, but the majority of the systems will be replaced through the Major Electrical Systems Preservation subprogram.

In general, Major Electrical Systems, P3 projects will be prioritized and programmed based on impact to the traveling public and WSDOT initiatives.

Performance

The underlying theme between all Major Electrical System Items is providing information to the traveling public, media and WSDOT planning, design, construction, operations and maintenance programs to support decisions made on the operational condition of the roadway infrastructure. Information provided by major electrical systems is critical for providing data that feeds a number of Gray Notebook performance measures as listed below. In addition, the performance of all the disciplines listed above and the ability for the traveling public to make an informed decision as they plan their trip or commute would be decreased as systems that are maintained through major electrical system P3 funding fail.

To date, measuring performance of the major electrical systems portion of the P3 program is currently accomplished through a variety of Gray Notebook performance measures. Other performance measures, such as Signal Operations, are under development. These performance measures provide insight into the impact major electrical systems have on the traveling public and WSDOT safety and congestion reduction initiatives.

Gray Notebook Performance Measures

The following is a list of Gray Notebook Performance Measures that rely on major electrical systems for data that supports how well the measures are working. The ability to make accurate assessments decreases as electrical system fail.

- Measuring Congestion – Travel Time Analysis
- Measuring Congestion – Lost Throughput Analysis
- Measuring Congestion – Percent of Days When Speeds Were Less than 35 MPH
- Measuring Congestion – Measuring Travel Delay
- Measuring Congestion – HOV Lane Performance
- Measuring Congestion – Case Studies - Before and After Results
- Measuring Congestion – Understanding the Relationship Between Safety and Congestion
- Measuring Congestion – Traffic Data Collection for Arterial Highways

- Incident Response – Number of Responses and Average Clearance Time
- Incident Response – Response Increases to Fatality Collisions
- Travel Information – 5-1-1 (Total Calls to Travel Information)
- Travel Information – Website Usage

Maintenance Accountability Process (MAP) Performance Measures

The Maintenance Accountability Process (MAP) is a tool which measures and communicates the outcomes of the maintenance activities. It provides the tools to link strategic planning, the budget and maintenance service delivery. Twice a year, field inspections are made of randomly selected sections of highway. The results of WSDOT's work are measured, recorded and compared to the MAP criteria to determine the level of service (LOS) delivered. The MAP performance measures relating directly to the Major Electrical Systems that are rehabilitated or replaced by the preservation program are listed below.

- Traffic Signal Systems
- Highway Lighting Systems
- Intelligent Transportation Systems (ITS)

Other Performance Measures

- Signal Operations – Time Between Operational Reviews by Signal Type with Specific Review Criteria

Weigh Station Replacement and Rehabilitation

Weigh Stations promote safe travel of commercial vehicles on state highways. This is accomplished by conducting driver and vehicle inspections and enforcing size, weight and load laws.

These inspections help reduce the number and severity of commercial motor vehicle collisions and hazardous material incidents on interstate and state highways. This task is accomplished through comprehensive inspections of commercial motor vehicles and their drivers. Commercial Vehicle Safety Alliance (CVSA) certified inspectors conduct levels 1-5 CVSA North American Standard inspections. These inspections examine the commercial driver's license, medical certificate, logbook, and vehicle equipment. (per RCW 46.32)

WSDOT compliments the Washington State Patrols (WSP) effort to prevent over-height and over-weight trucks from damaging the state's pavements and bridges by rehabilitating deteriorated weigh station facilities and constructing new locations as the needs are identified. Currently, WSDOT's preservation program builds the off and on-ramps, signage and illumination systems, while WSP's budget provides the buildings and utilities.

The current Joint Operating Policy Statement (JOPS) between WSDOT and WSP states that WSDOT will work with WSP and provide "turn key" weighing facilities to WSP. WSDOT will seek the funding and build the mutually agreed scales which are then turned over to WSP to maintain per the Memorandum Of Understanding between WSP and WSDOT. WSP will care for the building, static scales, weigh-in-motion equipment, and pay the utilities for the building. WSDOT maintains signs, pavement, striping, outside lighting and pays to power the outside lighting.

A Department of Highways weigh station circa 1940 on what was most likely SR 101. The truck (a '35 or '36 Ford) was owned by Walter Plumb Company, Copalis Beach.

Needs

Inventory of Weighing Facilities

Statewide map showing locations of permanent, portable and plug-n-run sites.

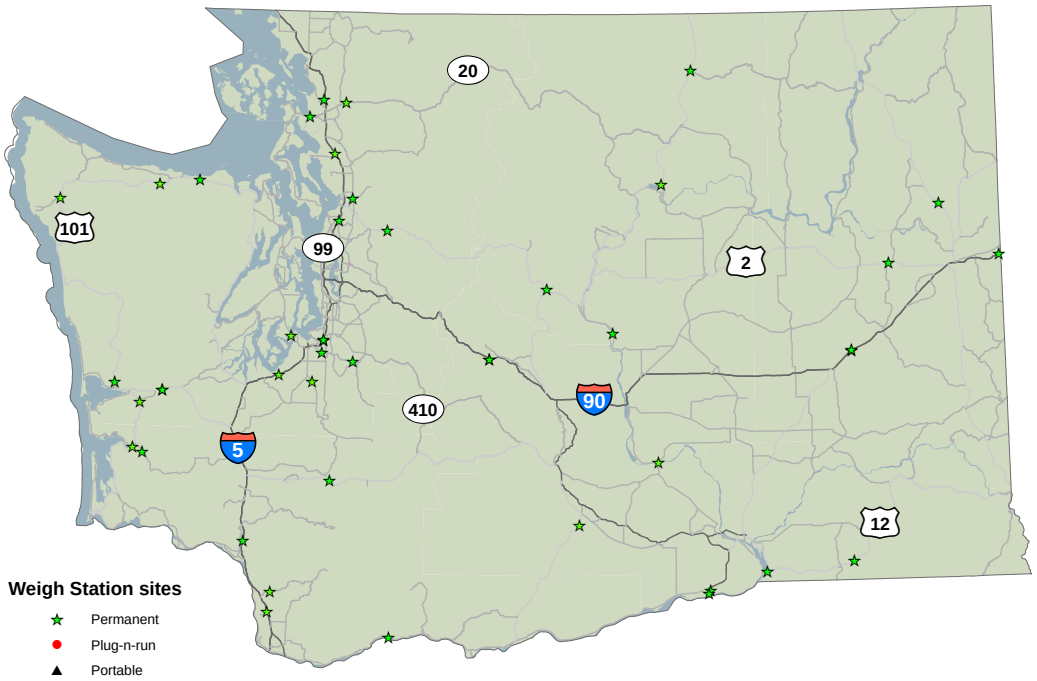
Washington State currently has 46 permanent-scale weigh stations. Sixteen are located on interstate highways. Permanent fixed scales are equipped to detect axle, tandem, and gross weight violations. The Ports of Entry (POE) at Ridgefield, Bow Hill, Plymouth, and Spokane operate 24 hours per day, seven days per week, as does the scale site at Cle Elum, which also serves as an interior POE for traffic east and west bound on interstate 90.

Weigh Station on Interstate 90 Tokio Road (milepost 231)

A typical shoulder weigh site (similar to a portable site although it's not separated from traffic)

Plug-and-Run sites exist where enforcement officers operate full-sized vans equipped with a desk and work area. The officer drives onto the scale site, removes the scale head from the pedestal, activates an electronic sign, and begins the weighing process. These sites enable officers increased mobility from site to site. Currently, Plug-and-Run sites are operational on SR 99 in Federal Way, SR 12 in Naches, SR 395 in Spring Valley, SR 395 in North Pasco and SR 2 at Chattaroy, north of Spokane.

Locations of Permanent, Portable and Plug-n-Run Sites



Strategies

Approaches to Preserving Weighing Facilities

It is the responsibility of WSDOT and WSP to jointly develop plans for improving and preserving commercial vehicle enforcement capabilities throughout the state of Washington. This responsibility entails determining and implementing improvements, as needed, in weigh station facilities. In collaboration with the WSP, criteria have been developed to assist decision-makers in determining where funding should be allocated to achieve the goal of effective commercial vehicle enforcement for the least amount of funds possible.

Prioritization Process for Selecting Projects

Project ranking is by category (interstate fixed, non-interstate fixed, portable) relative to each other in accordance with siting criteria. The various siting criteria as listed below in table 1 is weighted depending on category. (for example, utilities are important for fixed sites but not necessary for a portable site.)

Table 2 - An example of ranking including weighting

A list of projects is developed in coordination between WSDOT and WSP, working within available funding.

Weigh Stations

Weigh Station on Interstate 90 Tokio Road (milepost 231)

A typical shoulder weigh site (similar to a portable site although it's not separated from traffic.)

Performance

With the installation of weigh-in-motion at additional sites, down time of trucks is reduced. It is estimated the operating cost of a commercial vehicle is $1.25 per minute and that an average stop at a weigh station is 5 minutes. The savings to the industry is approximately 70,000 hours of travel time and five million dollars per year!

The major objective of the Motor Carrier Safety Assistance Program (MCSAP) is to reduce the number and severity of commercial motor vehicle collisions and hazardous material incidents on interstate and state highways. This task is accomplished through comprehensive inspections of commercial motor vehicles and their drivers. The weigh station sites allow WSP to carry out this objective.

Weigh Station Siting Criteria

- Average Daily Truck Traffic
- Forecast Average Daily Truck Traffic
- Weigh Station Site Bypass Potential
- Vehicle Inspection Violation History
- Weigh Station Site Traffic Conflicts
- Accident History
- Hazardous Materials Transported
- Potential Environmental Impacts
- Right-of-Way Availability
- Availability of Electricity
- Telephone Availability
- Fiber Optic Cable Availability
- Redundant Weigh Station Facilities
- Pavement Conditions
- Roadway Operating Speeds
- Topography
- Sight Distance
- Land Use Compatability
- Climate
- Availability of Water/Sewage Utilities
- Proximity to WSP Offices
- Seasonal Movements
- Origin and Destination Characteristics
- Highway Improvement Opportunities

20 Year Investment Plan

The twenty year investment plan consists of three projects as shown in Table 1 below. The Project Reserve in the out biennia totals $35,800,000 over the next 14 plus years.

Top priorities are: Interstate 90 – Cle Elum Eastbound and Interstate 90 – Spokane Port of Entry (with a construction start in 2009).

Site Alternatives

Siting Criteria	I-90 Vic Tokio Interchange	I-90 Vic Port-of-Entry
Average Daily Truck Traffic	6	6
Forecast Average Daily Truck Traffic	6	6
Site Bypass Potential	6	3
Inspection Violation History	6	6
Traffic Conflicts	6	3
Accident History	3	6
Hazardous Materials	3	6
Environmental Impacts	6	3
Right-of-Way Availability	3	6
Telephone Service Availability	3	6
Electrical Service Availability	6	6
Fiber-Optic Service Availability	3	6
Redundant Facilities	3	6
Pavement Condition	4	4
Operating Speeds	4	4
Topography	4	2
Sight Distance	4	4
Land Use Compatability	4	2
Climate	2	4
Availability of Water/Sewage Utilities	2	4
Proximity to WSP Offices	2	4
Seasonal Movements	2	2
Origin and Destination Data	2	1
Highway Improvement Coordination	1	1
Total Score	91	101

Investment Plan

Project Title	07-09	09-11	11-13	13-15	15-17	Future
Other Facilities Project Reserve - Weigh Stations	0	0	5,300,000	5,500,000	5,800,000	19,200,000
I-90/Cle Elum Weigh Station EB - Install Weigh in Motion	200,000	0	0	0	0	0
I-90/Spokane Port of Entry - Weigh Station Relocation	0		0	0	0	0
Total	200,000		5,300,000	5,500,000	5,800,000	19,200,000

II. Improvement

Highway Safety

Highway Safety investments are intended to reduce and prevent serious traffic injuries, the frequency and severity of disabling injuries, and the societal costs of accidents. Consequently, safety projects on Washington State highways have two primary focuses:

- The Accident Reduction approach has two elements; A spot locations approach, and corridor sections approach. Each addresses sections of highway greater than one mile in length.
- Accident Prevention addresses locations with a high risk of collision occurrence. This program allows WSDOT to address potentially hazardous situations before they become a problem.

While all highway capital projects address motorist safety, a targeted safety improvement program is also required to address highway safety needs on routes without other planned improvements.

Data relating to collisions on the state highway system:

2004 fatalities
2004 disabling injury accidents
2003 fatalities
2003 disabling injury accidents

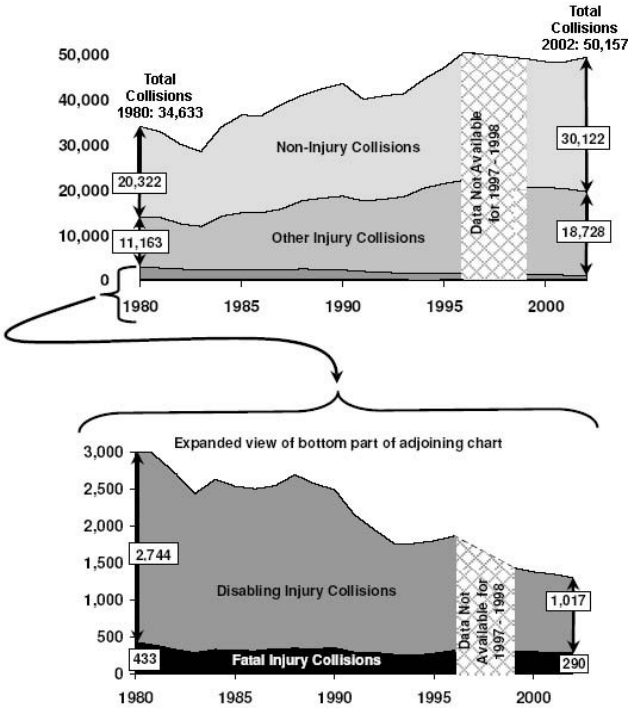
Fatal collisions are only a small fraction of all accidents on our roadways. WSDOT's data shows that the sum of all collisions on Washington State highways grew from 34,662 in 1980 to 50,157 in 2002. This is an overall increase of 45 percent. However, Vehicle Miles Traveled (VMT) over the same period increased by 88 percent. So despite the fact that the volume of collisions grew, that growth was relatively less than the growth of VMT.

Source: http://www.wsdot.wa.gov/planning/wtp/datalibrary/Safety/MVCollisions.htm

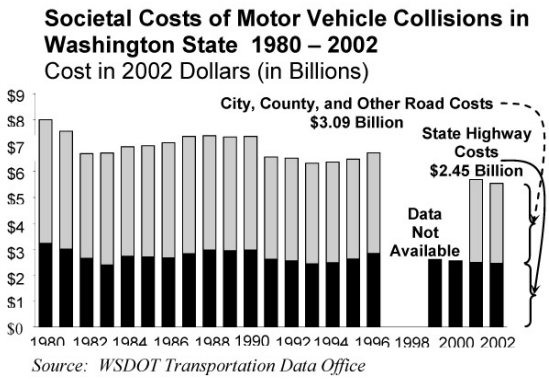
Source: http://www.wsdot.wa.gov/planning/wtp/datalibrary/Safety/MVCsocietalcost.htm

CHART SHOWING SOCIETAL COST HISTORY

The total number of collisions – all types – has increased



Societal costs of motor vehicle collisions



Source: WSDOT Transportation Data Office

Cost factors are used to identify deficiencies based on past collision history and enable us to calculate future benefits of proposed improvements.

The source of these cost factors is the Federal Highway Administration's (FHWA) Technical Summary "The Cost of Highway Crashes", Publication No. FHWA-RD-91-005. This research was conducted to develop a set of comprehensive costs that people are willing to pay to avoid pain and lost quality of life. Cost factors

were developed, and are periodically updated on both a per person and per collision basis.

Any cost factors used to identify deficiencies and establish priorities should be on a per collision basis. To prevent the factor of fatal collisions from excessively influencing the priority selection process, and recognizing that the difference between a fatal and a disabling injury collision is often relatively minor, WSDOT's traffic safety personnel recommend that a weighted Fatal/disabling injury collision cost factor be utilized.

Periodically, these factors will be adjusted as appropriate, or upon the development of new cost factors by FHWA.

Needs

The following are representative needs found on the State Highway system:

- Extend on and off-ramps to the interstate, remove fixed objects, and flatten slopes on the side of the freeway.
- Reduce risk and improve safety by removing fixed objects, flattening roadside slopes, improving horizontal and vertical stopping sight distance, and widening roadways .
- Implement specific low-cost features statewide to reduce accidents and their severity.
- Provide and maintain a safety rest stop every 60 miles throughout the state highway system. Drivers benefit from reduced accidents due to inattention or sleepiness.
- Improve At Grade Intersections and reduce the potential for serious accidents as the volume of mainline and crossroad traffic increases.
- Identify intersection Improvements where traffic volumes are growing and/or minor accidents are beginning to occur.
- Identify Pedestrian Risk locations where pedestrians are at higher risk including around schools, senior centers, and transit facilities.
- Identify corridors with geometric and roadside elements contributing to accident probability and increased accident severity.
- Include safe connections and convenient access to pedestrian and bicycle facilities (bicycles covered-parking facilities, racks, etc.) at transit centers, transit stops, airports, rail terminals, ferry terminals and park & ride lots.
- Modifying roadways to include paved shoulders or bicycles lanes,sidewalks, and safe crossings with a focus on known accident locations.
- Creating new, and maintaining existing corridors for bicycles and pedestrian transportation purposes.

Another way of finding location specific data on fatal and disabling accidents is to compare urban roadways to rural roadways (regardless of the level of government that owns the road). Roadways are classified as either urban or rural based on a federal designation of "urban areas," established by the population density of an area. "Urban Areas" are highlighted in the map below.

Accidents and Rates by County and System

map here

Strategies

Strategies for reducing and preventing injury collisions

Approaches for improving highway safety continue to evolve. The traditional approach is to reconstruct highways to meet current design standards. While rebuilding roadways to design standards will reduce the risk of collisions, this approach can be very costly, particularly impacts to property or environmentally sensitive areas as a result of the improvement.

Making large investments at spot locations results in fewer locations being addressed and limits the public benefit of improvements.

Therefore, the preferred approach to improving highway safety is investing in improvements that are rela-

tively low cost per site/mile and provide significant reductions in the risk of serious collisions.

A systematic approach to bringing highways up to standards provides the public safer highways at a lower cost..

- Collision Reduction Priorities
  - Spot locations on the highway system with higher than average collision rates
  - Corridor sections on the State Highway System with higher than average collision rates.
- Collision Prevention addresses locations exhibiting a higher risk of collision occurrence and include the following focus areas: Interstate Safety, Risk Reduction, At Grade Intersection, Intersection Improvements, Pedestrian Risk, and Special Safety Initiative. This program allows WSDOT to address potentially hazardous situations before they become a problem.
  - Identify corridors with geometric and roadside elements that contribute to accident probability and increased accident severity.
  - Identify improved signalization and channelization opportunities to reduce collision risk.
  - Identify at-grade intersections in high-speed multi-lade divided highway intersections exhibiting high accident potential.

Providing a basic level of safety on all state highways

List items

The primary strategies for increasing biking and walking while making it safer includes:

- Maximizing funding for safety needs through partnerships.
- Raising awareness of bicycle and pedestrian safety needs.
- Sharing information on bicycles and pedestrian issues between Washington's agencies, jurisdictions, and organizations.

Prioritization arrays for each of these project types can be found in the table on the previous page.

Interstate Safety

WSDOT and the Federal Highway Administration (FHWA) agreed to create a strategy to identify non-standard features on the Interstate System and initiate a program to bring them up to standards.

In the past, these projects were not prioritized but imbedded in roadway preservation projects already programmed. The amount of work programmed within a biennium is limited to funds available for this purpose (for the 2005-07budget - $16 million).

Research is currently underway to develop a more strategic approach than investing in standards upgrades on the interstate system. The results are expected to be available for development of the 2009-11 budget.

Risk Reduction

Identify locations where few accidents have occurred but the potential for accidents is above average due to traffic volumes and non-standard features on the roadway and roadside.

These projects are prioritized based on the number of potential accidents eliminated and the cost of the proposed project.

Special Safety Initiatives

Special Safety Initiatives focuses on specific low-cost features that can be implemented statewide to reduce accidents and their severity. These initiatives include:

- Install shoulder rumble strips, or stripes on rural multi-lane highways to alert sleepy drivers.
- Replace non-standard guardrail installed prior to 1970.
- Installation of three-beam guardrail to strengthen non-standard bridge rails built before 1968.
- Install median cross-over protection on medians narrower than 50 feet wide to prevent vehicles from driving through.
- Install centerline rumble strips on two lane rural highways.
- Implement re-directional Landform Mitigation.
- Add passing lanes as a safety strategy on two lane rural highways
- Protect Re-directional Land Forms

These projects are prioritized two ways; either by the forecasted number of accidents eliminated and the cost of the proposed project or by the number and severity of accidents anticipated to be eliminated compared to the cost of the proposed project. The methodology used varies depending on the type of project

New Rest Areas

WSDOT strives to provide a safety rest stop every 60 miles throughout the state highway system. The Legislature requires that the department develop a partnership with another organization in order to build a new rest area.

The priorities in this category are determined by the cost effectiveness of serving an anticipated number of rest area users, including the benefits of reduced accidents due to the inattention or sleepiness, and includes the construction, operation, and maintenance costs of the facility.

Safety Rest Areas

Quick Facts:

- Statewide, the Washington State Department of Transportation (WSDOT) owns and operates 43 safety rest area facilities.
- The purpose of safety rest areas is to give fatigued drivers a safe place to stop and rest.
- The annual maintenance cost for state rest areas is over $4 million. This includes:
  - Facility maintenance
  - Landscape maintenance
  - Trash disposal
  - Utilities (electric, water, sewer)
- Parking is allowed in state rest areas for up to eight hours, unless otherwise posted. Hours are limited to prevent rest areas from being used as campsites.

Designed with the traveler in mind

Most safety rest area facilities provide these amenities:

- Restrooms designed to meet the Americans with Disabilities Act standards
- Picnic tables
- RV dump stations - available at 19 of the 43 rest areas
- Designated pet areas for leashed animals
- Pay telephones
- Snack machines
- Motorist information - restaurants, hotels/motels, gas, local attractions

Source: http://www.wsdot.wa.gov/traveler/safetyrestareas.htm

At Grade Intersections

Intersections are identified that meet the following criteria:

- On the National Highway System
- Multi lane
- Median separated
- Speeds in excess of 45 mph

These intersections have the potential for serious accidents as the volume of mainline and crossroad traffic increases. WSDOT intends to eliminate these intersections and construct grade-separated roadways to prevent accidents. These projects will also enhance the environment by treating stormwater drainage, and typically improve highway capacity by improving vehicle throughput.

WSDOT prioritizes these projects based on the anticipated number and severity of accidents eliminated as a result of the improvements compared to the cost of the proposed project.

Intersection Improvements

Intersections are identified where traffic volumes are growing and/or minor accidents are beginning to occur. These projects improve safety by adding channelization to eliminate rear-end collisions with left or right turning vehicles, constructing roundabouts, and by adding signals or roundabouts as traffic volumes grow.

These locations are prioritized based on traffic volumes, accidents and the cost of the proposed project.

Pedestrian and Bicycle Risk

Walking and bicycling are integral parts of a balanced transportation system. People in Washington walk and bike to work, school, for pleasure, shopping, and to connect with transit, ferries or other transportation services. Most of us are pedestrians at some point of every day and all modes of transportation include a pedestrian component. In some areas of the state, walking and bicycling play a significant role in reducing traffic congestion.

Walking and biking also have an economic impact. Bicycle touring is big business in Washington generating over $4 million in revenue primarily for smaller coastal communities along Washington's State route 101. Communities with pedestrian-friendly downtowns may enhance economic vitality by encouraging visitors to stop and shop at businesses. Individuals who walk or ride a bike may see a reduction of expenses related to owning and operating a car.

Locations are identified where pedestrians are at higher risk such as around schools, senior centers, and transit facilities. These locations are identified by WSDOT in coordination with local pedestrian groups.

These projects reduce pedestrian risk by installing or modifying features such as:

- sidewalks to reduce crossing distances at intersections
- better lighting,
- advance warning signs,
- refuge islands in the center of the roadway,
- in-pavement warning systems.

Projects are prioritized by the potential use and cost of the proposed project.

Investment chart (addressing spot with accident history, corridors, preventing crossover on multilane divided and undivided highways, etc…)

Prioritization Process for Selecting Projects

One of the primary goals of priority programming is to maximize return on investment dollars. To ensure to the greatest extent possible that transportation dollars are being spent in those areas with the highest benefit & lowest cost, where possible.

The approach for this HSP update will be a combination of Special Safety Initiatives. These initiatives are prioritized by highest benefit & lowest cost, as well as minimum, moderate, and maximum fixes. These are prioritized based on available funding, and warrant as in some cases a first step towards a more permanent fix as additional funding becomes available.

Performance Measures

Performance Measures are the indicators used to determine if a project, or type of projects are worth the expenditure of public funds required to build them in the first place. Safety Program performance measures include reduction in the number of:

- Crossover head on accidents
- Run off the road accidents
- Enter at angle accidents
- Same direction/Rear end accidents
- Pedestrian Vehicle accidents
- Fixed object Accidents
- Driver fatigue accidents

Currently, bicycling and walking account for approximately 5% of all trips, and over 6% of working trips in urban areas. An average of 88 pedestrians and bicyclists are killed in traffic crashes across the state each year. Over 60% of the bicycle and pedestrian crashes that most often result in serious injuries and death involve young children or the aging. (Source: US Census and the federal Fatality and Accident Reporting System). WSDOT will monitor and report on these and other benchmarks regularly.

Mobility

The Highway Demand/Capacity Imbalance

Washington State's population has increased 45% from 1980 to 2003 and is projected to increase another 36% by 2030 to an estimated 8.5 million, more than twice the number of people in 1980. This change in population has translated in to a significant increase in the number of licensed drivers.

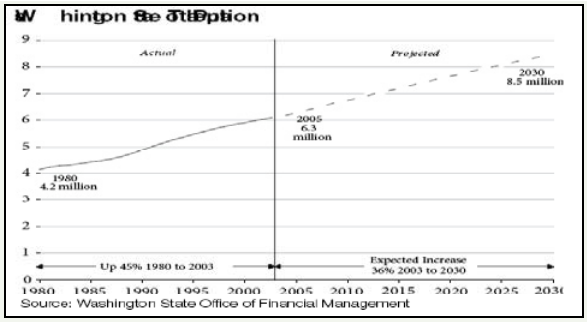
The number of licensed drivers in Washington increased from 2.7 million in 1980 to 4.4 million in 2003, an overall increase of 66 percent, or an annual average increase of 2.9 percent. In 2003, 72.1 percent of the population held a valid driver's license, an increase from 65.9 percent in 1980. This upward trend is expected to continue, increasing the number of licensed drivers to nearly 6 million by 2030.

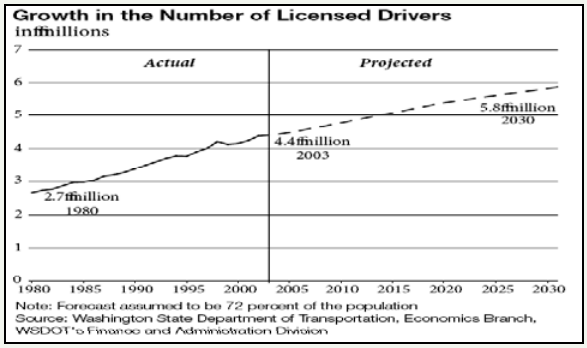
From 1980 to 2002, the number of jobs in Washington State grew from 1.83 million to 2.84 million, an average annual growth rate of 2 percent. Between 2002 and 2030, 1.15 million jobs are expected to be added to the state's economy. Employment in the state is expected to increase at an average annual rate of 1.2 percent, from 2.84 million in 2002 to 3.99 million by 2030.

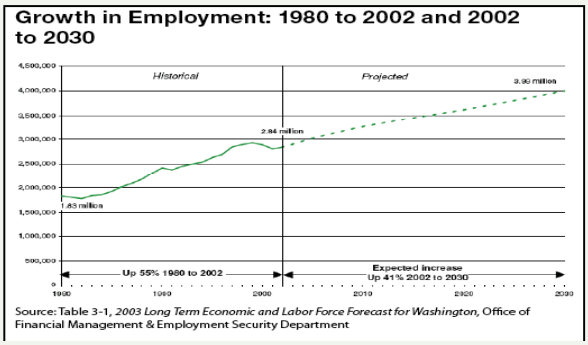
The combined growth in population, licensed drivers, and jobs will translate into substantial increases in travel and demand for transportation systems and services. From 1980 to 2003 the number of miles traveled (Vehicle Miles traveled or VMT) has increased by 91%. VMT is expected to increase another 46% above 2003 levels to a staggering 80.8 billion miles traveled per year on Washington's highways.

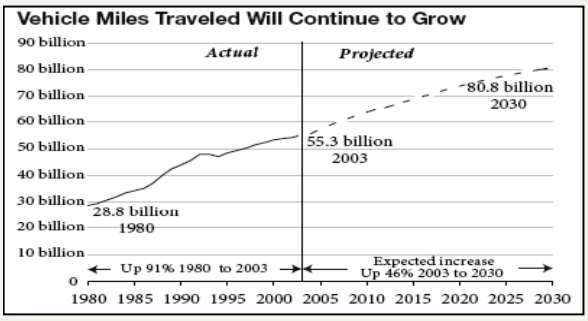
The growth in travel demand has outpaced expansion of transportation system capacity. This imbalance of demand and capacity occurs in virtually every mode of transportation: at our airports, on our rail lines, and especially on our roadways.

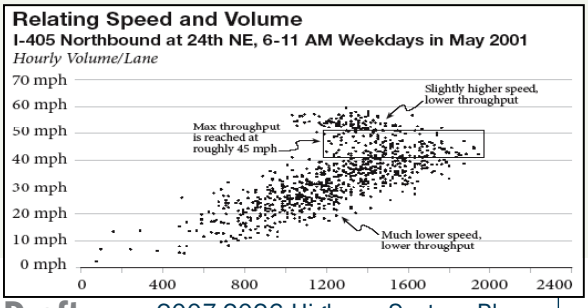
Congestion not only causes delay, it also causes lost productivity for the roadway system. That is, under











congested conditions, even though the road is "full" of cars, they are moving so slowly that fewer vehicles actually pass any given point on the road. Typically, the maximum throughput of vehicles on a freeway, about 2,000 vehicles per lane per hour, occurs at speeds of 42-51 mph, or about 70%-85% of the posted speed.

As demand increases, congestion causes a drop in speeds. For a typical freeway, when speed drops to below 45 mph, or about 85% of 60 mph, the productivity of the freeway starts to decline. When congestion causes drivers to lower vehicle speeds to 30 mph, the throughput (volume of flow) on a freeway may fall from 2,000 vehicles per lane per hour to as low as 700. When cars are stuck in congestion, the difference between the intended capacity of the roadway and the actual number of cars that the road is serving is called "lost productivity," "lost throughput," or "lost capacity." Whatever the term, congested freeways deliver far fewer benefits to citizens than if the roads could be kept flowing smoothly.

By 2030, without substantial new capacity or significant changes that affect how and when we travel, users of Washington State's transportation system will experience less reliable movement of freight and goods, longer travel times, increased delay and higher consumer costs to name a few.

Moving away from the historical practice of taxing to build our way out of congestion or to satisfy the demands of growth, this 20-year plan warns that as we grow, we must grow smarter and be more innovative. There is not enough state or local money and land to build our way out of congestion. Therefore, WSDOT has set a goal to get the highest possible performance from our existing transportation investments – from basic maintenance and operations activities to the application of sophisticated technologies – means people and goods move more reliably and predictably on the system.

Achieving a better balance between demand for the system and capacity of the system will require methods to:

- Maintain flow of traffic
- Maximize throughput
- Improve productivity

Alternatives to single occupant vehicle transportation are key to managing the demands placed upon the transportation system. Public transit, the Commute Trip Reduction program, and walking and biking facili-

How Does WSDOT Measure Congestion?

WSDOT's mission is to move the largest number of people and largest amount of freight as efficiently as possible using current capacity. This is partly served by maximizing the number of vehicles that the highway can move through the system. Currently, maximum traffic throughput is achieved on a typical freeway segment in the Central Puget Sound region at about 51 mph (roughly 85% of the posted speed limits). When speeds fall below 70% of posted speed, or about 40 mph, the highway has lost efficiency to the level of significant congestion. Below 35 mph, the road operates in a severely congested manner.

WSDOT's Congestion Measurement Thresholds

Condition	Highway Speed Range	Description
Posted Speeds	52 mph or above (Posted Speed)	Highway is at less than maximum productivity because drivers are at greater than optimal spacing
Maximum Throughput	51 mph-41 mph (about 85%-70% of Posted Speed)	Highway is working at maximum productivity
Congestion	40 mph (below 70% of Posted Speed)	Highway is at less than maximum productivity because drivers are jammed at less than optimal spacing
Severe Congestion	35 mph or below (about 60% of posted speeds)	Highway is well below maximum productivity

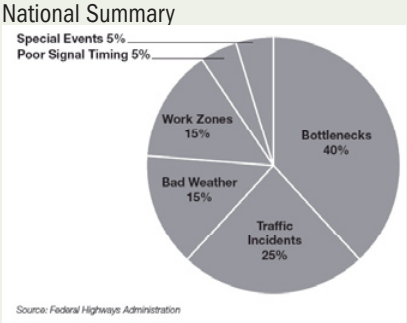
Note: Maximum throughput figures are based on current technology and roadway geometrics. Improved vehicle and roadway technology could shift these thresholds upwards.

WSDOT's Congestion Measurement Principles (since 2002):

· Use real-time measurements (rather than modeling) whenever possible.
· Measure congestion due to incidents as distinct from congestion due to inadequate capacity.
· Show whether reducing congestion from incidents will improve travel time reliability.
· Use plain English to describe congestion measures.
· Demonstrate both long-term and short-to-intermediate term results.
· Communicate about possible congestion fixes using an "apples to apples" comparison with the current situation (for example, if the trip takes 20 minutes today, how many minutes shorter will it be if we improve the interchanges?)

The Sources of Congestion

National Summary



According to the Federal Highway Administration's 2004 report Traffic Congestion and Reliability: Linking Solutions to Problems, the majority of congestion is caused by bottlenecks. Traffic incidents are the next highest contributor followed by inclement weather.

ties provide alternative modes of travel. They relieve demand on highway systems, and reduce congestion, as well as increase sustainability of the transportation system. Creating more usable capacity on our transportation system will include:

- Improving flow on the system with ramp metering, incident response, and high occupancy vehicle lanes
- Providing alternatives to traveling on congested highways with commute trip reduction programs, better local networks, and transit oriented development
- Keeping the system moving through basic maintenance and operations
- Increasing access management programs, which can increase roadway capacity by 23 percent to 45 percent

Major Factors Contributing to Congestion

The growth in travel demand, especially during peak hours has caused many of the highways in Washington State to operate less efficiently. This decreased efficiency further consumes the capacity of the highway leading to more congestion (recurring congestion). Non-recurring congestion resulting from weather, roadway construction, collisions and vehicle breakdown, further reduces the operating efficiency of the highway system. On a fundamental level, failure to price the use of roadway capacity contributes to unconstrained demand and causes congestion. The major factors that contribute to congestion based on a national summary from the Federal Highway Administration are as follows:

- Bottlenecks
- Traffic Incidents
- Bad Weather
- Work Zones
- Poor Signal Timing
- Special Events
- Fluctuations in Normal Traffic

Bottlenecks are places where the physical attributes of a roadway change in a manner that impacts the flow of traffic. Typical bottlenecks are locations where; the number of lanes decrease, the roadway physically narrows either in shoulder width or lane width or narrow bridges. WSDOT has separated bottlenecks into two categories, bottlenecks and chokepoints. WSDOT defines chokepoints as, places where congestion occurs because of traffic interference and/or the roadway configuration (examples: freeway interchanges; lack of left turn lanes at intersections; seasonal road closures). Bottlenecks and chokepoints greatly influence the flow of traffic, whether it be long backups of vehicles trying to exit the roadway, vehicles having to dramatically reduce their travel speeds when leaving one freeway to enter another (freeway to freeway connections) or vehicles slowing down as they cross a narrow bridge.

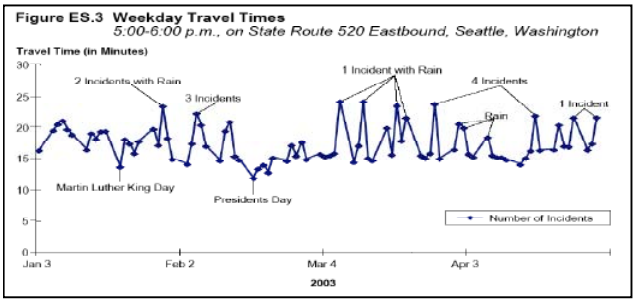
Traffic Incidents typically include; collisions, disabled vehicles, debris on the roadway, spills, and roadside distractions that alter driver behavior (e.g., roadside construction, electronic signs, a fire beside the freeway) and other events that impede the normal flow of traffic. For every minute a lane remains blocked, four to 10 minutes of congestion may result.

Bad Weather, such as the recent events in November 2006 where heavy rainfall caused flooding, sink holes and landslides, resulted in the temporary closure of more than a dozen highways in Western Washington for several days. Snowfall, avalanche control, ice and heavy fog can cause delay.

A Work Zone is an area of a highway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, traffic control devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or rotating/strobe lights on a vehicle to the END ROAD WORK SIGN or the last temporary traffic control device.

Poor Signal Timing causes additional delay to drivers. In fact, minor side street traffic may experience excessive delay, particularly during off-peak hours. Because of this, drivers may actually avoid the signalized intersection and switch to alternate routes or, to residential streets not designed to handle through traffic.

Special Events like sporting events, political rallies and parades can cause temporary, but major impacts to normal travel conditions expected by motorists.



Fluctuation in Normal Traffic is the variability of day to day demand. Some days, traffic volumes are abnormally high leading to significantly longer travel times, other days traffic volumes are below normal and traffic flows freely without delay.

Any one of the above factors can cause traffic to slow below an acceptable level. When two or more of these factors are combined, traveling on the freeway becomes a nightmare. This interaction between multiple factors creates a dynamic and unpredictable series of conditions that is rarely the same from one day to the next, or even from one highway to another. For example, the travel time that one motorist experiences leaving home at 6:30 a.m. may be completely acceptable, but another motorist who leaves home 30 minutes later experiences a travel time that is more than twice as long. These motorists' experiences can change dramatically if the next day there is a lane blocking collision, or if it is raining. The graph to the right clearly shows the combination of these factors at work.

To make matters even more complex some of these situations can cause other events to occur. Consider the following:

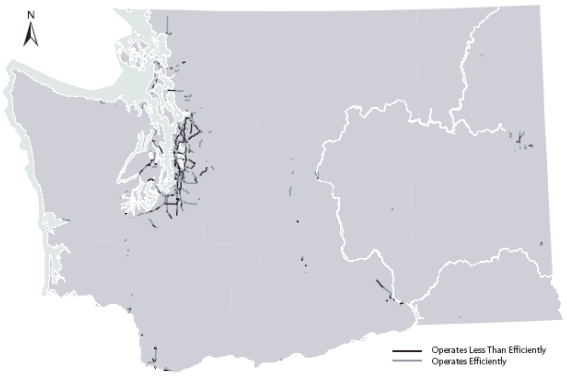
- When traffic volumes are above normal on one highway, many commuters may decide to take an alternate route causing volumes to spike and slowing traffic to a crawl.
- Even moderate congestion can cause an increase in collisions as the following distance between vehicles is reduced and drivers become distracted.
- Poor signal timing on a local road may cause vehicles on freeway off ramps to backup onto the mainline, reducing the through capacity of the roadway.
- Bad weather can cause poor visibility leading to slow downs and potentially more collisions.
- Drivers distracted by a collision may cause additional collisions as their attention leaves the roadway ahead of them.

Needs and How to Identify Congestion

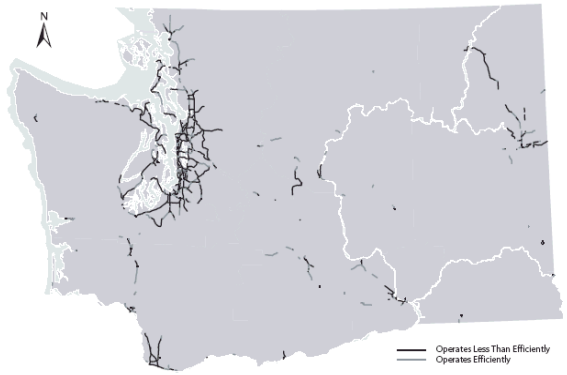
(How Was Congestion Identified for this HSP Update?)

Recurring congestion was determined by locations that operate below 70% of the posted speed during the peak-hour, as shown in figure xx along with areas that operate efficiently during the peak-hour, 70 to 85% of the posted speed. These conditions do not reflect the impact of congestion associated with local roads, additional impacts associated with ramps, interchanges, weather, special events, construction, collisions or incidents. This is the criteria used to determine both Interstate and non-Interstate congested corridors.

Computer analysis was used to forecast the 24-hour operating conditions for the year 2030 to identify locations where the peak-hour travel speeds fell below 70% of the posted speed. Of those locations, the ones with the most significant delay were chosen as study corridors. These projected future conditions reflect the completion of the mobility projects included in both the 2003 "Nickel" funding package and the fully funded projects included in the 2005 TPA. These projections do not reflect the impact of congestion associated with local roads, additional impacts associated with ramps, interchanges, weather, special events, construction, collisions or incidents.

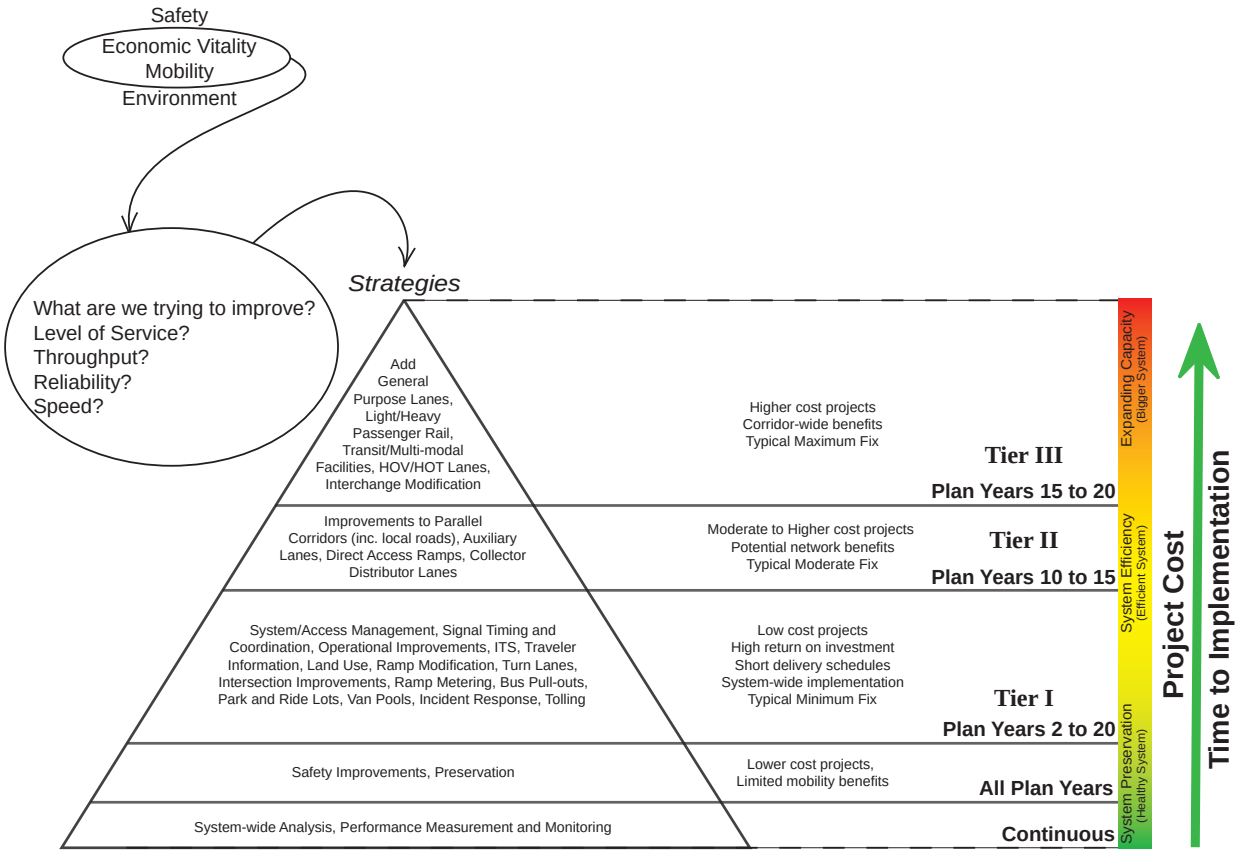


The above map shows the worst operating conditions experienced during 2005 on State Highways.



The above map shows the projected worst operating conditions for 2030 on State Highways.

Draft 2007-2026 Washington State Highway System Plan: Implementation Plan



Strategies to Address Needs (How will this HSP address Mobility Needs?)

A new approach to improve congested conditions on state corridors has been developed for inclusion in this update of the 2007-2026 HSP. There are three tiers of investment strategies that could be implemented incrementally over the life of the 20-year plan to maximize every dollar invested.

- System Operation (Healthy System)
- System Efficiency (Efficient System)
- System Expansion (Bigger System)

System Operation (Healthy System)

System operations promote a "healthy system" through continual performance measurement and monitoring to ensure capital investment decisions are made at the right time in the right locations. A healthy system also must be preserved to protect current and future assets. Another critical component of a healthy system is continual improvement in providing safer highways.

System Efficiency (Efficient System)

The second tier, system efficiency, promotes the optimum operation of the system. System efficiency begins with delivering low cost projects with shorter construction schedules to a wide range of high benefit locations. These projects could include operational improvements such as ramp metering, turn lanes or signal timing adjustments, and intelligent transportation systems. System efficiency also includes some moderately priced projects to expand upon the previously completed lower cost projects that maintain the operational efficiency of a corridor. Typical projects may include adding auxiliary lanes or improving a parallel corridor.

System Expansion (Bigger System)

System expansion is the third investment tier and includes the most costly solutions. These solutions would only be considered after all other (lower cost) alternatives have been exhausted. These solutions would also build upon previously implemented solutions so that no work would be wasted (see Figure 13). These solutions may include adding general pur-

pose or HOV lanes, passenger rail, transit, multimodal facilities and major interchange modifications.

Strategies to Address Congestion

- Complete project commitments made to the Legislature
- Incident Response
- Operational Improvements
- Chokepoints & Bottlenecks (not included in Congested Corridors)
- Congested Corridors (Tier I, Tier II, Tier III)

These strategies were considered for every congested corridor segment on the Interstate, as well as some of the congested corridor segments on non-Interstate. Future HSP updates will address additional corridor segments.

Complete project commitments made to the Legislature

The 2003 "Nickel" funding package and the 2005 funding package approved by the Washington State Legislature will generate over $11 billion towards mobility projects over the next 16 years. This additional revenue will complete many projects and will begin or continue work on the projects listed (see Figure 12). By doing this, the Legislature sets the priority for future projects and direction for transportation investments. Therefore the completion of these projects is seen as a high priority for WSDOT's future program.

Incident Management

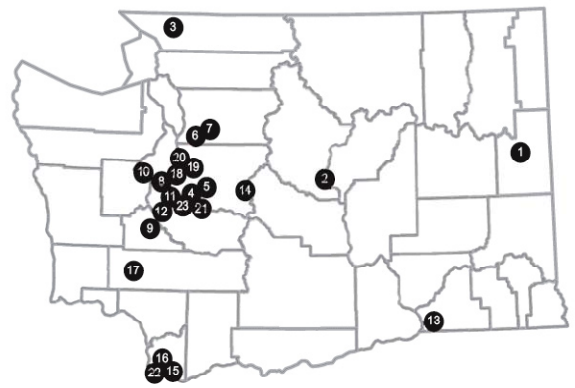
Incident Management is a reactive approach to addressing collisions, but WSDOT also takes a proactive approach to addressing collisions. The current efforts of WSDOT's Incident Response are discussed in the following paragraphs along with the locations around the state where these efforts are focused. For more information about Incident Response please visit the Incident Response web page at: http://www.wsdot.wa.gov/incidentresponse/.

Operational Improvements/Intelligent Transportation Systems (ITS)

WSDOT's approach to reducing congestion is multi-faceted, focusing on reducing the causes of congestion, providing capacity improvements, and making the most efficient use of the existing transportation system.

As roadway congestion increases, Intelligent Transportation Systems are used to maintain vehicle throughput. We now use these types of technology including ramp metering, traveler information, incident response, border crossing technology, weather operations based on prediction tools, commercial vehicle information systems networks (CVISN), and coordinated signal technology.

Location of Projects



Key	Project Title
1	US 395 North Spokane Corridor
2	SR 28 East Wenatchee Corridor
3	SR 539 Lynden to the USA/Canada Border
4	SR 509 Complete SR 509 from I-5 to Des Moines Memorial Drive
5	SR 18 Issaquah Hobart Road to I-90
6	SR 522 Paradise Lake Road to Monroe
7	US 2 Monroe Bypass
8	Completion of Puget Sound HOV System
9	SR 510/SR 507 Yelm Bypass
10	SR 3 Belfair Bypass
11	SR 167 from SR 509 at the Port of Tacoma to SR 167/SR 512 at Puyallup
12	SR 704 Crossbase Highway
13	US 12 US 730 to McDonald Road
14	I-90 Snoqualmie Pass East
15	SR 14 Camas / Washougal
16	I-205 SR 14 to NE 134th Street
17	I-5 13th Street to Mellen Street
18	SR 518/SR 509 Interchange
19	I-405 Lynnwood to Tukwila - Corridor Improvements
20	SR 520 Bridge Replacement and HOV
21	SR 410 Bonney Lake Vicinity - Corridor Widening
22	I-5 Columbia River Crossing
23	I-5/SR 161/SR 18 "Triangle" Interchange

Ramp Metering

Ramp metering has been in place in the Seattle area for years and has proven highly effective in maintaining and even increasing throughput. Ramp meters are stop-and-go signals located on entrance ramps to the freeway. They control the frequency with which vehicles enter the flow of traffic on the freeway.

Ramp meters are a proven and cost-effective method of relieving traffic congestion. By increasing the efficiency of freeway use, ramp meters save taxpayers costs associated with building new lanes. Past ramp meter activations have reduced rear-end and side-swipe collisions by over 30%.

Driver and Traveler Information Systems consists of roadway condition and congestion information, construction, maintenance and ferry delay information, and emergency and road closure information. Providing motorists with this information allows them to make route or timing decisions before or during their trip.

Truck Operations

Trucks are required to be weighed, inspected, and registered for travel in Washington. Stopping at truck scales and ports of entry can delay truck shipments. Advanced technology such as commercial vehicle information systems and weigh-in-motion technologies can improve efficiency and reduce the time spent at the scales in most cases.

Bottlenecks and Chokepoints

An extensive list of bottlenecks and chokepoint locations and solutions has been developed for this update of the HSP. Over the next several years additional locations will be identified through future analysis for inclusion in later updates to the HSP. To identify a bottleneck or chokepoint location for this update, WSDOT regions followed the guidelines established as follows.

First, the location under consideration had to fit the definition of being either a chokepoint or bottleneck:

Bottlenecks are places where the physical attributes of a roadway change in a manner that impacts the flow of traffic. Typical bottlenecks are locations where; the number of lanes decrease, the roadway physically narrows either in shoulder width, lane width or narrow bridges.

Chokepoints are places where congestion occurs because of traffic interference and/or the roadway configuration (examples: freeway interchanges; lack of left turn lanes at intersections; seasonal road closures).

Second, the observed congestion must be supported with traffic data and analysis models. If congestion is a problem today or anticipated within the next 20 years, it must also satisfy at least one of the following applicable criteria:

- The congestion problem impacts the flow of mainline through traffic.
- The impact on mainline traffic flow is measured as through vehicle peak hour speeds that are determined (measured or modeled) to be equal to or less than 70 percent of the posted speed.
- Traffic flow criteria for ramps will also be considered to determine if the congestion is caused by on/off ramp traffic.

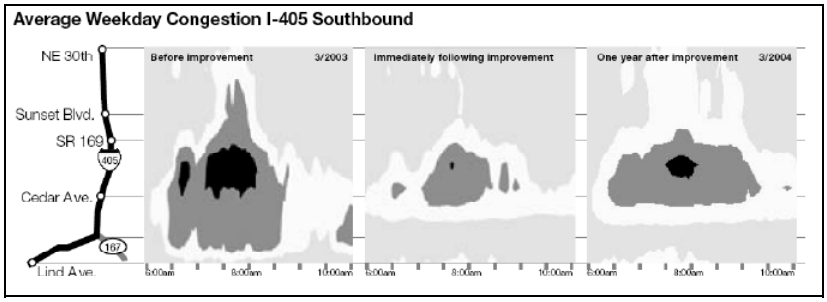
The Washington Transportation Plan identified funding targets for a statewide list of chokepoint and bottleneck locations. This list will be used to create strategies to address congestion in these specific locations.

Fixing Bottlenecks and Chokepoints

Targeted traffic flow improvements can also make a significant difference in system performance. The recently completed I-405/SR 167 Flyover ramp is a good example of one such targeted investment. Prior to the opening of the new ramp, stop-and-go conditions occurred weekday mornings between 6:45 and 8:00 a.m. Immediately after the opening the new ramp, the stop-and go condition was almost entirely eliminated. In the past year we've seen continued growth in the I-405 mainline volumes as well as the I-405 southbound to SR 167 southbound ramp. While serving higher volumes, the congestion at the interchange area is still considerably lower than the conditions prior to the project. On weekends, both the stop-and-go traffic and heavy congestion conditions have been essentially eliminated.

Congested Corridors (Tier I, Tier II, Tier III)

Improving the operating conditions of congested corridors will be accomplished through an incremen-



tal approach, where every improvement builds upon previous work so that no work is wasted.

Tier I Strategies

Tier one strategies are low cost projects that deliver a high return on capital investments and have the shortest delivery schedules. These strategies bridge the gap between system operation and system efficiency therefore; some of these strategies have been described earlier.

Access Management

Managing access to state highways by limiting driveways and cross traffic preserves highway capacity where growth is expected and maximizes existing highway capacity and safety where development has occurred.

Ramp Modification

Ramp modifications can vary widely in that ramps can be extended, widened or realigned to reduce the sharpness of a curve. Ramp modifications can also include reconstruction to create a flyover ramp which can greatly improve efficiency (see Fixing Bottlenecks and Chokepoints, page xx).

Turn Lanes

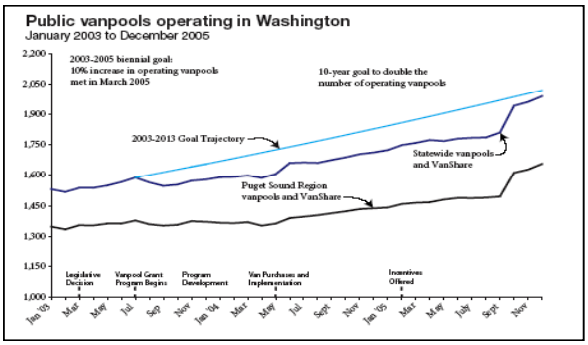
Turn lanes can be added to intersections, ramps and driveways to allow travelers a place to slowdown before making a turn without causing mainline traffic to slowdown or stop.

Intersection Improvements

Intersection improvements improve the efficiency of traffic movements and can reduce the risk of collisions.

Signal Timing and Coordination

Traffic signals are a vital tool used by the Washington State Department of Transportation to safely and efficiently manage vehicle, bicycle and pedestrian traffic on state highways. To achieve optimum efficiency, traffic signals must be monitored and adjusted to serve changing traffic patterns. Traffic engineers collect detailed information about traffic patterns, volumes and speeds. Once this data is analyzed, new timing plans are developed and field adjustments are implemented as required. To maximize traffic flow on arterials and along corridors, closely spaced signals are inter-connected, creating coordinated signal systems. Using traffic signals in coordinated systems may benefit



society by reducing time delay, and providing improved safety, efficient use of fossil fuels, and reduced air pollution.

Transportation Demand Management (TDM)

Also known as trip reduction, TDM is an umbrella term for strategies that reduce or shift use of the roadway. TDM strategies include:

CTR Programs

The CTR Program uses partnerships between employers and government to encourage change in commuting habits. By encouraging people to ride the bus, vanpool, carpool, walk, bike, work from home, or compress their workweek, the CTR program removes 19,950 vehicles from the state's roadways every morning. This saves space on the roads and reduces air pollution by about 5,000 tons and gasoline consumption by about six million gallons each year. Nearly 1,100 worksites in Washington State participate in the program.

Vanpools

The Puget Sound region leads the nation in vanpooling. There are currently 1,353 vanpools in Puget Sound; they remove approximately 9,400 vehicles from area roads each morning.

Park & Ride Lots which make car and van pooling and riding the bus more convenient. Park and ride lots enhance the convenience of transit, vanpools, and carpools. WSDOT owns 62 lots in Puget Sound, with 12,000 parking spaces. King County lots have an average occupancy of 91 percent. WSDOT plans to increase the capacity of its park and ride lots.

Planning for Land Use

Research has shown a link between land use patterns and travel patterns – denser, mixed-use types of development with good pedestrian and transit access

have shown higher walking, transit, and carpooling behavior than lower density areas.

Tolling/ Pricing

Information from other cities and states clearly shows the huge potential of roadway pricing to maintain flow and capacity and prevent congestion. This is done by charging users a fee for using the roadway during congested times. The fee limits the vehicles using the lanes, keeping volumes at a level that allows smooth flow and maximum throughput. California and Texas have had success in charging a fee to use underused HOV lanes. These High Occupancy/Toll (HOT) lanes improve the use of the HOV lane, while maintaining smooth flow and a travel time advantage for transit and carpools. Pricing represents the next frontier and a real potential to maximize use of the system.

Tier II Strategies

Tier two strategies are moderate to higher cost projects that deliver potential network benefits to both highways and local roads. These strategies will be considered only after all applicable tier one strategies have been implemented. These strategies support an efficient highway system.

Improvements to Parallel Corridors (including local roads)

There are times when widening a congested roadway is not feasible. One approach to add capacity is to widen a parallel roadway which can provide travelers an alternate route to the same destination.

Adding Auxiliary Lanes

Auxiliary lanes can connect two interchanges, add passing opportunities on two-lane highways or provide slow moving vehicles a lane when going up hills or mountains.

Adding Collector Distributor Lanes

Adding a collector distributor lane that begins before an off ramp and extends beyond the on ramp of closely spaced interchanges improves the efficiency of the interchanges and reduces the impact of vehicles entering and exiting the freeway, thus improving vehicle throughput on general purpose lane travelers.

Direct Access Ramps

WSDOT is building many HOV lane direct access ramps throughout the Puget Sound area for Sound Transit. Direct access ramps allow buses, carpools and vanpools to directly access the high occupancy vehicle (HOV) lanes from park and ride lots and local streets. Carpools, vanpools and buses no longer have to weave across the general-purpose lanes when they can connect directly with HOV lanes. Direct access ramps improve safety, reduce congestion, save time, and increase reliability for both HOVs and general-purpose traffic.

Tier III Strategies

Tier three strategies are the highest cost projects that can deliver corridor-wide benefits. These strategies will be considered only after all applicable tier one and tier two strategies have been implemented. These strategies support system expansion.

Transit

Sound Transit is making it easier to get around Central Puget Sound. Our congestion-fighting alternatives include fast ST Express buses, Tacoma Link light rail and Sounder commuter trains. ST Express buses connect more than 34,000 people every day on fast, direct routes between major population centers in the region.

Commuter Rail

Commuter rail trains provide passenger service between central cities and their suburbs. Commuter rail trains typically operate only on workdays and during commute hours. These trains typically run on the same railroad tracks as freight trains and often share some stations with Amtrak intercity trains.

Other Multi-Modal Strategies Inter-modal Connections

In Island and Kitsap counties and on Vashon Island, transit service is timed and linked with ferry schedules. In downtown Seattle, there is frequent transit service, but not specifically linked to ferry schedules. New inter-modal connections issues will emerge with the construction of new inter-modal ferry terminals in Mukilteo and Edmonds, which may have connections to commuter rail services.

HOV/HOT Lanes

HOV lanes are designed to move more people in less space, while providing a more reliable trip for buses, carpools and vanpools. HOV lanes also add capacity for general-purpose lanes when carpools move from the regular lane into the HOV lane.

A HOT lane pilot project is being planned for the HOV lanes on SR 167. WSDOT is using the pilot project to assess whether or not HOT lanes are a viable solution to relieve congestion, and could be implemented on other highways in the Puget Sound region. HOT lanes maintain free, priority status to transit and carpools, but also allow solo-drivers that pay a toll to use the lanes. Toll rates will be variable and will depend on the level of congestion.

Interchange Modification

Interchange modifications can range from ramp reconfiguration to full reconstruction with an entirely different design to accommodate projected future traffic patterns.

Add General Purpose Lanes

Adding general purpose lanes increases system capacity through capital investments in highway widening, improving connections and passing/climbing lanes.

Performance Measurements

(Inventory and Definitions of WSDOT's Congestion Measurement Terms Used in This HSP Update)

Vehicle Throughput: A measure of the number of vehicles that can pass through a roadway segment during a given time period, typically measured for one hour.

Lost Throughput Productivity: Percentage of a highway's throughput lost due to traffic congestion.

Delay: WSDOT uses annual total vehicle hours of delay. This is the total amount of time vehicles travel at or below 85% of the posted speed.

Duration of Congestion: This period is defined as the period in which average weekday speed on a highway fell below 70% of posted speeds.

Maximum throughput/Maximum productivity: When the highway is carrying the largest number of vehicles possible. This occurs when vehicles are traveling at 70%-85% of the posted speed limit. For freeways, it is ~50 mph.

Transportation and Land Use

Historically, the type and availability of transportation has had a major influence in defining the physical structure of our communities. Communities have evolved from being oriented around ports, rivers, canals, and railroads, to a pattern now dominated by the roadway. In turn, where we live, work, recreate, and find goods and services all drive transportation demand. Community design, social, political, and economic activity, and transportation are intertwined.

Traffic congestion, travel delays, unreliable travel times, and reduced safety can occur when demand exceeds roadway or transit capacity. Transportation problems can be exacerbated when:

- People perceive that the only available and apparently affordable housing they desire is miles, cities, and even counties away from jobs, schools, shopping, and recreation.
- Businesses relocate to the suburban fringe, creating "edge cities" and stranding their transit-dependent employees because traditional transit systems do not typically provide effective service in the "reverse commute" direction or from suburb to suburb.

Transportation problems cannot be solved solely by building additional roadways, interchanges, transit lines and stations, or intercity and commuter railway capacity.

These actions can address some congestion in the short-term and are very important, but developing a transportation system to improve Washington State's mobility that is sustainable, environmentally sound, socially equitable, and economically viable requires recognizing that: Transportation problems are symptoms of underlying individual and community decisions.

"Sprawl" development has infrastructure cost implications and travel cost and time implications that can directly affect housing affordability and quality of life. No one actually wants to commute several hours a day in congested traffic or considers the event life-enriching. People do it to gain other real and perceived benefits.

Many metropolitan area issues, including transportation and affordable housing, are regional and sometimes interregional in nature. Addressing these issues requires unprecedented levels of government cooperation and shared vision.

Transportation funds are collected from the public with the expectation that they will be used to meet transportation needs. There are more transportation needs and desires than there are funds to support them.

Any expenditure of transportation funds must have a reasonable link to improving mobility and access for people, goods, services, and information.

However, since transportation and community development are interconnected, the availability and location of housing, especially affordable housing, can have a positive impact on reducing overall transportation demand and increase the use and effectiveness of the transportation system. The appropriate investment of transportation funds in projects and services can foster affordable housing and yield a long-term transportation benefit.

Transportation investments can support the vitality and redevelopment of urban areas and first-ring suburbs.

This includes brownfield and grayfield areas, where infrastructure already exists and affordable housing can be developed. Such redevelopment can serve to increase transit usage and efficiency. It can also promote walking and bicycling.

Local agencies can use their discretionary transportation funds, such as Congestion Mitigation and Air Quality and Transportation Enhancement and Regional Surface Transportation Program funding, to help support transit-oriented development, redevelopment, and affordable housing development. Local agency-provided transportation improvements can offset some of the total cost of transit-oriented development or other development that includes affordable housing. State transportation investments can be prioritized with the intent of targeting areas where local investments in transportation facilities, transit services, and local decisions on development help to increase the long-term return on the state's transportation investment.

Transportation planning funds can be used to jointly plan transportation services and community development to maximize return on future investments and ensure the transportation system complements community growth and vitality.

Transportation and Land Use—Key Challenges

Washington State citizens often talk about the challenges facing the transportation systems in the next twenty years, including sprawl, quality of life, and the threats to natural ecosystems and salmon.

Confronting these issues is central to creating forward looking programs for transportation investment. There is no question that efficient transportation systems are essential to economic vitality. There is no question that individualized free market choices about housing, work, and lifestyles are influencing transportation and land use with greater force than either independently influences the other. And there is no question that failure of transportation systems to meet the needs of growing communities can trigger social and environmental costs, including poor land use outcomes.

Although since implementation of the GMA the state as a whole has begun to coordinate growth and transportation and address congestion more effectively, there remains much to learn about what mix of incentives and disincentives will improve the mobility of people and goods. It may take more serious efforts at partnership between governments and businesses to address land use and the everyday decisions people make about where to work, live, and recreate.

Growth Management

Transportation systems are costly public investments. Land use decisions made by local jurisdictions are key determinants of how the state's transportation system serves people, communities, and the economy. Transportation, in turn, helps define the physical structure of our communities.

When passed in 1990, the Growth Management Act included 13 far-reaching goals to guide local comprehensive plans and development regulations. (A fourteenth goal for shorelines was added later.)

The basic principle of the Growth Management Act is that new development should be allowed only at a pace that public agencies providing public services such as roads, water, and sewer systems can keep up with. Local jurisdictions planning under the Growth Management Act implemented these statewide goals with flexibility to make their own choices about growth and development.

Transportation investments must be made in support of growth management strategies or growth management cannot succeed. Our state's Growth Management Act (GMA) created a framework rooted in local government for reconciling the pressures from growth on the uses of land with the consequent demands for public infrastructure investment. Since the GMA passed, we have seen improved consistency and public engagement in our local land use decisions as a direct result of the coordinated planning required by the law. Major elements of the GMA are:

- √ Comprehensive Plans
- √ Urban Growth Areas
- √ Concurrency

Comprehensive Plans

Fast-growing counties and the cities within them are required to create comprehensive plans that include several plan elements addressing projected changes in land use and public facilities. Cities and counties have discretion in their comprehensive plans to make many choices about how to plan for and accommodate growth. The local transportation system is part of the infrastructure needed to support the land use element of the comprehensive plan. Regional Transportation Planning Organizations certify the transportation element of local comprehensive plans for consistency with regional goals.

Urban Growth Areas

Jurisdictions preparing comprehensive plans are also required to designate Urban Growth Areas (UGA) where future population growth and infill development

is to be encouraged and outside of which growth should occur only if it is rural in character. The purpose of the UGA is to attract and funnel growth to certain core areas, increasing density there while maintaining the rural character of the land outside the UGA.

Development Encroachment

Washington's Growth Management Act (GMA) also requires local jurisdictions to discourage incompatible development adjacent to public use airports through comprehensive plan policies and development regulations. The airport may no longer be able to function if nearby development creates an unsafe setting for planes taking off and landing. Incompatible development can affect both the short-term and long-term operational capabilities of the airport, impact airport capacity, cause safety implications for people in the

air and on the ground, impact noise sensitive uses, affect navigation, and impair the utility of the airport as an economic resource. Airports are recognized under GMA as Essential Public Facilities.

WSDOT encourages ports, special districts, airport sponsors, aviation interests, and local jurisdictions to form partnerships and to work together to discourage incompatible development. The Aviation Division provides research documentation and best management practices and tools that can be used by local jurisdictions and airports to address land use compatibility adjacent to airports.

Similarly, Washington's seaports, highways, rail lines, and distribution centers are vital links to the global economy. The compatibility of these facilities with neighboring communities can affect Washington State's ability to move products for export and serve as a gateway for imported goods.

Concurrency

Transportation and land use decisions continue to shape Washington State's quality of life. In 1990, when the legislature passed the growth management act, transportation planning across regional boundaries and the topic of concurrency were included. Concurrency refers to the timely provision of public facilities and services relative to the demand for them. To maintain concurrency means that adequate public facilities are in place to serve new development as it occurs. The Growth Management Act (GMA) gives special attention to concurrency for transportation. The GMA requires that transportation improvements or strategies to accommodate development impacts need to be made concurrently with land development.

"Concurrency" is defined by the GMA to mean that any needed improvements or strategies are in place at the time of development or that a financial commitment exists to complete the improvements or strategies within six years. Local governments have many choices about how to apply concurrency within their plans, regulations, and permit systems.

If concurrency cannot be demonstrated, then local jurisdictions are required to enforce adopted ordinances, which prohibit development approval unless transportation improvements or strategies to accommodate the impacts of development are made concurrent with the development.

Most local governments have comprehensive plans that include level of service (LOS) standards. If levels of service fall below those described in the transportation chapter of the local comprehensive plan, then corrective action is needed. Concurrency is managed at the local level through ordinances consistent with the standards and policies in the locally adopted comprehensive plans. Sprawl happens in several areas for various reasons. Counties fully planning under the GMA have concurrency requirements as well the cities and their LOS standards are often lower in urban areas.

To reduce inconsistency between neighboring jurisdictions and to consider regional implications of comprehensive plans, local plans are reviewed and certified by metropolitan planning organizations and regional transportation planning organizations. Because state highways serve as primary arterials for many local governments, establishing and maintaining a comprehensive level of service for local governments and the state continues to be an ongoing challenge.

In 1998, the Washington State Legislature passed HB 1487, relating to transportation and growth management planning. House Bill 1487, known as the Level of Service (LOS) Bill, was passed to enhance the identification and coordinated planning for major transportation facilities identified as "transportation facilities and services of statewide significance." LOS for Highways of Statewide Significance (HSS) is set by WSDOT, however, these facilities are not subject to local concurrency requirements under the GMA. Non-HSS facilities have LOS set by WSDOT in consultation with the RTPOs. The GMA does not address whether or not these facilities are subject to local concurrency requirements. Applicability of concurrency to state highways and ferry routes continues to surface as a policy discussion. Two legislative studies underway in 2006 address concurrency. These studies include an examination of whether the concurrency goal should apply to state-owned transportation facilities and how multimodal systems such as transit contribute to concurrency goals. These studies present a timely opportunity to discuss the Growth Management Act's concurrency requirement as it relates to statewide transportation needs. Both projects are in development and will be submitted to the Legislature by December, 2006.

Multimodal Concurrency Study

The multimodal transportation concurrency study requires WSDOT and the Puget Sound Regional Council (PSRC) to coordinate efforts to deliver a study that

examines multimodal transportation improvements and strategies to comply with the concurrency requirements of the Growth Management Act (GMA).

The study request calls for analyzing approaches to concurrency that better integrate roadway and transit planning, maintain the ability to attain development objectives of growth centers, and allow for tailoring of Level of Service standards to different growth centers and travel periods. Technical assistance is provided by the Washington State Transportation Research Center (TRAC). For more information, see www.wsdot.wa.gov/planning/concurrency/MultimodalStudy.htm.

State-Owned Transportation Facilities Analysis

The state-owned transportation facilities study directs WSDOT to conduct an analysis of expanding the statewide transportation concurrency requirements. It includes development impacts on LOS standards applicable to state-owned transportation facilities, including state highways and state ferry routes. The analysis will examine gaps in law and practice that strengthen state and local transportation planning. The Legislative objective of the analysis is to ensure that jurisdictional divisions do not defeat growth management concurrency goals.

Economic Vitality

Freight Systems

Freight system investments are intended to generate overall economic prosperity and wealth to citizens in the state. They are focused on focused on improving the performance of the freight system for the users and customers of the system. These improvements are necessary to support Washington's role as a global gateway, our own state's manufacturers and agricultural growers, and the state's retail and wholesale distribution system.

Washington State's strategic investment plan in the freight transportation system is supported by the Washington Transportation Plan Freight Report, which was presented to decision-makers in 2005 and 2006. It is organized in three chapters that explain Washington's role as a gateway state, how freight transport supports Washington's regional economies, and the role of the local distribution system.

The report analyzes original research and existent information about Washington State freight customers, to inform decision-makers:

- Who are the customers of the state's freight system
- Why freight customers matter in terms of jobs and contribution to Gross State Revenues
- What performance the customers expect from the freight system
- Where key performance gaps are located
- How decision-makers may make the most productive strategic investments in Washington State's freight system.

The report provides context for the system's assessment by featuring more than a dozen case studies of Washington State freight carriers, producers and distributors. It defines terms to create a common vocabulary, and summarizes data from state and federal freight studies relevant to Washington.

Overview of Washington State's Freight System

The three components of Washington State's freight system:

Washington State Value of Freight Shipments
(2005: Billions of Dollars)

* Washington State Department of Revenue and Washington State Department of Community, Trade and Economic Development

- Global Gateways – International and National Trade Flows Through Washington
- Made in Washington – Regional Economies Rely on the Freight System
- Delivering Goods to You – The Retail and Wholesale Distribution System

underpin our national and state economies, support national defense, directly sustain hundreds of thousands of jobs, and distribute the necessities of life to every resident of the state everyday.

First, Washington is a gateway state, connecting Asian trade flows to the U.S. economy, Alaska to the Lower 48, and Canada to the U.S. West Coast. About 70 percent of international goods entering Washington gateways continue on to the larger U.S. market. Thirty percent become part of Washington's manufactured output or are distributed in our retail system.

Trade Through Washington by Volume

Second, our own state's manufacturers and farmers rely on the freight system to ship Washington-made products to local customers, to the big U.S. markets in California and on the East Coast, and worldwide. Washington's producers generate wealth and jobs in every region in the state.

Finally, Washington's distribution system is a fundamental local utility, since without it our citizens would have nothing to eat, nothing to wear, nothing to read, no spare parts, no fuel for their cars and no heat for their homes. In other words, the economy of the region would no longer function.

The value and volume of goods moving in these freight systems is huge and growing.

What are the findings?

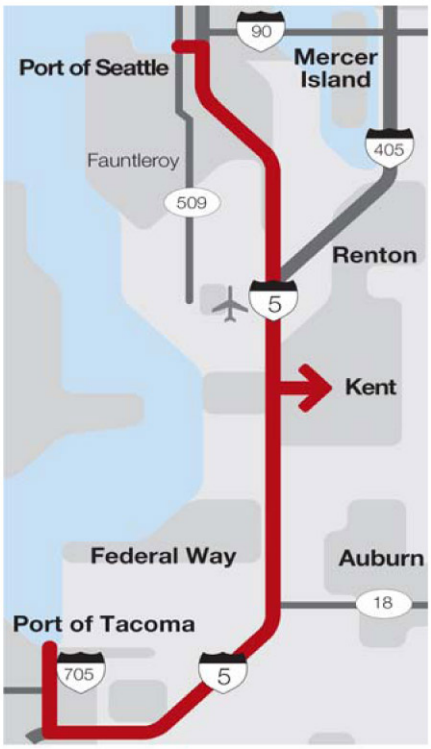
Globalization, competitive industry trends, and new technologies are pushing freight volumes up twice as fast as Washington's overall population and traffic growth. Without strategic investment by the public sector, our natural population growth, intensified by these three trends, will choke international trade flows through the state, undermine regional economies, and spill over into competition for road capacity in congested metro centers. With strategic investment, Washington will continue to compete.

While Washington State's population grew from 4.1 million to 6.1 million from 1980 to 2003 (the 45 percent increase includes substantial in-migration), and is projected to grow to 8.5 million (a 34 percent increase) by 2030, growth in the freight system is increasing at a much higher rate. Truck trips increased by 94 percent on the Interstate 5 corridor, and by 72 percent on the Interstate 90 corridor, in the ten years between 1993 and 2003. From 1998 to 2020, freight volumes in Washington State are expected to increase by 80 percent.

Global Gateways – International and National Trade Flows Through Washington

- Washington State is an important and growing gateway for trade access to the Pacific Rim, Canada and U.S.
- The state's global gateways freight system serves the national economy and national defense.
- It also provides competitive advantage for logistics and trade, manufacturing, agribusiness and timber/wood products sectors.

Central Puget Sound Container Port to Regional Distribution Center



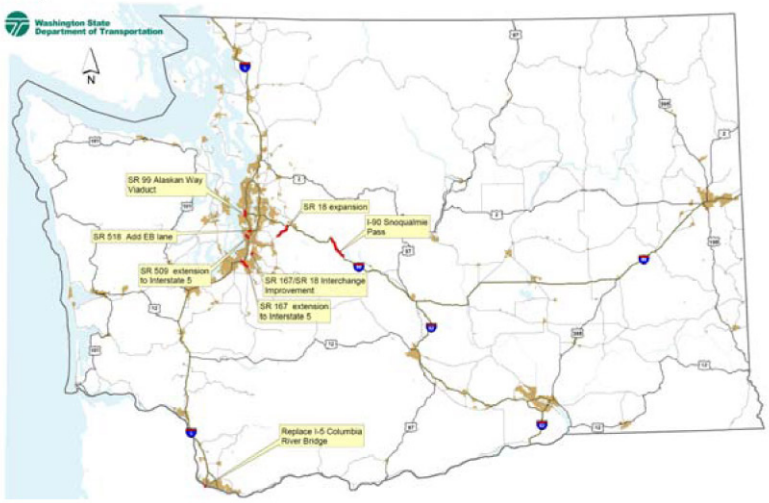
Globalization, in particular the emergence of China and Asia as an important part of the factory floor for the United States, will double the volume of imported container freight entering the Ports of Seattle and Tacoma by 2025. Midwest and East Coast consumers, at the far end of the Asia-to-United States supply chain, purchased about three-fourths of the international goods entering Washington ports in 2005. Most of these goods are shipped to the Midwest in containers via rail.

Washington's exporter and importer distribution facilities are concentrated in the Kent and Auburn Valley. They have no practical alternative to the state's most heavily used north-south freight routes:

- Interstate-5
- Interstate-405-Highway 167
- Highway 99-Alaskan Way Viaduct-
- Highway 509

Delay costs everyone. Consumer goods cost more. Shippers turn fewer shipments to the ports. Manufacturers have shorter windows to ship air cargo. Worst of all, it takes more trucks to ship the same volume, as each truck gets fewer trips per day.

Deficiencies and Failing Structures on the Core Freight System Grid



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Global security needs and our national defense depends on the United States' ability to rapidly project force when needed. Fort Lewis is the only Power Projection Platform on the West Coast. In the event of a major conflict, essential equipment and supplies will rush to Fort Lewis from all over the United States by rail and road, then ship through the Ports of Tacoma, Olympia and Seattle to support the troops. The military traffic will attempt to surge through highway freight systems that have already reached their capacity limits on Interstate 5 in Central Puget Sound.

Washington's own largest waterborne export is food, mostly grain. Eighty-five percent of eastern Washington wheat is shipped to Asia via Columbia River ports, but farmers struggle to get product through the state's freight system. For example, growers can't get produce off the farm up to two months a year due to weight-restrictions on county roads.

By far, Washington's largest waterborne import is crude oil from Alaska, shipped to the state's refineries. Refined product: gas, diesel and jet fuel, then moves by pipeline or barge to distribution centers and is trucked to gas stations. The Olympic Pipe Line, currently operating at close to 100 percent capacity, has no plans to add pipeline capacity in the state.

Cross-border truck volumes have nearly doubled at western Washington crossings over the past 11 years. This growth has strained border crossing facilities and enforcement agencies processes, resulting in queues of trucks north and southbound.

Needs

The following are representative needs for the Global Gateways Highway Freight System:

- There are deficiencies on the core freight system grid in Central Puget Sound:
  - Congestion on the I-5 corridor from Everett to Olympia
  - Missing highway links and failing structures such as Highway 509 and Highway 167, and the Alaskan Way Viaduct
  - Failing structures
- The I-5 Columbia River Bridge is at capacity and needs to be replaced
- I-90 Snoqualmie Pass improvements to prevent severe weather closures
- A local truck route program is needed to connect ports to the core freight system grid

Washington State Regional Economies

- Washington - Canadian border delays, congestion and security issues
- Ground access for air cargo: SR 518
- Grade separations at high-impact locations
- Operational improvements: complete statewide Weigh-In-Motion system, communications/ITS, truck rest stops

Made in Washington – Regional Economies Rely on the Freight System

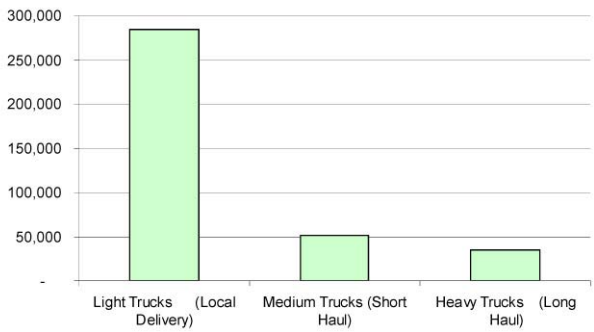
Our state's regions have built strong and distinct economies based on industry and agriculture. Regional manufacturing, agriculture, construction, and forestry depend on an effective and efficient freight transportation system.

Over 519,000 jobs in regional manufacturing, agriculture, construction and forestry depend on Washington's freight system, and accounted for $145.7 billion, or 36 percent of all state gross business revenues in 2005. Transportation is especially important for Washington agriculture because the state produces about three times as much food – and for some commodities up to twenty times as much on a tonnage basis – as it consumes, and it is separated by long distances from the majority of the nation's consumers. More efficient freight systems will help Washington manufacturers compete in the larger West Coast market.

Competitive pressure to cut inventories from every step in the manufacturing process is reshaping industrial supply chains, and causing more frequent freight shipments. The Boeing Company, employing 65,000 in Central Puget Sound, is Washington's largest manufacturer with $22.7 billion in airplane revenues in 2005. Boeing's dependence on the state's freight system will become even greater as it sets new levels of efficiency in the manufacture of the new 787 Dreamliner. Although Boeing has historically made planes from up to a million smaller pieces and shipped them by truck, train and boat, its new strategy to gain efficiency is based on major component assembly. Fewer parts, with more frequent deliveries, will support their just-in-time inventory reduction strategy.

Cost-cutting inventory reduction strategies are also underway at thousands of other mid-market manufacturers and producers around the state. For example, the Vancouver Frito-Lay plant receives up to 50 truckloads of fresh potatoes each week from growers in the Columbia Basin. The plant keeps just enough potatoes on hand for one eight-hour shift; if the potatoes do not arrive on time, the plant cannot run. WaferTech's one-million-square-foot semiconductor foundry in East Clark County can't function without fast and reliable air cargo; if a tool is delayed overnight in the supply chain from Taiwan, the plant will shut down and idle 1,000 employees. Farmers ship vegetable produce over 200 miles from Prosser to Costco in Central Puget Sound, and are required to deliver within 15 minutes of their scheduled appointment.

Most Commercial Trucks Licensed in Washington State Are Light



Washington State Department of Licensing, September 2004.

These competitive trends are repeated in thousands of manufacturing plants, construction sites, agricultural growers and processors, and distributors facilities in Spokane, Bellingham, TriCities and across the state - driving logistics practices toward perfect flow that puts more trucks on the road, more frequently, with ever-shorter delivery windows.

Spokane regional manufacturers and health care system practitioners, and Eastern Washington agricultural growers and processors, all cite severe winter weather closures on Interstate 90 at Snoqualmie Pass as Eastern Washington's top freight priority. They ship to customers in Central Puget Sound, so fixing delays on Interstate 5 from Everett to Olympia comes in a close second.

Northwest and Southwest Washington manufacturers and trucking firms are also shipping to the Central Puget Sound region, so they put fixing the Interstate 5 corridor at the top of the list.

The Columbia Basin/North Central Washington agricultural center leads the nation in apple and potato production. Apples and potatoes must be shipped in

refrigerated truck or rail cars; 90 percent are trucked to market. Continued refrigerated truck shortages are likely due to seasonal peak demand and an ongoing pull from other U.S. regions for refrigerated capacity.

Needs

The following are representative needs for the Made in Washington Highway Freight System:

- There are deficiencies on the core freight system grid in Central Puget Sound:
  - Congestion on the I-5 corridor from Everett to Olympia
  - Missing highway links and failing structures such as Highway 509 and Highway 167, and the Alaskan Way Viaduct
  - Failing structures
- The I-5 Columbia River Bridge is at capacity and needs to be replaced
- I-90 Snoqualmie Pass improvements to prevent severe weather closures
- Washington - Canadian border delays, congestion and security issues
- Ground access for air cargo: SR 518
- Operational improvements: complete statewide Weigh-In-Motion system, communications/ITS, truck rest stops
- Local roads are closed or weight restricted to heavy trucks for up to two months a year during spring thaw.
- A local truck route program is needed to connect industry to the interstate and the state highway system.
- A solution is needed for refrigerated truck and railcar shortages.

Delivering Goods to You – The Retail and Wholesale Distribution System

Distribution is a critical component of the freight system, as it produces up to 80 percent of all truck trips in metropolitan areas, and serves the retail, wholesale and business services sectors. Over 732,000 jobs are involved in the distribution system; accounting for $221 billion in 2005 gross business revenues, equal to 71 percent of total state revenues. An enormous variety of goods are handled on this system; food and groceries, fuel, pharmaceuticals and medical supplies, retail stock, office supplies and documents, trash and garbage, construction materials and equipment.

Washington State's modern service economy depends on speed of delivery through the freight system. Distribution companies must provide fast and ubiquitous service that is reliable under all conditions. FedEx and UPS drivers do not go home until every package is delivered. Hospital patients cannot wait for drug deliveries. Washington's modern service economy depends on speed of delivery through the freight system. These companies rely on Interstate 90 and the core freight system grid to reach population centers; and

The most common method of distributing goods is by truck from large Distribution Centers (DCs) to stores and businesses. When those trucks run into congestion, companies compensate for delays by sending more trucks out on the road, causing even more congestion. Land use costs are also causing higher truck volumes. For example, in response to increased consumer demand for a wider variety of food products, grocers are increasing overall store size and shelf space. But back-storage space doesn't generate sales, so modern grocery stores are reducing expensive, non-productive storage space. This requires more frequent deliveries in smaller quantities; one Seattle specialty grocery store, for example, receives 375 truck deliveries per week.

New technologies enable companies to track more and more trucks, balance their inventories and capital usage, while managing very tight delivery windows. For example, UPS and FedEx's high-tech logistics services allow companies to track inventory on the Internet no matter which warehouse, truck, or other location holds their products. By implication, the greatest increase in overall truck volumes will be seen in many more, smaller trucks on the roads.

Tremendous population and employment growth in Washington State will increase the need for distribution services. The state's 2005 population of over 6 million will grow to 7.8 million by 2020, and to 8.6 million by 2030. Employment is projected to grow from 3.1 million in 2005 to almost 3.8 million by 2020, and to over 4.1 million by 2030. Growing urban areas need daily delivery of consumer goods; most are coming from the state's major distribution hubs in Central Puget Sound. In order to achieve population and employment growth, the freight system must be able to provide delivery of consumer goods to residents everyday

Needs

The following are representative needs for the Delivering Goods to You Highway Freight System:

- There are deficiencies on the core freight system grid in Central Puget Sound:
  - Congestion on the I-5 corridor from Everett to Olympia
  - Missing highway links and failing structures such as Highway 509 and Highway 167, and the Alaskan Way Viaduct
  - Failing structures
- The I-5 Columbia River Bridge is at capacity and needs to be replaced
- I-90 Snoqualmie Pass improvements to prevent severe weather closures
- A local truck route program is needed to connect distributors and urban areas to the interstate and the state highway system
- Construction planning on truck routes
- Operational improvements and active management of the system to ensure that high-value, time-critical deliveries must move quickly through the freight distribution system

Health and the Environment

Investing in our transportation systems can help align citizens' goals for a healthy environment. Environmental elements are considered part of every project's design, construction, operation and maintenance.

Highway construction projects are designed to:

- Treat stormwater by removing sediments and metals
- Protect the quality of groundwater
- Control erosion of banks and reduce surface run-off
- Provide fish passage and enhance habitat connections
- Build barriers to reduce noise on neighborhoods
- Replace and improve wetland functions
- Protect cultural and historic resources
- Minimize air pollution
- Allow habitat connectivity for animals
- Provide Bicycle/Pedestrian Facilities as needed.

WSDOT plans to continue investing in stand-alone environmental retrofit projects to fix problems along the existing highway system.

These projects are funded to:

- Remove culverts that keep fish from reaching upstream habitat
- Reduce highway noise in areas not addressed by past construction projects
- Treat stormwater
- Fix stretches of highway that suffer repeated flooding or streambank erosion
- Provide pedestrian crossings near schools, senior centers, and parks
- Provide bicycle connections near schools and in urban areas

Fish Passage Barrier Retrofit

What is the Problem?

Salmon and other fish need access to freshwater habitat for spawning and juvenile rearing. Under-sized road culverts act as barriers, blocking fish from habitat.

A state program identifies and fixes fish passage barriers on state highways (recent funding boosts this program). There is currently no statewide program to identify and fix barriers on non-state roads.

Vision for the Fish passage Barrier Removal Program

1. What is the problem and how do you find it? Highway culverts can act as barriers to fish passage that may keep salmon and trout populations from accessing their historic rearing and spawning grounds. Prior to WSDOT establishing its fish passage barrier removal program, there was no way to fund stand alone fish barrier correction projects. In 1991, WSDOT established a programming process to propose stand alone fish barrier removal projects to the Legislature.

We contracted with the Washington Department of Fish and Wildlife (WDFW) to inventory, identify, and prioritize state-owned culverts that are fish passage barriers. To date, WDFW has inspected 5,853 highway stream crossings and have identified 1,538 WSDOT-owned fish passage barriers where modifications to the culvert or other water crossing would result in significant fish habitat gain. We have removed 180 of these barriers and over 411 miles of stream habitat has been reclaimed for fish use.

2. What is our vision for the Fish Passage retrofit program and where do we want to be in 10 year, 20 years? (THIS SECTION IS STILL A WORK IN PROGRESS).

   WSDOT's long-term goal is to correct all fish passage barriers. Our strategy is to correct the highest priority fish passage barriers first. Some barrier corrections provide more habitat gain than others and projects to correct the barrier can vary widely in cost. The highest priority barriers are those that open up the greatest amount of high-quality fish habitat

at the lowest cost. The rate of barrier correction also depends on the amount of funding WSDOT has for the barrier removal program.

Existing funding:
TPA:

Our vision (or what we'd like to do if we had the money): In 20 years, we would complete 40% of the barriers to gain 80% of the highest quality habitat.

3. How do we prioritize the retrofit work?

WDFW evaluates and prioritizes WSDOT culverts identified as barriers to fish passage and establishes a Priority Index (PI) for each project. Projects are prioritized so that the first culvert barriers corrections are those that provide the greatest habitat benefits to fish. The PI takes into account the habitat gain, mobility and health status of the fish stocks that would benefit from the increased habitat, and the projected project cost. Barriers that rate the highest are those that benefit the most species and open up the most habitat.

5). How do we characterize the benefits? What are our performance measures? What are our links to current initiatives (executive order, governmental goals, policies, etc.

We characterize benefits as the square meters of habitat opened up for salmonid use as a result of barrier removal. WDFW inspects each corrected barrier the first year after construction. Each project is checked for fish passage use, and certain sites are selected for long term studies to see if fish use continues and whether the design of the structure is working as intended. As of May 2006, more than 1,752,387 square meters of salmonid habitat, or over 662 linear kilometers (411 miles) has been reclaimed.

Correction of WSDOT fish passage barriers directly supports statewide salmon recovery efforts. In addition, barrier correction may also help reduce repetitive maintenance activities.

6). Maps
GIS maps of identified WSDOT fish barrier removal projects have been created and are available as overlays.

2005 Legislative Action

$20 million for fish passage barriers on state highways.

WTP says "188 million to remove 900 barriers"

Ability to meet goal of fixing all barriers (nearly 900 sites require fixes on state highway system).

Description of Proposal

Assess whether projected funding over the next 12 years for the Fish Passage Barrier Retrofit program will adequately cover the need on state facilities.

Develop a strategy to address barriers on tribal, county and city roads.

Description of Benefits/Impacts of Implementing the Proposal

Correcting fish passage barriers like roadway culverts is one of the most effective ways to improve streams for fish habitat conditions.

WSDOT Fish Passage Barrier Removal Plan

WSDOT has been evaluating and correcting state highway fish passage barriers using a three-pronged approach. First, it designates dedicated (I-4) funding to correct the highest priority fish passage barriers within the Environmental Retrofit Program's Six Year Plan. Second, as road projects are constructed, additional fish passage barriers are removed whenever a Hydraulic Project Approval (HPA) is required. Combining fish passage restoration with road project construction decreases costs eliminating duplication in equipment and personnel mobilization. And third, some fish passage barriers are corrected as a result of routine maintenance on failing culverts.

Fish Passage Barrier Correction with Dedicated I-4 Funding

Each biennium dedicated funding within the WSDOT Environmental Retrofit Program (I-4) budget is set aside for correction of ranked, high priority fish passage barriers identified during the WSDOT inven-

tory. Projects are prioritized to provide the largest gains in habitat and the greatest production benefits for both migrating and resident fish species. Many factors determine a project's priority including: the degree of passage improvement, potential increase in production for specific species resulting from the gained habitat, amount of habitat gained, benefits or drawbacks from increased mobility to species present, stock status of species present (WDFW Salmonid Stock Inventory, SaSI), and cost of the project. All the factors are consolidated in a numeric Priority Index (PI) model, which provides an objective priority ranking for each project. These projects are contained within the Washington State Department of Fish and Wildlife (WDFW) Fish Passage and Diversion Screening Inventory Database.

Six Year Planning Document

At WSDOT's request, WDFW has prepared a prioritized list of fish passage projects to be constructed and evaluated over the next three biennia. The Six Year Plan is the result of a process of project evaluation, scoping, development of conceptual designs, and budgeting. The Six Year Plan is regularly updated as projects are identified, prioritized, scoped, and refined. Project scoping is a multi-phased process that is carried out by WDFW biologists, environmental engineers, and WSDOT regional staff.

Fish Passage Inventory

Fixing Chronic Stream Bank Failures

What is the Problem?

At numerous locations along the state highway system, stream banks frequently flood or fail, damaging the roadway. Frequent and chronic maintenance and repairs to the state transportation infrastructure cause impacts to fish and/or fish habitat.

2005 Legislative Action

The Legislature provided $52 million to fund 10 retrofit projects.

WTP lists this as Medium Priority $98 Million

Stream bank failures additional needs.

(note: based on rate at which sites are currently identified and reach analyses completed, this is the low estimate. Aggressive retrofit would be $400 million)

Description of Proposal

Increase the funding level in order to continue identifying and fixing sites that are in need of long-term solutions to repetitive, high-cost maintenance.

Description of Benefits/Impacts of Implementing the Proposal

Expanding the program reduces maintenance costs for chronic repairs, reduces flooding risk, and improves habitat for important fish species.

Prioritization for Chronic Environmental Deficiencies (CED) Projects

Washington State Department of Transportation
Fish Passage Barrier Removal Data used in the Development of the 05-07 Program

								6 Year Plan				
								05-07	07-09	09-11	11-13	13-15
Stream/Project Name	Priority Index	Percent Passable	Hwy	MP	Region	Tributary Location	Site ID	Cost Est ($1,000's)	Cost Est ($1,000's)	Cost Est ($1,000's)	Cost Est ($1,000's)	Cost Est ($1,000's)
WDFW Inventory and Scoping	N/A	---	Statewide	N/A	All	---	N/A	$1,500.0	$1,600.0	$1,700.0	$1,800.0	$1,900.0
Mill Cr	19.1	0	US 2	70.21	NC	Nason Cr	990282	$1,009.0				
Little Boulder Cr	15.7	0	SR 20	181.34	NC	Methow R	990228	$498.0				
Beaver & Frazer Cr's (Twisp)	43.6/19.1	---	SR 20	205.84/206.85	NC	---	980114/24	$832.0				
Stevens Cr	22.0	0	SR 92	0.47	NW	Lake Stevens	991821	$280.0				
Toad Cr	13.4	0	SR 542	2.4	NW	Squalicum Cr	991803	$204.0				
High Cr	21.4	33	SR 542	24.9	NW	Kendall Cr	991621	$141.0				
Baptist Camp Cr	8.4	67	SR 542	28.74	NW	NF Nooksack R	990023	$140.0				
Hedrick Cr	16.6	0	SR 542	32	NW	Nooksack R	990187	$181.0				
Gribble Cr	21.9	33	SR 9	48	NW	WF Nookachamps Cr	991122	$208.0				
Catherine Cr	24.8	---	SR 92	1.93	NW	---	07.0148 1.3	$82.0	$126.0			
Swamp Cr	61.6	---	I 405	29.75	NW	---	08.0059 7.00	$92.0	$174.0			
Skobob Cr	20.0	67	SR 106	0.85	OLY	Skokomish R	990384	$947.0				
Unnamed to Physt R.	28.0	0	SR 112	24.91	OLY	Pysht R	990714	$243.0				
Chicken Coop Cr	30.9	0	US 101	271.98	OLY	Sequim Bay	990075	$32.0	$732.0			
Unnamed to Skokomish R	10.8	0	SR 106	2.95	OLY	Skokomish R	991244	$24.0	$288.0			
Bjorgen Cr	17.2	0	SR 305	9.88	OLY	Liberty Bay	991742	$71.0	$1,375.0			
Unnamed to Squamish Harbor	12.9	0	SR 104	12.7	OLY	Squamish Harbor	992196	$322.0				
Bear Cr	19.0	33	SR 112	54.35	OLY	Salt Cr	990713	$441.0				
Bowman Cr	32.4	---	SR 142	20.2	SW	---	30.0068 0.4	$896.0				
Snyder Canyon	23.2	33	SR 142	13.4	SW	Klickitat R	992223	$291.0				
							05-07 Total	$8,434.0				
Unnamed to Pilchuck Cr	31.6	33	SR 532	9.75	NW	Pilchuck Cr	990624		$143.0			
Swamp Cr	58.4	67	I 5	182.73	NW	Sammamish R	993090		$800.0			
Unnamed to Pacific Ocean	15.8	67	SR 109	36.4	OLY	Pacific Ocean	991270		$110.0			
Lees Cr	21.1	0	SR 101	250.5	OLY	Strait of Juan de Fuca	990240		$1,200.0			
Unnamed to Mayfield Lk	17.6	0	SR 122	4.99	SW	Mayfield Lk	992234		$260.0			
Mosquito Cr	20.4	67	US 101	76.48	OLY	North R	991908		$300.0			
Unnamed to Liberty Bay	24.2	0	SR 305	9.6	OLY	Liberty Bay	990709		$875.0			
Butte Cr	20.7	33	US 101	61.15	SW	Smith Cr	990053		$457.0			
Unnamed to Willapa Bay	25.9	0	SR 6	5.37	SW	Willapa R	990805		$423.0			
Foster Cr	20.6	33	I 5	58.63	SW	Cowlitz R	990152		$130.0			
Deadman Cr	11.5	0	US 395	247.7	E	Kettle R	990106		$1,002.0			
								07-09 Total	$9,995.0			

Methodology for 05-07 biennium

Prioritization for chronic environmental deficiencies projects was developed by comparing several key factors pertaining to the severity of each problem site including:

Likely recurrence interval of damage
Presence of fish
Presence of Endangered Species Act listed fish
Number of species impacted
Habitat type impacted
Size and severity of impact area

For the 05-07 Biennium this evaluation was largely qualitative. A more quantitative methodology has since been developed that uses the same criteria in a statistical format, which will reduce the subjectivity of the evaluation and prioritization process.

Stormwater

Transportation agencies have come a long way toward aligning citizen's goals for a clean and healthy environment with meeting their transportation needs.

Today's highway construction projects integrate environmental components into project design, budget, construction and operation. We are now making major investments in wetland avoidance or replacement, erosion control, cultural resource protection and stormwater treatment. This is in response to specific permit requirements as well as best practices that demonstrate our environmental commitment.

Public discussion of emerging issues, advances in scientific knowledge, and evolving practices also inform us of additional needs and priorities.

Improving our Performance: Stormwater Management

Today's focus is on inventorying drainage outlets and investigating the performance of stormwater best management practices (BMPs) in terms of their ability to remove pollutants from stormwater, and control runoff. We are learning alot about the performance of various practices used by WSDOT and state, tribal, and local jurisdictions. Monitoring helps transportation agencies and regulators evaluate the effectiveness of treatment facilities and helps match the right treatment to each unique situation. For example, WSDOT's research has shown that grass-lined swales can reduce most pollutants from runoff and are very economical to build and maintain. We are now working with the State Department of Ecology and other agencies on acceptable approaches to manage stormwater and flow control more broadly within a watershed.

Expanding the menu of available stormwater management techniques also helps to build connections between transportation investments and other community goals such as landscape design and watershed initiatives.

There are numerous strategies and policies that guide how stormwater is addressed on various projects. In all cases where new pavement or structures are constructed, all stormwater from the new surfaces is treated for quality and quantity. The solutions we use are spelled out in the Highway Runoff Manual. They can range from something as simple as dispersion and infiltration to engineered facilities. Treating stormwater outside the immediate project footprint is sometimes allowed.

, We have established specific provisions for treating stormwater coming from existing pavement in order to maintain the financing intent and capacity of our budget subprograms. In Mobility Projects (Program I1) treating runoff from existing pavement is always allowed. In Safety and Economic Initiatives projects (Programs I2 and I3) there is generally a limit of 20% of the cost to treat new pavement, although a variance can be requested. Environmental Retrofit projects (I4), except for Stormwater Retrofit, are not allowed to treat runoff from any pavement. Paving projects (P-1 subprogram) can only consider retrofitting existing impervious surfaces for projects involving the total replacement of existing concrete lanes.

These policies are reviewed periodically by the Strategic Planning and Programming Office to consider any changes that may be necessary due to changes in laws and other legislative directives.

Needs

Regulations requiring that highway runoff be treated to remove pollutants and control peek flows took effect in 1995. As most of Washington's highways predate such regulations, the water running off of these highways is not treated. This lack of treatment results in large amounts of dirty stormwater leaving the highway system in thousands of places called outfalls. The water from these outfalls potentially degrade local water used for drinking, recreation, fish habitat, and other beneficial uses. Because new

construction projects only affect limited portions of the highway system, WSDOT programming procedures allow for environmental improvements as part of the Environmental program. Although authorized, this program has been underfunded for some time despite a requirement of the Washington administrative Code (WAC 173-270) to retrofit deficient outfalls in the Puget Sound Region.

Strategies

While WSDOT is intent on addressing all stormwater deficiencies, this stormwater strategy priority will be given to growing urban fringe areas. There is a closing window of opportunity associated with preserving and protecting urban fringe areas compared to rural and intensely urbanized areas. As the area develops, land becomes much more expensive. Decreasing land availability and increasing real estate costs in such areas impose a level of urgency to provide stormwater treatment before currently available, cost-effective treatment options are forever lost. Development in urban fringe areas is transitioning to more intense land uses but the natural systems, while under stress, are still functioning properly and not beyond repair. Retrofitting stormwater here is more likely to make a measurable difference. At a minimum, the retrofits constructed in this environment will eliminate highways as a pollutant-contributing source as the area builds out. There will be a large array of treatment facilities to choose from and more of an opportunity to use low impact systems.

Stormwater Retrofit vision

1). What is the problem and how do you find it?

A stormwater outfall is the point where highway runoff leaves the right of way via a pipe or ditch, and flows into a stream or other water body, a storm sewer, or into the ground. Many outfalls carry untreated runoff from pavement, and the problem is how to 'retrofit' these outfalls, such as adding stormwater treatment facilities or using Best Management Practices (BMPs).

Prior to 1995 there were no design standards for managing and treating stormwater from roadways. Subsequent to 1995 the Highway Runoff Manual provided criteria for managing stormwater and recommendations for Best Management Practices to use. The problem is what to do with the stormwater outfalls constructed prior to 1995. To get a handle on the scope of the problem, first we must find and map all the outfalls; then to evaluate retrofit priorities, we must evaluate the discharge and where it flows, and then select the most appropriate BMP for the site conditions.

? Include in the vision the answer to "Where do we want to be in 10 yrs, 20 yrs?"

Our goal is to steadily improve the quality of water discharged from the state highway system. In 10 years we want to arrest the upward trend in pollutant loading and in 20 years to reduce the pollutants 20% below today's discharges.

3). How do we prioritize the retrofit work?

What is the likelihood of new construction doing it (before a crisis hits). Although new construction treats new surfaces for stormwater and retrofits existing surfaces within the project area, only a limited amount of highway miles can be treated in this fashion.

How do we prioritize in the near term and long term (this becomes our strategy for achieving the vision). Because WSDOT plans to retrofit areas where the best performance can be achieved for the resources committed, the first areas selected for retrofit will be in the developing urban fringe. WSDOT will first focus on the urban fringe because it 1) still contains high quality waters, 2) land is still available for building treatment facilities and 3) the window of opportunity to protect those waters is rapidly shrinking due to development. Retrofitting outfalls in rural area is less urgent because rural waters are less likely to become significantly affected in the near future and retrofit opportunities will not diminish as quickly. Retrofitting opportunities in urban areas are already greatly restricted due to a lack of space and real estate costs. Likewise, potential benefits are low in urban areas where extensive development in surrounding areas severely limits the potential for significantly restoring habitat and water quality.

Within these developing areas environmental specialists will apply a rating methodology that takes into account proximity to sensitive surface water bodies, drinking water supplies, and traffic density. We will use the data to identify areas in the developing urban landscape where retrofits are most likely to have a beneficial impact. Additional detailed inventory can then be scheduled to determine the highest priority outfalls in those areas and the best solutions.

5). How do we characterize benefit?

a) our performance: We can characterize benefit in terms of 1) acres of surface treated or 2) estimate reductions in annual load.
b) support other initiatives (Clean Puget Sound, Salmon recovery, etc.) Any program that relies on water. Controlling water flow benefits fish habitat, reduces bridge scour, and culvert maintenance. Managing pollutants benefits health of aquatic animals, drinking water supplies and human recreation activities.

6). Maps

Location of existing/proposed retrofit projects; Overlays of features we intend to protect (like sole source aquifers). Available shortly.

What is the Problem?

Most highways were built prior to stormwater regulations and have no treatment facilities associated with them. All new projects address stormwater, however, only a small amount of funds are applied to retrofit old stormwater facilities where no new construction is planned. There is also a lack of information about the outfalls on the state system. At the current rate of construction it will take more than a century to fix all of the roads lacking adequate treatment facilities.

Prioritization

Outfalls that discharge the largest amount of pollutants to the most sensitive waters are given top priority for retrofit. The first strategic step is to identify potential stormwater problem areas based on available Geographical Information System (GIS) mapping methods and information. Available map information is used to screen the entire state based on predefined conditions that are known to present higher that average risks for highway stormwater impacts. Receiving water uses are a large factor in assessing stormwater retrofit priority. GIS mapping methods identify receiving water size, receiving water quality, and use as a drinking water supply as three factors for consideration. Map information is also used to broadly characterize the quality of runoff, identify the potential for fixing the problem in association with a project, and identify whether treatment options are likely to be eliminated in the future due to urbanization. Once the areas that present higher than average risks for highway stromwater impacts have been identified using GIS map tools, site-specific field information is gathered to further prioritize those areas and to develop retrofit recommendations with cost estimates. Site specific information includes size of stormwater generating area, the presence of erosion problems or polluted discharge, and cost effectiveness of available treatment options.

To date we have evaluated 900 stormwater outfalls and determined that 360 (40%) of them need to be retrofitted. The estimated cost to retrofit the 360 outfalls is $17M ($47,200 average per outfall). WSDOT has approximately 18,000-24,000 outfalls (very rough extimate). If we presume that:

1) WSDOT has 18,000 outfalls (Low end of estimated range because limited inventory work has occurred in eastern Washington where outfalls may be less numerous),
2) The same proportion of outfalls (40% or 7,200 outfalls) need to be retrofitted statewide and
3) the average cost for retrofitting those outfalls would be the same ($47,000) as we have estimated to date,

Then we can make a extremely rough estimate that the total retrofit costs would be $340M (7,200 deficient outfalls X $47,000 average/outfall + $340M).

If we can fund $6-10M for stormwater retrofits per biennium for the next ten years we may be able to fix the worst 10% of WSDOT's outfalls. Costs to collect data, prioritize outfalls, and gather pre-scoping information would be $250,000 per biennium.

2005 Legislative Action

The 2005 Legislature funded several stormwater retrofit projects ($7.6 million for 8 projects).

Description of Proposal

Increase the funding for the stormwater retrofit program to complete the outfall inventory and fund more retrofit projects.

Description of Benefits/Impacts of Implementing the Proposal

Improving the performance of highway drainage facilities will improve water quality and reduce damage to the highway system from stormwater.

A complete inventory of outfalls and treatment facilities will help WSDOT better plan, execute and maintain an effective stormwater program.

Complete the inventory of stormwater facilities on the state highway system to develop a strategic

implementation plan, and begin retrofit istallations at selected locations – $340 million

This dollar request is derived from the following: Stormwater retrofit (capital) and maintenance / operating unfunded priority needs include:

- funding projects on 5% of outfalls to install stormwater treatment statewide,
- completion of an inventory of stormwater facilities (to track and prioritize);
- stormwater facility maintenance and inspection to comply w/ new permits.

(note: First ten years = 100 million for projects and the inventory; 70 million for 20 year maintenance /operations to comply with NPDES. Actually the total amount needs to be $340 million, not 170. The 170 was for 10 years, but the current instruction we're getting is to make the dollars needed for 20 years. For the retrofit item, the $100 million/10 year amount was for only retrofitting 5% of outfalls statewide, which is a very low target to begin with.)

Benefit: Improving the performance of highway drainage facilities will improve water quality and reduce damage to the highway system from stormwater. A complete inventory of outfalls and treatment facilities will help WSDOT better plan, execute and maintain an effective stormwater program. (slide #16)

Related Investments proposed by Commission in WTP:

Roadside Maintenance - Retrofit of existing state highway shoulders and medians as part of the Integrated Vegetation Management program to improve filtration of stormwater runoff and establish desired grass stands.

(note: 2 million a year for first ten years, one million per year last ten.)

Result would be decrease in herbicide use, weeds and invasive species and maintenance costs. Grass shoulders filter contaminants - benefiting water quality. (Slide 19)

FUNDAMENTALS OF THE STORMWATER OUTFALL PRIORITIZATION PROCESS

Stormwater Outfall

The Department is currently inventorying its existing facilities to locate impervious surfaces, to identify the location of stormwater runoff drainage points or outfalls, to determine whether they have been retrofitted in accordance with WAC 173-270-060. During the inventory process the engineers and environmentalists collect information about the quantity and quality of the stormwater runoff and the quality of the stream or river affected. This information, along with cost data, will be used by the Department to prioritize locations needed for water quality improvements.

Some of the key data elements considered are:

- Type and size of receiving water body
- Beneficial uses of receiving water body
- Highway contribution to total runoff
- Percent highway drainage contributes to watershed
- Water quality of receiving water
- Court mandated water quality standards for watershed
- Best professional judgment

Stormwater Outfall Inventory

Noise Barrier Retrofit

What is the Noise Wall Retrofit Program?

Noise wall retrofit is a voluntary program established by WSDOT to improve livability at locations where traffic noise was not considered when highways and freeways were initially built. Retrofit locations are only identified if sensitive uses likes homes, schools, and parks were permitted for construction on or before May 14, 1976. The date is important because federal traffic noise regulations came into effect in 1976. Anything built prior to that date is not subject to the federal noise regulations.

A short summary of How, When and Why WSDOT builds noise walls...

Noise walls are free-standing barriers built parallel to a highway. They are usually made of concrete and are found near public areas (such as parks) and residential homes. The walls range in height from 6 to 20 feet, but are typically 12 to 15 feet tall. Around the Seattle area, examples of noise walls can be seen on Interstate 5 just north of the Ship Canal bridge, on Interstate 90 just west of the Mount Baker Ridge tunnel, and on Interstate 405 between Totem Lake and Bellevue. Most noise walls are installed as part of large construction projects that add new highway lanes, which increase vehicle capacity.

Long before construction begins, acoustical engineers evaluate sources and patterns of noise in neighborhoods near the project limits. The findings are used to determine if noise walls would be appropriate and cost-effective. This evaluation takes into account many factors, only one of which is actual highway noise. Among other things, acoustical engineers

Washington State Department of Transportation
Stormwater Outfall Locations used in the Development of the 05-07 Program Showing Projects Programmed

Project Number	SR	Begin	End	Sub. Pgm	Project Title	Location	Phase	Start Start Date	End Date
100231B	2	18.91	24.90	I4	US2/Fern Bluff Road Vicinity to Sultan Startup Road Vicinity	E. of Monroe	PE	9/22/05	5/1/07
100231B	2	18.91	24.90	I4	US2/Fern Bluff Road Vicinity to Sultan Startup Road Vicinity	E. of Monroe	CN	4/2/07	9/10/08
100231B	2	18.91	24.90	I4	US2/Fern Bluff Road Vicinity to Sultan Startup Road Vicinity	E. of Monroe	RW	7/3/06	4/2/07
100232C	2	22.92	22.92	I4	US2/10th St I/S Vicinity	Sultan	PE	11/1/05	12/15/06
100232C	2	22.92	22.92	I4	US2/10th St I/S Vicinity	Sultan	CN	3/5/07	12/17/08
100559S	5	219.15	219.45	I4	I-5/Fischer Creek Vicinity	Mt Vernon S.	PE	7/2/07	2/2/09
100559S	5	219.15	219.45	I4	I-5/Fischer Creek Vicinity	Mt Vernon S.	CN	12/22/08	11/2/09
100583S	5	247.00	250.00	I4	I-5/Chuckanut Creek Vicinity	Bellingham	PE	8/6/07	6/1/09
100583S	5	247.00	250.00	I4	I-5/Chuckanut Creek Vicinity	Bellingham	CN	4/20/09	11/5/10
100583W	5	250.30	250.60	I4	I-5/Padden Creek Vicinity	Bellingham	CN	4/20/09	11/5/10
100583W	5	250.30	250.60	I4	I-5/Padden Creek Vicinity	Bellingham	PE	8/6/07	6/1/09
100591G	5	255.05	255.42	I4	I-5/Squalicum Creek Vicinity	Bellingham	PE	8/6/07	6/1/09
100591G	5	255.05	255.42	I4	I-5/Squalicum Creek Vicinity	Bellingham	CN	4/20/09	11/5/10
100598D	5	273.93	274.15	I4	I-5/Dakota Creek Vicinity	Blaine	CN	2/9/09	5/4/10
100598D	5	273.93	274.15	I4	I-5/Dakota Creek Vicinity	Blaine	PE	8/1/07	3/23/09
300507B	5	114.35	114.43	I4	I-5/Mcallister Creek - Stormwater	Nisqually	PE	12/14/01	2/21/06
300507B	5	114.35	114.43	I4	I-5/Mcallister Creek - Stormwater	Nisqually	CN	1/17/06	10/18/06
300507B	5	114.35	114.43	I4	I-5/Mcallister Creek - Stormwater	Nisqually	CN	1/17/06	10/18/06

PE - Preliminary Engineering
R/W - Right of Way
CN - Construction

look at area topography, population density, cost, and expected levels of noise reduction a wall would provide. If, for example, homes near a project are widely-spaced or built high on a hill, we often will not build noise walls because the cost to reduce noise for each resident is usually quite high and the wall does not noticeably decrease noise.

On occasion, we may build noise walls in high-noise neighborhoods that existed before the freeway. These walls, known as “retrofit” walls, are rare because their project funding must compete with other important programs like safety improvements and pedestrian accommodations. To be fair to everyone, retrofit noise walls are ranked and built according to a neighborhood priority list. We build on average one retrofit wall every two years. That means even if your neighborhood qualifies for a noise wall, it may be several years before it is actually built.

Our agency gets many requests from citizens to build noise walls, but not everyone wants them. Sometimes finished walls obscure scenic views from residents’ homes. And, in almost every case, we must remove trees and shrubs within our right-of-way to make room for a wall.

During the design phase of a project, we hold open houses to solicit public comments. We invite you to get involved by watching for notices of these open houses in your local newspaper. We want to hear your ideas and suggestions, especially if a project is planned near your neighborhood.

Health

Noise levels at 67 decibels (db) are based on annoyance curves from previous studies and has no relationship with health. Noise and health is an extremely complex issue because it affects many people differently. Annoyance leads to health concerns/stress in some people and not in others. Some people have a high tolerance for loud things and can not stand quiet. Others say that they can only function where it is quiet. Some people like to look at cars (e.g., NASCAR races) and others do not because the vehicle sounds bother them. Some people will put up with traffic if there is a scenic view at stake – but not without one. Other people are upset because they cannot control their noise environment, yet that lack of control is not an issue.

Property Values

We provide noise mitigation when it is reasonable and feasible to do so (including a cost/benefit analysis). Our determinations are not related to property values in any way, If we took property values into account, we would not be in compliance with environmental justice and non-discrimination values. The effects of noise mitigation on property values (like health), is so subjective that we can not make specific determinations. At 67+ db – if we place a noise wall that blocks a scenic view – property values may go up or down depending on the values of the property owner. For some locations, property values may temporarily dip during construction phases (because people do not generally like construction delays), but then come back up again once the project is complete. In some cases, properties values may increase more without

a barrier because of better access to transportation facilities. When we place barriers, the property value may go down because to some people the wall is too imposing, but others may value it more because of the noise reduction.

What is the Problem?

The impact of traffic noise on neighborhoods throughout the state was not considered before May 1976, when noise regulations were put in place. WSDOT has developed a prioritized retrofit program to construct noise barriers in these locations, but it has been under-funded.

2005 Legislative Action

The legislature provided about $38 million to address several of the highest priority locations.

Description of Proposal

Dedicate consistent funding for the noise retrofit program. The retrofit priority list consists of 61 locations in 20 different counties.

Description of Benefits/Impacts of Implementing the Proposal

Addressing the continued backlog of noise projects will benefit established neighborhoods and help to meet noise reduction goals.

WPT Priority Page 78 of WTP: Medium Priority $205 Million

Complete the remaining pre-1977 locations statewide. Fund 60 noise retrofit projects on state highways – $205 million

Benefit = Addressing the continued backlog of noise projects will benefit established neighborhoods and help to meet noise reduction goals.

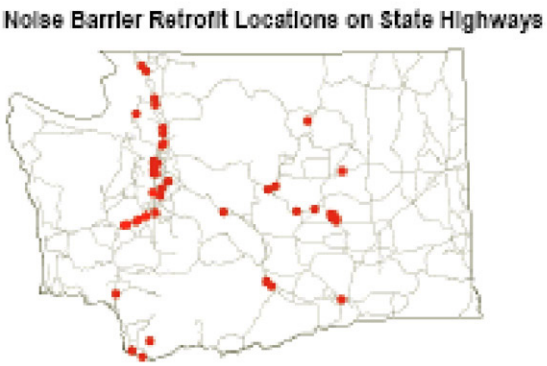
*No policy recommendations are made in the final WTP for addressing noise issues other than the specific retrofit of sixty locations.

Source WSDOT WTP Presentation-6/15/05

Washington State Department of Transportation
Chronic Environmental Deficiencies used in the Development of the 05-07 Program

Location	County	SR/River	Project summary
Vic. W of Yakima	Yakima	SR 12, Naches River	Project will construct a bioengineered bank, side channel reconnection and in stream engineered log jam structures to address repetitive bank erosion and toe slope failures affecting SR 12 and the Lower Naches River
Vic. S of Forks	Jefferson	SR 101, Hoh River (site #2)	Project will construct a series of 9 engineered log jam structures to deflect/diffuse erosive flows threatening SR 101 and improve habitat conditions in the Hoh River
Vic. N of Darrington	Skagit, Snohomish	SR 530, Sauk River (site #1)	Project will relocate approx ½ mile of highway along the Sauk River, protecting the highway while allowing channel migration to occur
Vic. W. of Hamilton	Skagit	SR 20, Red Cabin Creek	Project will replace existing culvert with a bridge and modify the channel to address bed aggradation and repetitive maintenance problems.
Vic. N of Hoquiam	Grays Harbor	SR 109 Moclips	Project will replace bridge that traps debris thus eliminating need for repetitive channel excavation
At Mt. Rainier Nat'l. Park	Pierce	SR 410, White River	Project will address severe bed aggradation problems that are forcing the White River on to and down SR 410, resulting in repetitive maintenance activities and the potential catastrophic loss of the highway
Vic. NW of Yakima	Yakima	SR 410 Rattlesnake Creek	Project will construct bank stabilization elements to address repetitive toe slope failures at the confluence with the Naches River
Vic. E of Arlington	Skagit, Snohomish	SR 530, Sauk River (site #2)	Project will construct bioengineered bank stabilization structures to address repetitive toe slope failure
Vic. E of Burlington	Skagit	SR 20, Skagit River	Project will construct engineered log jams and bioengineered revetment to address repetitive bank erosion and toe slope failures along the Skagit River
Vic. W of Port Angeles	Clallam	SR 112, Hoko/Pysht Rivers	Project will construct several bioengineered LWD structures for repetitive erosion sites
Vic. N of Deming	Whatcom	SR 542, Nooksack (site #2)	
			Total cost

[1] Cost estimates should include the following costs: Preliminary Engineering (20%), Right of Way, Construction, Construction Engineering/Inspectio (9%), traffic control (10%), mobilization, and inflation (15%)



Noise Barrier Inventory

Source Prioritization Process

How are noise retrofit locations prioritized on the list?

Washington State Department of Transportation Directive D22-22 outlines the procedures for placing locations on the ranked retrofit list and provides a detailed methodology on how to prioritize locations. Locations on the list are prioritized in an order reflecting traffic noise levels, number of homes benefiting, planning level cost, and achievable reductions.

Habitat Connectivity

Why is this an issue for WSDOT?

There is a growing understanding of the impacts of roads on wildlife and habitat. This is important from a natural resource conservation perspective as well as a matter of public safety. The 2005 publication by the National Academies of Sciences "Assessing and Managing the Ecological Impacts of Paved Roads" identifies how roads can constitute barriers to animal movement, lead to habitat loss, and in some cases can contribute to the decline of imperiled wildlife populations. Animal-vehicle collisions pose a serious hazard for motorists as well as a significant source of wildlife mortality. WSDOT annually records about 3,000 collisions with deer and elk on state highways.

Washington is biologically diverse state with over 650 vertebrate species. More than 63 of these are currently designated under the federal Endangered Species Act, including 38 terrestrial species. A list of these species can be found at: The state highway system occurs in the majority of the habitat types of the state. There is strong public support for transportation solutions that include ecological considerations as part of meeting transportation objectives.

Measures such as enlarged stream crossing structures, wildlife crossing structures, animal detection and warning systems, and fencing have proven useful in reducing some of the problems, but these need to be applied an a strategic manner to get the best gain. Significant effort has been made in a few areas of the State, such as the I-90 Hyak to Easton corridor, but in Washington, the attention has largely been opportunistic, and project by project. To provide the best benefit for habitat connectivity as well as helping reduce the potential for animal-vehicle collisions, a system for identifying and prioritizing key areas statewide is needed. This can then be used to develop location specific solutions in a strategic manner.

How can we contribute to a solution?

While there is a growing body of knowledge about how to better address wildlife habitat connectivity Research is needed to help identify high priority focus areas in the state for addressing wildlife connectivity statewide and to make preliminary recommendations for addressing connectivity. Working with existing GIS data, and other existing information including local expert knowledge, it would be possible to develop a habitat connectivity plan for the highway system. This would include where notable habitat linkage areas exist for large terrestrial animals such as deer, elk and cougar, as well as for other species that are of special conservation management concern. This prioritization should also note localities that have management for protecting nearby habitat and where significant records for animal vehicle collisions occur.

Potential Benefits of addressing this issue

This effort would provide a basis for determining the locations of key focus areas for connectivity. This could be used in project planning and scoping to identify where the best opportunities for improving connectivity and reducing animal vehicle collisions are and allow these to more be easily included in project planning. With a well developed system for prioritization, WSDOT will gain a better understanding of the scope and scale of the issue and will develop proactive strategies for improvements. This would also help with demonstrating compliance with SAFTEA LU section 6001 that directs states to incorporate natural resource information into transportation planning.

WILDLIFE KILL MAP

Washington State Department of Transportation
Noise Reduction Locations used in the Development of the 05-07 Program Showing Projects Programmed

									Numbers Provided in Residential Equivalencies									
Funded?	Project Number	2004 Ranking	WSDOT Region	SR	Est. Mile Post 1	Est. Mile Post 2	Location	County	Houses	Apartments / Mobile Homes	Schools	Day Care / Year Round Schools	Hospitals / Nursing Homes	Churches	Recreation Areas&Parks	Avg Wall Height	Wall Length	Total Wall Dollars **
Programmed but Un-funded	100524Z						I-5 / Ship Canal Bridge - Study to Develop Noise Mitigation						Partial noise analysis completed by con					$150,000 est.
Programmed but Un-funded	100525P	1	Northwest	005	171.40	171.90	85th St., southbound, east side	King	99							20	1260	$1,269,867
Programmed but Un-funded	100569N	2	Northwest	005	230.60	230.80	Westview School	Skagit			631					14	558	$400,241
Programmed but Un-funded	100524H	3	Northwest	005	168.06	168.40	Roanoke to Shelby, west side, southbound	King	11	100						22	1300	$1,441,198
Programmed but Un-funded	100524H	4	Northwest	005	167.78	168.06	Boston to Roanoke, west side, southbound	King	11	72	250					24	1716	$2,058,031
Programmed but Un-funded	100524H	5	Northwest	005	168.06	168.40	Roanoke to Shelby, east side, northbound	King	29	14				112		18	748	$695,434
Programmed but Un-funded	100525P	6	Northwest	005	171.50	171.90	85th St., northbound, west side	King	30							11	1667	$924,030
Programmed but Un-funded	100524H	7	Northwest	005	167.78	168.06	Boston to Roanoke, east side, northbound	King	53	4						12	1367	$826,623
Programmed but Un-funded	100567A	8	Northwest	005	225.80	226.40	South end of SR536 Interchange	Whatcom	66	8						14	2650	$1,840,469
		9	South Central	395	15.56	15.60	W. 19th Avenue, Benton County	Benton		50						12	1900	$1,141,503
		10	Olympic	005	110.10	111.00	14th Avenue, Thompson Place	Thurston	126			14				12	3800	$2,269,503
Not Programmed		11	Northwest	020	32.32	32.75	60th NW St.	Island	39							12	1176	$724,194
Not Programmed		12	Northwest	005	194.00	194.60	25th St. (southbound, west side)	Snohomis	20							14	1290	$910,807
		13	Southwest	005	49.16	49.84	Castle Rock, between Powell Road and Huntington Avenue	Cowlitz	32							10	2783	$1,388,803
		14	South Central	395	19.07	19.33	Flamingo Mobile Home Community, Pasco	Franklin		36						12	1315	$790,040
Programmed but Un-funded	100552N	15	Northwest	005	202.18	202.61	116th Street NE	Snohomish		30						12	838	$519,825
Programmed but Un-funded	100528N	16	Northwest	005	175.14	175.41	NE 155 th St.	King	28							12	1426	$862,300
		17	South Central	012	338.49	338.72	Crawford Dr. to Fraizier Dr., Walla Walla north side	Walla Wal	40							12	1400	$841,107
		18	Olympic	005	112.30	112.69	Queets Dr., East Tanglewild	Thurston	23							12	1911	$1,148,112
Programmed but Un-funded	100545C	19	Northwest	005	194.00	194.60	North of SR 2 Interchange (northbound, east side)	Snohomis	31					171		18	1330	$1,207,348
		20	South Central	240	38.14	38.58	Nevada Avenue to Short Avenue, Richland	Franklin	21							12	1000	$615,811
		21	South Central	012	338.50	338.72	Wellington Ave., Walla Walla south side	Walla Wal	30							12	1275	$766,009
		22	Southwest	014	11.49	12.00	West of 6th Avenue	Clark	30							12	2360	$1,416,714
Programmed but Un-funded	100525P	23	Northwest	005	171.00	171.20	NE 80th St. on west side of highway	King	36							16	1400	$1,128,771
		24	Olympic	512	11.55	11.99	Southwest of SR 167 I/C near Milepost 11.55	Pierce	15							10	2129	$1,070,236
Not Programmed		25	Northwest	005	170.10	170.30	Ravenna	King	23							18	1296	$1,175,534
		26	Olympic	005	121.52	122.05	Fort Lewis, 41st Division Drive to Berkley Jackson Avenue	Pierce	42							12	2611	$1,561,917
Not Programmed		27	Northwest	515	1.50	2.00	S 228th Street	King	32							14	1000	$723,119
Programmed but Un-funded	116928F	28	Northwest	169	24.10	24.30	Fifth Ave SE, Monroe Avenue to SE 5th Street	King	20							12	1145	$709,689
		29	North Central	017	51.73	52.19	Chief Moses Jr. High School	Grant			224					10	1200	$614,809
Funded Ad Date 10/04	100528Z	30	Northwest	005	176.56	176.70	NE 175th to 185th both (right and left sides)	King	16							12	2200	$1,330,337
		31	South Central	097	67.85	68.54	Wapato High School	Yakima			750					12	2175	$1,302,471
		32	Southwest	014	3.20	3.66	Evergreen Blvd., Vancouver	Clark	23							16	2450	$1,944,647
		33	North Central	002	115.18	115.63	County Park, Monitor	Chelan							380	10	2132	$1,067,405
		34	South Central	090	71.56	71.75	Easton, E. Easton Road to east of Trailer Park	Kittitas		25						10	1090	$557,997
		35	North Central	017	52.62	52.83	Dahlia Drive to Fairbanks Drive, School/Park, Moses Lake	Grant			135				430	10	1100	$563,575
		36	Olympic	512	1.11	2.21	South side of SR 512, Parkland	Pierce	49					30		12	3785	$2,264,211
		37	North Central	017	52.41	52.62	Evergreen Drive, Moses Lake	Grant	20							10	1150	$589,192
		38	South Central	090	71.28	71.56	Easton School	Kittitas	5	25	154					10	1190	$609,190
Not Programmed		39	Northwest	005	175.14	175.31	N. 145th St.	King	16							20	991	$998,761
Not Programmed		40	Northwest	522	5.96	6.24	Lake Forest Park	King	24							14	1476	$1,041,291
		41	North Central	017	52.83	53.20	Grand Drive, Moses Lake	Grant	39							12	3071	$1,826,679
		42	South Central	097	68.50	69.08	Hoffer Road to 1st Street, Wapato	Yakima	43							12	3050	$1,811,233
Not Programmed		43	Northwest	005	206.40	206.70	Smokey Point	Snohomis	13							14	1315	$928,458
		44	Olympic	512	1.11	2.21	North side of SR 512, Parkland	Pierce	55							12	3715	$2,222,337
Not Programmed		45	Northwest	005	191.97	192.63	47th Street SE to 41st Street SE	Snohomis	66							18	2916	$2,647,088
Not Programmed		46	Northwest	005	175.52	176.16	N 171st	King	31						50	16	1553	$1,252,129
		47	South Central	097	64.20	64.42	Mobile Home Park	Yakima		30						12	1150	$705,879
Not Programmed		48	Northwest	005	256.40	257.00	McLeod Rd., Bellingham	Whatcom	32							14	2600	$1,805,744
Not Programmed		49	Northwest	509	25.38	25.60	NE Ramp SR 518 Interchange	King	22							12	1215	$753,077
Not Programmed		50	Northwest	908	4.69	5.09	138th Ave NE	King	6							18	720	$669,401
		51	North Central	017	57.10	57.92	Offut Drive, Moses Lake	Grant	50							14	4330	$2,979,560
		52	South Central	395	17.24	17.59	SW Columbia Riv. Br., Kennewick	Benton	12	24			72			12	1485	$892,175
		53	North Central	017	56.90	57.13	Trailer Park	Grant		17						14	1200	$839,740
Not Programmed		54	Northwest	090	12.60	13.04	NW 41.5, 169th Avenue SE to 171st Avenue SE	King	22							16	1700	$1,370,650
Not Programmed		55	Northwest	526	2.93	3.32	Glenn Drive	Snohomis	7							16	700	$578,962
Not Programmed		56	Northwest	522	6.24	6.54	Uplake Terrace	King	30							12	1612	$974,774
		57	North Central	028	44.57	45.05	Oasis Park	Grant								10	2550	$1,274,605
		58	North Central	002	190.81	191.60	City Park, Coulee City	Grant							250	8	1430	$586,118
Not Programmed		59	Northwest	520	1.20	1.73	Foster Island/Arboretum, beg. Union Bay Br. to beg. Lake WA Br. (eastbound, south side)	King							520	16	2745	$2,194,754
		60	North Central	028	30.61	30.84	Quincy Park	Grant								8	800	$333,230
		61	North Central	097	260.85	261.13	Okanogan County	Okanogar	18							10	1400	$716,110
Not Programmed		62	Northwest	104	28.23	28.92	Wallingford Ave	King	19							18	1086	$1,009,680
Not Programmed		63	Northwest	005	262.80	263.00	Cedar Street	Whatcom	5							14	553	$396,978
		64	North Central	017	58.30	58.60	Castle Drive, Moses Lake	Grant	15							12	2180	$1,307,595
		65	North Central	002	119.10	119.26	Wenatchee	Chelan	11							12	1830	$1,099,448
		66	Olympic	005	120.00	120.50	North of Fort Lewis entrance	Pierce	24							14	2715	$1,894,819
		67	North Central	002	120.63	127.86	East Wenatchee, Douglas County	Douglas		6						12	590	$369,236
		68	North Central	017	55.70	55.90	Grape Drive, Moses Lake	Grant	11							14	1200	$841,107
		69	South Central	395	20.19	20.28	Wernet Road	Franklin		6						12	2045	$1,226,620
Not Programmed		70	Northwest	520	1.20	1.73	Arboretum, beg. Union Bay Br. to beg. Lake WA Br. (westbound, north side)	King							520	14	2710	$1,895,923
		71	South Central	395	19.51	19.80	Riviera Trailer Park Village, Pasco, Franklin County	Franklin		54	13					10	1350	$692,787
Programmed but Un-funded	100506N	2	Northwest	005	145.30	145.80	S 292nd St.	King		120						14	2300	$1,609,086

Source: WTP Presentation 6/15/05-Page 17

Health and the Environment

Habitat Connections

What is the Problem?

Transportation systems have the potential to impact habitat in ways that include:

- Direct effects such as noise disturbance or wetland fill
- Habitat fragmentation
- Barrier effects that impede the movement of fish and wildlife.
- Vehicle-wildlife collisions.

WSDOT recognizes the importance of habitat connections at the policy level. Funding for program support is needed to more consistently consider habitat connection as part of transportation planning, design, and construction.

Strategy to address the need:

WSDOT will develop a habitat connectivity plan, which will identify areas where habitat connectivity must be maintained. These will include priority areas where highways intersect important wildlife linkage zones, wildlife migration routes, and lands under special management for the protection and enhancement of wildlife (like wildlife refuges). These areas will be prioritized as low, medium and high priority for retrofit. Prioritization will consider many factors including, but not limited to, permeability needs of ESA listed species, areas of high animal vehicle collisions, management of adjoining landscaped (i.e. wildlife refuges, national forest etc.), and highway areas that are wider than normal.

Performance Outcomes:

Effectiveness of the program will be measured by the methods that relate to the solutions implemented. Typical measures may include reductions in the numbers of animal vehicle collisions, a measure of the number of connectivity structures installed per mile, frequency of use of connectivity structures, miles of habitat corridors connected etc.

2005 Legislative Action

None

Description of Proposal

Funding identification and prioritization of problem areas, development of design guidance, and coordination with agencies for connectivity planning.

Description of Benefits/Impacts of Implementing the Proposal

Careful analysis will help WSDOT determine the highest priority locations where investments should be made. This proposal would create dual benefits: protect wildlife and improve the safety of the traveling public.

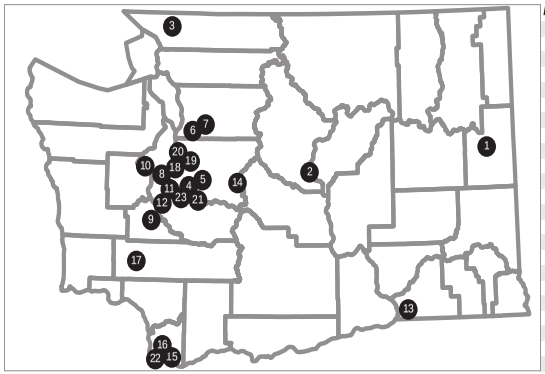
Increase habitat connectivity by providing safe connections across the highway for wildlife migration – $50 m

Benefits = Improve streams for fish habitat, increase potential for salmon recovery, and improve wildlife habitat and connectivity.

(note: establish program in 07/09 to set priorities; plan for gradual start to program through 2027)

Habitat Connectivity - the ability to reduce animal/vehicle collisions by providing safe connections across the highway for animal migration: Careful analysis will help WSDOT determine the highest priority locations where investments should be made. This proposal would create dual benefits: protect wildlife and improve the safety of the traveling public.

DRAFT 2007-2026 HSP: Mobility Implementation Plan



Key	Project Title
1	US 395 North Spokane Corridor
2	SR 28 East Wenatchee Corridor
3	SR 539 Lynden to the USA/Canada Border
4	SR 509 Complete SR 509 from I-5 to Des Moines Memorial Drive
5	SR 18 Issaquah Hobart Road to I-90
6	SR 522 Paradise Lake Road to Monroe
7	US 2 Monroe Bypass
8	Completion of Puget Sound HOV System
9	SR 510/SR 507 Yelm Bypass
10	SR 3 Belfair Bypass
11	SR 167 from SR 509 at the Port of Tacoma to SR 167/SR 512 at Puyallup
12	SR 704 Crossbase Highway
13	US 12 US 730 to McDonald Road
14	I-90 Snoqualmie Pass East
15	SR 14 Camas / Washougal
16	I-205 SR 14 to NE 134th Street
17	I-5 13th Street to Mellen Street
18	SR 518/SR 509 Interchange
19	I-405 Lynnwood to Tukwila - Corridor Improvements
20	SR 520 Bridge Replacement and HOV
21	SR 410 Bonney Lake Vicinity - Corridor Widening
22	I-5 Columbia River Crossing
23	I-5/SR 161/SR 18 "Triangle" Interchange

Preservation
Safety
Economic Vitality
Mobility
Environment

What are we trying to improve?
Level of Service?
Throughput?
Reliability?
Speed?

Strategies

Add General Purpose Lanes, Light/Heavy Passenger Rail, Transit/Multi-modal Facilities, HOV/HOT Lanes, Interchange Modification	Higher cost projects Corridor-wide benefits Typical Maximum Fix	**Tier III** **Plan Years 15 to 20**
Improvements to Parallel Corridors (inc. local roads), Auxiliary Lanes, Direct Access Ramps, Collector Distributor Lanes	Moderate to Higher cost projects Potential network benefits Typical Moderate Fix	**Tier II** **Plan Years 10 to 15**
System/Access Management, Signal Timing and Coordination, Operational Improvements, ITS, Traveler Information, Land Use, Ramp Modification, Turn Lanes, Intersection Improvements, Ramp Metering, Bus Pull-outs, Park and Ride Lots, Van Pools, Incident Response, Tolling	Low cost projects High return on investment Short delivery schedules System-wide implementation Typical Minimum Fix	**Tier I** **Plan Years 2 to 20**
Safety Improvements, Preservation	Lower cost projects, Limited mobility benefits	**All Plan Years**
System-wide Analysis, Performance Measurement and Monitoring		**Continuous**

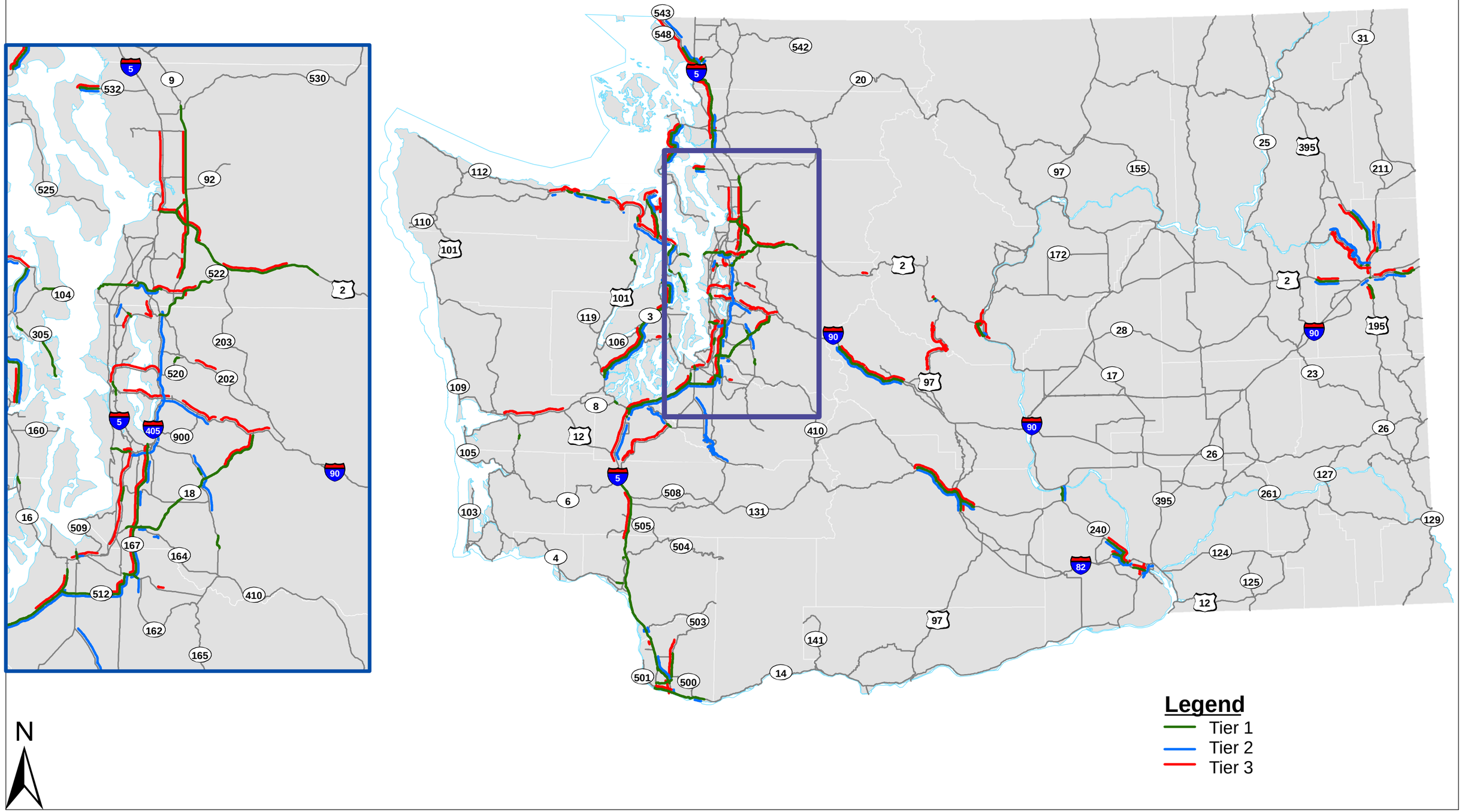
Expanding Capacity (Bigger System)
System Efficiency (Efficient System)
System Preservation (Healthy System)

Project Cost

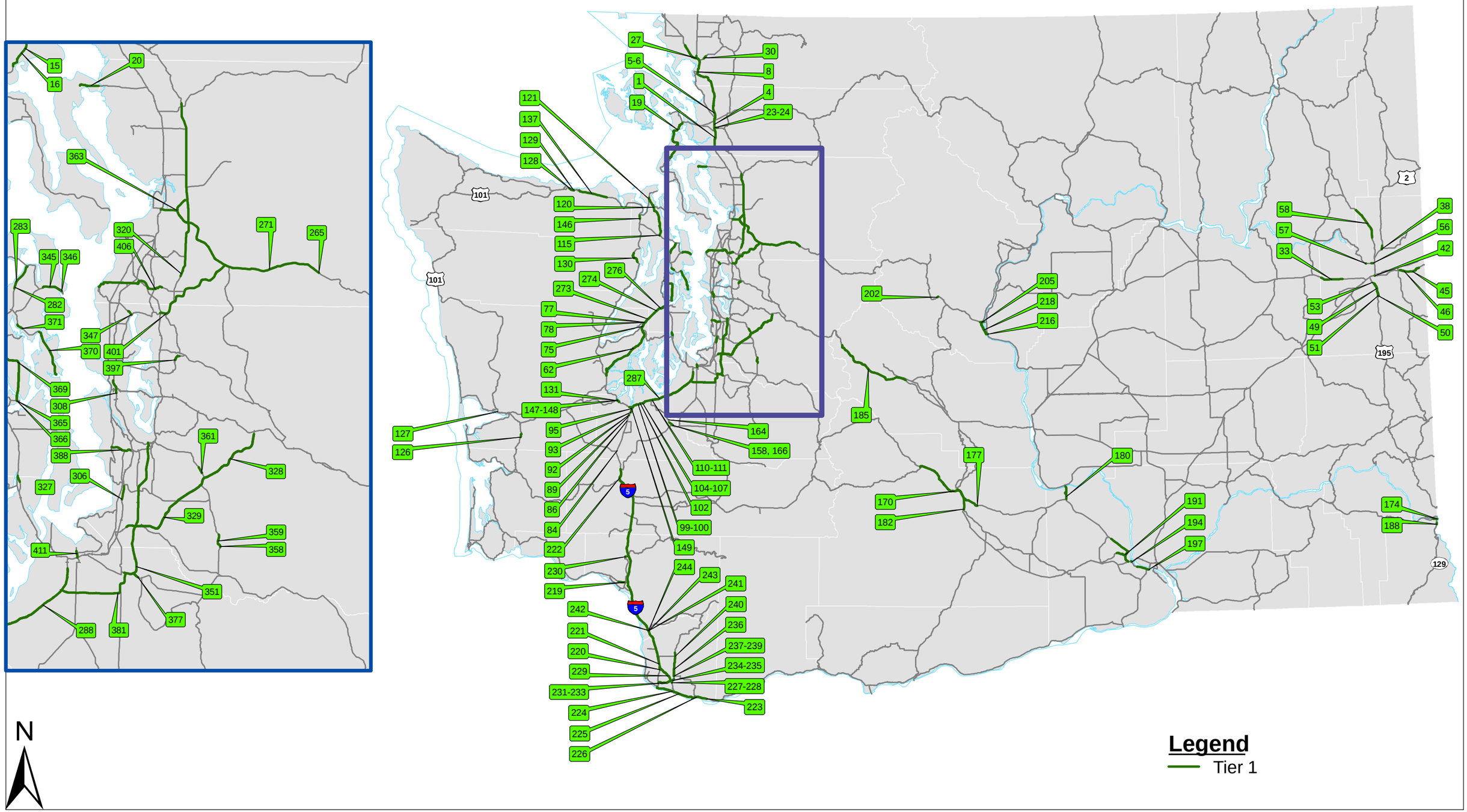
Time to Implementation

Appendix

2007-2026 DRAFT Mobility Implementation Plan: Solutions



2007-2026 DRAFT Mobility Implementation Plan: Solutions



Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
1	I-5	221.19 to 232.95	I-5/SR 538 to Hopper Rd - Interchange Improvements	Current/Future	$10,000,000
	Solution:	Intersection improvements at Cook Road and George Hopper Road interchanges, along with any other improvements which are determined by the findings of the Freeway Master Plan.			
	Expected Benefits:	20% reduction in accidents, 10% reduction in delay.			
4	I-5	228.99 to 228.99	I-5/Hopper Rd Interchange - Intersection Improvements	Current	$4,000,000
	Solution:	Intersection improvements at ramp terminals			
	Expected Benefits:	Reduced delays at ramp terminal intersections, and reduction of southbound left-turn queuing.			
5	I-5	232.95 to 232.95	I-5/Cook Rd Interchange - Intersection Improvements	Current	$10,000,000
	Solution:	Intersection improvements at ramp terminals			
	Expected Benefits:	Reduced delays at intersections, and reduction of queuing on ramps.			
6	I-5	232.95 to 250.87	I-5/Samish River to N Lake Samish - Freeway Improvements	Future	$6,000,000
	Solution:	A truck climbing lane from the Samish River to Bow Hill Road., and a longer ramp taper at the North Lake Samish SB on-ramp.			
	Expected Benefits:	20% reduction in accidents, 20% reduction in delay.			
8	I-5	250.87 to 262.69	I-5/ Fairhaven to Ferndale - Freeway Master Plan	Future	N/A
	Solution:	To be determined by the Freeway Master Plan			
	Expected Benefits:	N/A			
15	SR 20	30.05 to 30.36	SR 20/Swantown Rd to Erie St - Widening and Improvements	Current	$6,000,000
	Solution:	Widen to 4 lanes, close median, U-turns or roundabouts at Swantown and Erie.			
	Expected Benefits:	Reduced delays at intersections, and reduction of queuing.			
16	SR 20	30.05 to 47.01	SR 20/S Oak Harbor to Sharpe's Corner - Short Term Improvements	Current	$70,000,000
	Solution:	Incorporating access management strategies in the corridor will help to reduce accidents and delays caused by the many driveways which exist here. Intelligent Transportation Systems (ITS) strategies will help to make the corridor more efficient by providing real-time information to drivers, as well as the traffic operations staff. Transportation Demand Management will help to reduce the demand of vehicles using the corridor. The pavement in this corridor will need to be rehabilitated, based on data from the WSPMS.			
	Expected Benefits:	Better flow of traffic using existing facilities as much as possible. Eliminating left turns out of driveway will reduce accidents.			
19	SR 20	47.3 to 47.34	SR 20/Sharpe's Corner to Fiadalgo Bay Rd - Intersection Improvements	Current	$5,000,000
	Solution:	Multi-lane roundabouts at each intesection			
	Expected Benefits:	Reduced delays at intersections, and reduction of westbound left-turn queuing.			
20	SR 532	0 to 2.91	SR 532/Sunrise Dr to County Line - Corridor Improvements (Minimum)	Current	$22,000,000
	Solution:	Incorporating access management strategies in the corridor will help to reduce accidents and delays caused by the many driveways which exist here. Intelligent Transportation Systems (ITS) strategies will help to make the corridor more efficient by providing real-time information to drivers, as well as the traffic operations staff. Transportation Demand Management will help to reduce the demand of vehicles using the corridor. The pavement in this corridor will need to be rehabilitated, based on data from the WSPMS.			
	Expected Benefits:	Better flow of traffic using existing facilities as much as possible. Eliminating left turns out of driveway will reduce accidents.			
23	SR 538	0 to 0	I-5/SR 538 - Ramp Terminals	Current	$4,000,000
	Solution:	Intersection improvements at ramp terminals			
	Expected Benefits:	Reduced delays at ramp terminal intersections.			
24	SR 538	0 to 1.27	SR 538/I-5 to LaVenture Rd - Corridor Improvements (Minimum)	Future	$22,000,000
	Solution:	Incorporating access management strategies in the corridor will help to reduce accidents and delays caused by the many driveways which exist here. Intelligent Transportation Systems (ITS) strategies will help to make the corridor more efficient by providing real-time information to drivers, as well as the traffic operations staff. Transportation Demand Management will help to reduce the demand of vehicles using the corridor. The pavement in this corridor will need to be rehabilitated, based on data from the WSPMS.			
	Expected Benefits:	Keep traffic flowing by maximizing the existing roadway as much as possible.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
27	SR 539	0 to 0.87	SR 539/I-5 to Kellogg Rd - Corridor Improvements (Minimum)	Current	$40,000,000
	Solution:	Incorporating access management strategies in the corridor will help to reduce accidents and delays caused by the many driveways which exist here. Intelligent Transportation Systems (ITS) strategies will help to make the corridor more efficient by providing real-time information to drivers, as well as the traffic management center. Transportation Demand Management will help to reduce the demand of vehicles using the corridor. The pavement in this corridor will need to be rehabilitated, based on data from the WSPMS.			
	Expected Benefits:	Better flow of traffic using existing facilities as much as possible. Eliminating left turns out of driveway will reduce accidents.			
30	SR 542	1.74 to 2.79	SR 542/McLeod Rd to Britton Rd - Corridor Improvements (Minimum)	Future	$10,000,000
	Solution:	The pavement in this corridor will need to be rehabilitated, based on data from the WSPMS. Some intersection and spot capacity improvements will be needed to address congestion/delay issues. These improvements could include signals, roundabouts, turn lanes, and auxiliary lanes.			
	Expected Benefits:	Keep traffic flowing by maximizing the existing roadway as much as possible.			
33	US 2	259.21 to 266.89	US 2/Fairchild Air Force Base to I-90 - Access Control and I/S Improvements	Current	$5,500,000
	Solution:	Various improvement strategies have been developed over the last several years to alleviate growing congestion on the route segment. In the near-term, improvements to existing intersections, including the addition of signalization and possibly roundabouts, will be required to maintain adequate LOS as new developments are completed. Channelization may also be needed to address traffic flow disruptions.			
	Expected Benefits:	Intersection improvements will alleviate substantial delay currently experienced on minor streets while improving the safety of mainline operations. Raised median channelization will improve operating speeds by eliminating conflicting movements while also improving safety.			
38	US 2	288.92 to 290.2	US 2/Deer Rd to Pend Orielle Co Line - Access Consolidation and I/S Improvements	Current	$3,500,000
	Solution:	In the short range, improvement strategies include the use of raised channelization, acceleration/deceleration lanes, approach consolidation, right-in/right-out only, and additional signage to alleviate congestion and preserve operating speeds.			
	Expected Benefits:	These projects will serve to maintain an acceptable level-of-service on the facility and to enhance safe operations in areas where turning movements into residential and commercial land uses are creating congestion and delay.			
42	I-90	278.83 to 279.05	I-90/US 2 I/C EB Off-Ramp - Ramp and Terminal Improvements	Current	$2,700,000
	Solution:	Ramp and terminal improvements.			
	Expected Benefits:	Improved operation on the ramp, and at the ramp terminal, will eliminate mainline I-90 congestion as well as safety issues related to the potential for ramp queuing interfering with I-90 mainline movements. Air quality may improve as a result of less delay. Freight movements will benefit as a result of less delay.			
45	I-90	288.13 to 295.22	I-90/Sullivan I/C to Idaho State Line - Enhanced ITS and Incident Response Capabilities	Current	$3,540,000
	Solution:	Provide for enhanced ITS and incident response capabilities within the route segment.			
	Expected Benefits:	Improved traffic flow resulting from increased incident detection, response capabilities, and motorist advance warning.			
46	I-90	288.13 to 289.63	I-90/Sullivan I/C to Barker I/C - Construct General Purpose Lanes	Current	$12,000,000
	Solution:	Construction of an additional lane, in each direction, between Sullivan Rd. and Barker Rd. interchanges.			
	Expected Benefits:	Construction of additional capacity will allow travel speed to be maintained above the 70% of posted speed threshold.			
49	US 195	85.96 to 90.75	US 195/Hatch Rd to I-90 - Provision of Park & Ride Facilities	Current	$2,000,000
	Solution:	Provision of Park & Ride facilities.			
	Expected Benefits:	Reduction in single occupant vehicles within the corridor, resulting in improved safety and mobility.			
50	US 195	85.96 to 90.75	US 195/Hatch Rd to I-90 - Provision of ITS	Current	$2,830,000
	Solution:	Provision of ITS capabilities in the corridor to alert motorists to traffic delays caused by incidents, accidents, or congestion, especially at the US 195 interchange with I-90, which is a chokepoint.			
	Expected Benefits:	ITS capabilities will enhance safe operations of the facility through motorist awareness of delay caused by incidents on the facility.			
51	US 195	85.96 to 90.75	US 195/Hatch Rd to I-90 - I/S Modifications and Improvements	Current	$5,500,000
	Solution:	Left turn restrictions and intersection improvements for turning traffic.			
	Expected Benefits:	Elimination of left turn movements, as well as the construction of acceleration and deceleration lanes, will improve the safe operations at intersections located within the route segment.			
53	US 195	91.21 to 91.22	US 195/Cheney-Spokane Rd to Lindeke Rd - Construction of I/C and Arterial	Current	$19,800,000
	Solution:	Construction of a fully directional interchange at Cheney-Spokane Rd. and new City of Spokane arterial.			
	Expected Benefits:	Elimination of conflicts between mainline and minor street traffic as well as the diversion of some traffic from US 195 to local street system. This will allow US 195 to be maintained as a high-speed regional facility.			
56	SR 291	0.5 to 1.18	SR 291/Wall St to Ash St - I/S Improvements	Current	$400,000
	Solution:	Signal timing improvements and construction of dedicated turn lanes at signalized intersections will help to improve travel through this chokepoint.			
	Expected Benefits:	Improved travel speeds will improve regional air quality. Reduced travel times will benefit regional, as well as local, freight mobility. SR 291 also provides direct access to many recreational opportunities in the Spokane area.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
57	SR 291	3 to 3.1	SR 291/Assembly Rd I/S - Construct Fly-over Ramp	Current	$2,309,000
	Solution:	Construction of flyover ramp will greatly decrease congestion and improve safety at the intersection.			
	Expected Benefits:	This project will eliminate a chokepoint that is created by high traffic volumes, an unusual intersection configuration, and is exacerbated by special events and recreational facilities located nearby.			
58	US 395	176.79 to 188.48	US 395/Fender Rd Vic to Stevens Co Line - I/S Improvements	Current	$3,000,000
	Solution:	Channelization improvements that will improve operations at intersections with failing LOS.			
	Expected Benefits:	Reduction of accidents at existing at-grade intersections. Reduced delay at intersections, which are projected to operate at LOS F in the 2020 forecast year. Reduction of delay on mainline, which is currently functioning at LOS E, with portions of the route functioning at LOS F in the forecast year.			
62	SR 3	0 to 36.69	SR 3/South Kitsap and North Mason County - Subarea Study	Current/Future	$1,250,000
	Solution:	South Kitsap/East Mason County Subarea Study			
	Expected Benefits:				0
75	SR 3	24.88 to 26.35	SR 3/SR 106 to SR 300 - Two Way Left Turn Lane Extension and Sidewalk	Current	$8,503,000
	Solution:	Concept A: 3 lane facility (raised median). This project will widen State Route 3 from a 2/3 lane facility to a 3 lane facility (TWLTL) from SR 106 to SR 300 in Belfair. This project assumes a Belfair Bypass will be constructed eliminating the need for a 4/5 lane facility in Belfair. A two way left turn lane should only be considered if access classification is reduced from class 3 to class 4 or if Belfair Bypass diverts more traffic away from SR 3. Origin/Destination studies indicate ~15% or less traffic may be diverted without a US 101 connector. Our planning level estimate assumes ROW width going from 60 ft to 80 ft with treatment locations for storm water outfalls. A Belfair estimate assumed width staying at 60 ft or going to 100 ft. In either case it is a deviation since SR 3 HSS rural requirement is 150 ft when widened. Sidewalks are also assumed for a pedestrian benefit.			
	Expected Benefits:	Mobility Benefits for extending a two-way left turn lane is ~$3,000,000 and Safety Benefits (30% reduction placeholder) is ~$4,000,000. The project will also address two fish passage barriers. A partnership with Mason County to fund improvements is anticipated because they are required to address sewer issues in the community of Belfair. Combining sewer improvements and widening improvements is beneficial to the County because of reduced utility relocation costs associated with widening. The sewer project is anticipated to cost around $16,000,000 to $17,000,000. If projects are combined, the total estimated cost would be less than $26,000,000.			
77	SR 3	26.35 to 26.36	SR 3/SR 300 Jct - Modify Intersection	Current	$112,000
	Solution:	Concept A: Intersection improvements. Prohibit eastbound left turn movements from SR 300 to SR 3 and install raised median. Consider right-in, right-out only if a safety and operational analysis calls for it later, otherwise assume some costs for loss of access rights due to diversion, ~$100 per frontage foot for developments between SR 3 and NE Clifton Rd.			
	Expected Benefits:	Prohibit left turn movement from SR 300 onto SR 3 for an intersection benefit of ~$24,000 and a placeholder safety benefit of ~$169,000. Total benefits of approximately $193,000. The intersection of SR 300 and NE Clifton Lane was analyzed for the addition of the rerouted vehicles prohibited from turning left at SR 300/SR 3 I/S (9 vehicles). A two-way stop was considered to replace the existing four-way stop. This did not improve the LOS at this intersection and this location was not considered a bottleneck and chokepoint.			
78	SR 3	26.35 to 27.63	SR 3/SR 300 to Belfair Yard Rd Vic - Widening and Intersection Improvements	Current	$13,257,000
	Solution:	Concept A: 4 lanes (divided outside of Belfair). This project will widen State Route 3 from a 2/3 lane facility (Existing NB climbing lane MP 26.93 to MP 27.66) to a 4 lane facility between SR 300 and the Mason/Kitsap County Line with intersection improvements at SR 3/NE Clifton Lane (SB right turn on SR 3, EB right turn on NE Clifton creating a double left, and two additional through lanes on mainline SR 3). Sidewalks in area of existing TWLTL (MP 26.38 to MP 26.86)			
	Expected Benefits:	GP for ~$8,866,000, intersection benefits for $3,568,000, and placeholder safety benefits of ~$6,351,000 (30%). Total benefits of ~$18,785,000.			
84	I-5	88.7 to 88.71	I-5/Grand Mound I/C Vic - Add WB lane on US 12 from SB Off Ramp I/S to Elderberry St Vic	Current	$3,799,000
	Solution:	Concept A: This project will add a WB auxiliary lane on US 12 between the I-5 SB off ramp stop controlled terminal and the right turn drop lane at Old Highway 99 (Elderberry).			
	Expected Benefits:	Unknown at this time. This conceptual solution is a placeholder for an emerging bottleneck/chokepoint location.			
86	I-5	99.65 to 99.66	I-5/93rd Ave SW I/C - Signal and Channelization at SB Off Ramp I/S	Current	$1,528,000
	Solution:	Concept A: New signal and channelization (Separated right and left turn lanes along the off ramp and left turn lane on 93rd Ave. SW to the SB on).			
	Expected Benefits:	Unknown at this time. This conceptual solution is a placeholder for an emerging bottleneck/chokepoint location.			
89	I-5	101 to 101.01	I-5/Tumwater Blvd I/C - Signal at NB Off Ramp I/S and EB Acceleration Lane on Tumwater Blvd	Current	$3,418,000
	Solution:	Concept A: Traffic signal and EB acceleration lane on Tumwater Blvd.			
	Expected Benefits:	Intersection benefits are ~$2,374,000 assuming .5% traffic growth and safety benefits are ~$1,459,000 for total benefits of ~$3,828,000. Tumwater Blvd provides a direct access to and from the Olympia Airport improving port accessibility.			
92	I-5	101.69 to 101.7	I-5/Tumwater Blvd I/C - Signal Modification and Channelization at SB Off Ramp I/S	Current	$6,264,000
	Solution:	Concept A: Signal modification and channelization (Right turn and acceleration lanes)			
	Expected Benefits:	Intersection benefits are ~$6,152,000 assuming zero traffic growth and safety benefits are ~$1,848,000 for total benefits of ~$7,999,000 with projected 2005 traffic volumes Assume signal modification, right turn lanes, and acceleration lanes will be partially funded with private developer participation through the City of Tumwater. Tumwater Boulevard provides a direct access to and from the Olympia Airport improving port accessibility.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
93	I-5	102.86 to 115	I-5/Trosper Rd I/C to Pierce County Line - Ramp Metering	Current	$3,236,000
	Solution:	Concept A: Ramp metering. This project will improve upon the existing Intelligent Transportation System by providing ramp metering at ~15 on-ramps in the northbound and southbound directions of Interstate 5 in the urban areas of Tumwater/Olympia/Lacey.			
	Expected Benefits:	General purpose lane benefits are ~$46,612,000. I did not assume any safety benefits even though congestion type accidents along mainline could be improved. Benefits assume ramp meters will increase capacity along mainline from ~1800 pcphpl to ~2000 pcphpl. For HCM 2000 analysis assume this capacity improvement correlates to an ~200 pcphpl decrease in adjusted traffic volumes along mainline.			
95	I-5	104.12 to 104.13	I-5/N 2nd Ave Off Ramp I/S - Three Way Stop Controlled I/S	Current	$6,000
	Solution:	Concept A: Install stop signs on local arterials (Desoto and N 2nd Avenue) to create 3-way stop. A signal with acceleration lane could be considered or additional turn lane at next local arterial (balance lane utilization), but would result in a B/C ratio less than 1.			
	Expected Benefits:	Intersection benefit of ~$301,000 and safety benefit of ~$469,000 with total benefits of ~$770,000 based upon signal with acceleration lane. B/C for signal with acceleration lane likely to be 0.83 or less with costs greater than $1 million.			
99	I-5	107.16 to 107.17	I-5/Pacific Ave I/C - NB Off Ramp Double Left Turn	Current	$3,533,000
	Solution:	Concept A: Create an I-5 Northbound off ramp double left turn movement to Westbound Pacific Avenue at the ramp terminal and consider modifying the existing Eastbound Pacific Avenue roadway section to create a double left turn movement toward the I-5 Northbound on ramp terminal.			
	Expected Benefits:	Intersection benefits for ~$3,984,000 and safety benefits for ~$984,000. Total benefits of ~$4,968,000.			
100	I-5	107.58 to 109.26	I-5/Pacific Ave I/C to Martin Way I/C - Collector Distributor Lanes or Extend Auxiliary Lanes	Current	$40,000,000
	Solution:	Concept B: Collector-Distributor lanes or Auxiliary Lanes (Both the C-D and Auxiliary lane proposals need further study for ramp diverge, merge, and weave. This project will install one lane collector-distributor lanes or auxiliary lanes in both northbound and southbound directions. Consider making proposed C-D lanes 2-lanes where existing or acquired right-of-way will accommodate the extra widening without high bridge widening costs or class 1 trail relocation costs. Design deviations are anticipated for the C-D proposal. Consider alternative auxiliary lane proposal to reduce the estimated costs and to eliminate probable design deviations. A C-D will require a design deviation at the Lilly Road and College Street undercrossings. Also, installing C-D lanes may require an Access Point Decision Report for interchange modifications. An extension c the existing auxiliary lane between Sleater Kinney Road and College Street northbound could also be considered. It may be desirable to complete a feasibility study prior to constructing C-D lanes or extending auxiliary lanes in this vicinity.			
	Expected Benefits:	General purpose lane benefits of ~$175,983,000 and Safety benefits of ~$5,059,500 for a total benefit of ~$181,042,500.			
102	I-5	108 to 108.01	I-5/Sleater Kinney I/C - SB Acceleration Lane on Sleater Kinney	Current	$945,000
	Solution:	Concept A: Southbound acceleration taper and/or auxiliary lane on Sleater Kinney to allow free right turn movements at the ramp terminal (EBR).			
	Expected Benefits:	Intersection benefits for ~$3,596,000 and safety benefits for ~$421,000 for total benefits of ~$4,017,000. If acceleration lane extends to South Sound Mall right-in, right-out access it could help with traffic arrivals at the mall during special events (e.g. July fireworks). Widening for the acceleration taper and/or lane also means widening the existing bike tunnel. A wider roadway cross section will help deter bicycles from crossing Sleater Kinney at-grade and encourage usage of the bike tunnel to cross under Sleater Kinney.			
104	I-5	108.71 to 109.01	I-5/Martin Way I/C - NB Off Ramp Deceleration Lane Extension	Current	$2,094,000
	Solution:	Concept A: Northbound I-5 deceleration lane. Providing a 0.3 mile (1570 ft) NB deceleration lane into the Martin Way I/C off ramp will improve ramp diverge from LOS E t C (0.15 mile or 800 ft NB deceleration lane would improve year 2003 ramp diverge from LOS E to D). Unable to identify any low cost ramp terminal improvements at the NB off/on ramp terminal that would improve overall intersection LOS to better than LOS F due to high local arterial traffic volumes. A "Northeast Lacey Access" Study would consider various alternatives at Martin Way and at other locations that could be addressed further in an access point decision report and/or environmental documentation.			
	Expected Benefits:	General purpose lane benefit of ~$8,672,000 and safety benefit of ~$199,000 for total benefits of ~$8,871,000. Interstate 5 is a T-1 freight route.			
105	I-5	109.22 to 109.23	I-5/Martin Way I/C - Add Additional Lane on Martin Way to Double Length of Left Turn Storage Both D	Current	Unknown
	Solution:	The Martin Way O'xing - Bike Lanes project could be modified/supplemented to add one additional lane under I-5 on Martin Way to double the length of left turn storage an place bike path behind bridge columns.			
	Expected Benefits:				0
106	I-5	109.26 to 109.27	I-5/Martin Way I/C - Expand Park and Ride Lot and Consider Transit Only Right Turn Lane to NB On F	Current	Unknown
	Solution:	Expand existing Martin Way park and ride lot by 60 stalls (expansion may be greater than 60 stalls due to closure of the Marvin Road park and ride lot). A "transit only" right turn drop lane between the existing Martin Way park and ride lot and the I-5 Northbound on ramp could also be considered in partnership with the City of Lacey along with other options.			
	Expected Benefits:				0
107	I-5	109.41 to 109.42	I-5/Martin Way I/C - SB Off Ramp Double Right Turn	Current	$2,554,000
	Solution:	Concept A: Ramp terminal improvements. This project will add a southbound right turn lane to create two right turn lanes and extend the storage lane length of the existin left turn lane (~doubling length) at the southbound off ramp terminal. City of Lacey will be a partner for the "SR 5 Martin Way O-xing Bike Lanes" under agreement GCA-2701. It is possible that this nearby shelf project could happen at the same time as the bottleneck/chokepoint double right turn proposal. It is also possible that widening under the I-5 bridge for the urban bike project could be modified such that any future additional widening could be used to extend the left turn lanes (doubling them from ~400 feet to ~800 feet of storage) with the bike lanes being constructed behind bridge piers.			
	Expected Benefits:	Intersection benefit of ~$4,491,000 and safety benefit of ~$745,000 for total benefits of ~$5,236,000. Interstate 5 is a T-1 freight route.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
110	I-5	112.32 to 113.77	I-5/Marvin Rd I/C - Add Right Turn Lane to SB Off Ramp Creating Double Left Turn Lanes	Current	$3,967,000
	Solution:	Concept A: Ramp terminal improvements. This project will construct an exclusive right turn lane on the Interstate 5 Southbound off ramp to Marvin Road. It may be possible to minimize impacts at the existing traffic signal by dropping the right turn lane behind the mast arm in the NE quadrant into an acceleration lane and taper for free right. The existing right turn could then be restriped as a second left (with through movement to the I-5 SB on ramp).			
	Expected Benefits:	Intersection benefit of ~$6,150,000 and safety benefit of~$205,000 for total benefits of ~$6,355,000. Marvin Road has Class II bike lanes. The exclusive right turn would help facilitate freight movements toward the industrial area north of the interchange where distribution centers are proposed/exist.			
111	I-5	112.77 to 113.77	I-5/Marvin Rd I/C to Nisqually I/C - SB Climbing Lane	Current	$25,000,000
	Solution:	Southbound climbing lane from the Nisqually on ramp past crest of 3% vertical curve near the Marvin Road (SR 510) I/C. This auxiliary lane would also function as an acceleration lane and deceleration lane from the Nisqually on ramp to the Marvin Road off ramp and help reduce weaving conflicts.			
	Expected Benefits:	Unknown benefits at this time			
115	SR 19	0 to 14.09	SR 19 and SR 20/SR 104 to Port Townsend Ferry Terminal - Corridor Analysis	Current/Future	$850,000
	Solution:	Corridor Analysis: A corridor analysis plan will identify intersection locations that would benefit from intersection improvements (e.g. left or right turn channelization for mobility and new signal locations for safety).			
	Expected Benefits:				0
120	SR 19	10.68 to 10.69	SR 19/SR 116 Intersection - Signal and Channelization or Roundabout	Current	$1,298,000
	Solution:	Concept A: Intersection improvements (signalization and channelization). Install an additional southbound left turn lane (creating double left), a northbound right turn lane, reconfigure the westbound channelization by installing a right turn lane and consider a northbound acceleration lane, and install a signal system.			
	Expected Benefits:	Intersection benefit of ~$1,380,000 and safety benefit of ~$22,000 for total benefits of ~$1,402,000.			
121	SR 20	7.79 to 8.26	SR 20/SR 19 to Old Fort Townsend Rd - Widening or Channelization	Current	$3,071,000
	Solution:	Concept A: 4 lane divided highway. This project will widen State Route 20 from a 2 lane facility to a 4 lane divided facility from SR 19 to Old Fort Townsend Road (Class 2 access management with > 20,000 AADT in 2025).			
	Expected Benefits:	Safety benefits of ~$130,500, intersection benefits of ~$231,000, and general purpose lane benefits of ~$9,786,000 for total benefits of ~$10,147,500. Direct route to Port Townsend Ferry Terminal for Port Accessibility.			
126	US 101	72.17 to 73.4	US 101/One Mile S of Artic Rd - SB Truck Climbing Lane	Current	$5,681,000
	Solution:	Concept A: 3 lane facility (climbing). This project will widen US 101 from a 2 lane facility to a 3 lane facility (climbing lane) in the southbound (decreasing) direction. Includes retaining walls in 2 areas identified as unstable slopes. Required repair on 1 fish bearing passage barrier is included in the estimate. No treatment was included for the other 11 fish passage barriers because they appear to have no fish use (GeoDatabase-GIS workbench).			
	Expected Benefits:	Safety benefits of ~$4,945,000 and a climbing lane benefit of ~$402,000. For this analysis assume maximum benefits of ~$5,347,000. T-2 freight route and repair one fish passage.			
127	US 101	87.24 to 87.26	US 101/SR 109 Intersection - Double Left Turn	Current	$1,086,000
	Solution:	Concept A: Add NB lane. This project will add a northbound (increasing) lane through/left turn creating double left at SR 109 intersection. During low tides (clam season) SR 109 is a primary route to the Pacific Ocean Beaches. Consider restriping and signal modification to create double left if right-of-way constraints in the central business district (CBD) are severe and if future NB left turn volume growth is disproportionably high.			
	Expected Benefits:	Intersection benefits of `$68,000 and safety benefits of ~$1,543,000 for total benefits of~$1,611,000. SR 109 is the primary access to the Port of Grays Harbor and is the recreational route to Pacific Ocean beaches. Special events such as low tides for clam digging increase traffic volumes. Assume ~300 feet of sidewalk to be included.			
128	US 101	248.09 to 249.98	US 101/Race St to Brook Ave - Access Management, Signal Replacement, and Sidewalk	Current	$8,425,000
	Solution:	Concept A: Access Management and signal coordination. This project will apply Access Management control between Golf Course and Delguzzi, replace six signal systems with interconnect (Assumed saltwater corrosion requires replacement of existing signals), repair two fish barriers within project limits, and provide continuous sidewalks within city limits.			
	Expected Benefits:	Intersection benefits of ~$1,797,000 and safety benefits at ~$12,917,000 for total benefits of ~$14,714,000. Consider access management controls that improve non-motorized use (continuous sidewalks, purchase of access rights). There are 2 fish passage barriers that require repair in this segment. This segment is also a T-2 freight route which is used by the Port of Port Angeles and is a recreational route from Hurricane Ridge in the Olympic National Park and private ferry to Victoria B.C.			
129	US 101	248.99 to 249.89	US 101/Port Angeles Couplet from Golf Course Rd to Race St - Access Management, Signal Replace	Current	$3,327,000
	Solution:	Concept A: Access Management and signal coordination. This project will apply Access Management controls between Golf Course and Race Street on the Front Street Couplet, replace two signal systems with interconnect (Assumed saltwater corrosion requires replacement of existing signals), repair one fish barrier within project limits, and provide continuous sidewalks within city limits.			
	Expected Benefits:	Intersection benefits of ~$233,000 and safety benefits at ~$3,596,000 for total benefits of ~$3,829,000. Consider access management controls that improve non-motorized use (continuous sidewalks). There is one fish passage barrier that requires repair in this segment. This segment is also a T-2 freight route which is used by the Port of Port Angeles and is a recreational route to Hurricane Ridge in the Olympic National Park and private ferry to Victoria, B.C.			
130	US 101	296.65 to 300.71	US 101/Falls View Campground to Spencer Creek Rd Vic - SB and NB Truck Climbing Lanes	Current	$1,502,000
	Solution:	Concept A: 3 lane facility (climbing lane). This project will widen US 101 from a 2 lane facility to a 3 lane facility (climbing lane) between Falls View Campground and Buckhorn Road on US 101 at the locations noted in the deficiency statement.			
	Expected Benefits:	Climbing lane benefit of ~$173,000 and safety benefit of ~$5,889,000 for total benefits of ~$6,062,000. Hood Canal Bridge East Half Replacement Closure is a special event which will increase traffic volumes in the summer of 2009 or later. US 101 is a recreational route into the Olympic National Park/Forest with scenic views in the Mt. Walker Vicinity. The project cost estimate is from the Project Engineers Office and includes a 30% variance.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
131	US 101	359.36 to 359.95	US 101/SR 8 Interchange - Ramp Widening to Two Lanes in Increasing Direction	Current	$7,000,000
	Solution:	Concept A: 2 lane ramps. Observed Southbound and Eastbound (increasing direction) queues extend back to Steamboat Island Road Interchange and Westbound (decreasing direction) queues extend back to Mud Bay Interchange. Phase 1 could be in the Southbound to Eastbound direction and phase 2 in the Westbound direction. Phase 2 (Westbound decreasing direction) may include an auxiliary lane to the upstream interchange.			
	Expected Benefits:	A bike path is proposed behind the pier columns in the increasing direction. US 101 is a T-1 route with over 10 million tons of freight hauled annually.			
137	US 101	252.35 to 262.29	US 101/Deer Park Rd to River Rd - Traffic Circulation and Access Plan Study	Future	$500,000
	Solution:	Traffic Circulation and Access Plan			
	Expected Benefits:				0
146	US 101	281.68 to 282.85	US 101/SR 20 to E Uncas Rd S - Passing Lane and Right Turn Lane	Future	$8,823,000
	Solution:	Southbound (Increasing) Passing Lane with Northbound (decreasing) right turn lane on US 101 into the SR 20 wye connection. Includes retaining wall work at one unstabl slope location, one fish barrier repair, and one fish passage extension.			
	Expected Benefits:				0
147	US 101	359.51 to 359.67	US 101/SR 8 Interchange - Study Interchange Alternatives	Current	$200,000
	Solution:	SR 8/US 101 Interchange Feasibility and Design			
	Expected Benefits:				0
148	US 101	359.62 to 360.51	US 101/SR 8 Interchange - Ramp Widening to Two Lanes in Decreasing Direction and Auxiliary Lane	Current	$9,169,000
	Solution:	Concept A: 2 lane ramps. Observed Southbound and Eastbound (increasing direction) queues extend back to Steamboat Island Road Interchange and Westbound (decreasing direction) queues extend back to Mud Bay Interchange. Phase 1 could be in the Southbound to Eastbound direction and phase 2 in the Westbound direction. Phase 2 (Westbound decreasing direction) may include an auxiliary lane to the upstream interchange.			
	Expected Benefits:	US 101 is a T-1 route with over 10 million tons of freight hauled annually.			
149	US 101	364.57 to 365.56	US 101/Mottman Interchange to I-5 - Auxiliary Lanes	Current	$10,352,000
	Solution:	Concept A: Auxiliary Lanes. Provide a Northbound (decreasing) deceleration lane into the Mottman/Cooper Point I/C off ramp that also serves as a climbing lane (~MP 366.65 to MP 366.91) and provide a Southbound (increasing) auxiliary lane between the Mottman/Cooper Point on ramp and the I-5 SB/2nd Avenue off ramp diverge that also serves as an on ramp acceleration lane from Mottman and off ramp deceleration lane into 2nd Avenue off ramp (~MP 366.75 to MP 367.35).			
	Expected Benefits:	General purpose lane benefit of ~$7,296,000 (increasing auxiliary lane), climbing lane benefit of ~$4,569,000 (decreasing auxiliary), and safety benefits of ~$11,608,000 for total benefits of ~$23,473,000. US 101 is a T-1 freight route.			
158	SR 507	28.2 to 28.56	SR 507/Manke-Koeppen Rd and Vail Rd - Channelization and Signal	Current/Future	$2,310,000
	Solution:	Concept B: Alternate Route. This project will provide improvements on SR 507 to encourage an interim alternative route to the City of Yelm's proposed Y-2 alternative utilizing existing County roadways already used by local traffic familiar with the area. Provide channelization at Manke (121st Avenue SE)/Koeppen Road Intersection (MP 25.42 Vicinity). Channelization to include a SB right turn pocket, NB right turn lane, and WB right turn pocket to create a left turn storage lane. Also consider a signal system at Vail Road SE (MP 30.50) provided concerns about violating driver expectancy can be addressed (e.g. advanced warning signal for SR 507 NB traffic incidating signal status before the horizontal/vertical curve). It appears that Koeppen Road to 123rd Avenue SE to Morris Road SE to Bald Hills/SR 507 (or 123rd to Hannus Rd SE t Vail Rd SE to SR 507) mimics the City of Yelm's proposed Y-2 alternative. Because it is located further to the south or southeast away from the City of Yelm it will divert less traffic away from the congested area. Manke Road is often used as a short-cut to Rainier Road and also serves industrial sites where truck traffic interacts with traffic flows on SR 507.			
	Expected Benefits:	Intersection benefits of ~$252,000 (Manke/Koeppen for ~$106,000 and Vail for ~$146,000). Safety benefits were not calculated because no improvements were identified for the actual bottleneck/chokepoint segment within the City of Yelm. The benefits at Manke/Koeppen may not be accurate since volumes and distributions were based on nearby intersection to the north. Traffic counts at Manke/Koeppen are needed to determine if intersection benefits are higher.			
159	SR 507	to	SR 507/Yelm Loop - New Alignment Y-2	Current	Unknown
	Solution:	Loop road alternative southeast of Yelm Core Business District			
	Expected Benefits:				0
164	SR 510	10.75 to 10.76	SR 510/Yelm Loop - New Alignment Y-1	Current	Unknown
	Solution:	New Southeasterly alignment for SR 510 and SR 507 in the City of Yelm (Y-1)			
	Expected Benefits:				0
166	SR 510	11.81 to 13.07	SR 510/Burnett Rd to SR 507 - Two Way Left Turn Lane and Sidewalk	Current	$10,296,000
	Solution:	Concept A: Two-way left turn lane (Y5). This City of Yelm project will provide a continuous two-way left turn lane with sidewalk (curb & gutter), bike shoulders, and bus pullouts between Burnett Road (Yelm WCL) and SR 507. Assume City of Yelm to be the lead agency because they are establishing a local improvement district (LID) from 93rd Avenue to NW Killion Road. SR 510 bottleneck/chokepoint limits are also within City of Yelm incorporation limits, therefore, roadway standards should conform to City standards (city streets as part of State Highways, RCW 47.24). Assume local arterial realignment at the skewed intersections of 93rd Avenue and Killion Road.			
	Expected Benefits:	Two-way left turn lane benefits are ~$3,369,000 and safety benefits are ~$9,340,000 for total benefits of ~$12,709,000. State Route 510 is listed as a designated bicycle touring route in the Thurston County Comprehensive Plan 1995. Intercity Transit has indicated a need for bus pullouts within the City of Yelm. Yelm schools will benefit from continuous sidewalk, curb, and gutter.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
170	US 12	184.7 to 202.13	US 12/W Naches Rd to ECL Naches - Safety Improvements	Future	$8,000,000
	Solution:	Improve access control through Naches with curb, gutter and sidewalk. Safety improvements include rumble strips and widening shoulders. Channelize US 12/W. Naches Road intersection.			
	Expected Benefits:	Installing curb, gutter and sidewalk within the Town of Naches will improve the safety and operation of this segment of US 12, and provide a safe separate pedestrian facility. Reduce run-off-the road accidents by installing shoulder rumble strips. Chan			
174	US 12	429.24 to 430.67	US 12/SR 128 to SR 129 - I/S Improvements and Signals	Future	$2,537,000
	Solution:	This improvement project will upgrade intersections and install signals through the Clarkston area.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $8,806,611 in safety benefits associated with this improvement			
177	SR 24	0.08 to 5.52	SR 24/Bell Rd/Rivard RD/Faucher RD - Signals	Future	$1,300,000
	Solution:	Signalize Bell, Rivard, and Faucher Roads intersections. Install rumble strips.			
	Expected Benefits:	Signalize the three unsignalized intersections to enhance safety and maintain acceptable level-of-service for those intersections adjacent to the City of Moxee. Reduce run-off-the road accidents by installing shoulder rumble strips.			
180	SR 24	38.43 to 43.51	SR 24/SR240 to Columbia River - Climbing Lane	Future	$4,512,000
	Solution:	The solution for this section of the corridor is to construct a truck climbing lane. This will move the high percentage of trucks out of the SB through lane and allow traffic to maintain speed.			
	Expected Benefits:	This project is proposed to help maintain SR 24 as a free flow higher speed facility by reducing congestion and delay in this section of steeply graded highway. There are $806,006 in climbing lane benefits associated with this solution in addition to $6,432,595 in Safety benefits			
182	I-82	30.69 to 38.45	I-82/Yakima River Crossing to Naches River Crossing - Bridge Replacement	Future	$15,100,000
	Solution:	1).Twin Bridges replacement, 2).Eastbound US 12 to eastbound I-82 merge revision, 3).Improve pedestrian and recreational access to the Naches and Yakima rivers, 4).Protect/armor the interstate right-of-way from the Yakima River at the south end of this section			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where merge and weave movements are creating congestion and delay.			
185	I-90	56.56 to 84.47	I-90/Stampede Pass and Cabin Creek I/C's - Reconstruct I/C	Future	$12,350,000
	Solution:	MP62.69 to MP 63.98: Exit 62 and 63 (Stampede Pass and Cabin Creek) interchange improvements. Reconstruct interchanges to comply with standard verticle and horizontal clearances. MP 79.42 to MP79.63: In conjunction with Washington State Patrol, construct eastbound "weigh-in-motion" weigh station.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations.			
188	SR 129	40.5 to 41	SR 129/Fleshman Way - I/C Improvements	Current	$8,500,000
	Solution:	This project will improve traffic flow through the SR 129/Fleshman Way interchange area by reconfiguring the ramps, constructing a roundabout and eliminating at grade stops through the interchange area.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $3,752,583 in Safety benefits and $16,110,480 in intersection benefits associated with this project.			
191	SR 224	6.82 to 10.15	SR 224/S 38th Ave/S 41st Ave/S 40th Ave/Bombing Range Rd/38th Ave - I/S Improvements and Sign	Future	$1,368,000
	Solution:	This low cost proposal will add right turn lanes at intersections at MP 7.56, MP 8.01, and MP 8.10. It will also add signal systems at MP 7.68 and 8.23.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $20.280,651 in safety benefits associated with this project.			
194	SR 240	21.43 to 34.38	SR 240/Twin Bridges Rd to Horn Rd - I/S Improvements	Current/Future	$358,000
	Solution:	This project will channelize two intersections at MP 25.14 (Twin Bridges Road) and MP 20.49 (Horn Road) and add right turn lanes and illumination.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $38,917,181 in Safety benefits associated with this project.			
197	SR 240	37.08 to 41.34	SR 240/Edison St I/C - EB Offramp Improvements and Signal	Current/Future	$1,170,000
	Solution:	This project will improve the eastbound off ramp connection with Edison St. by adding a lane to the ramp for an additional right turn movement onto Edison. The raised traffic island will be removed so that the existing through, left and right movements will change to a dedicated double right turn with a through and left as the other leg eastbound. A signal would also be added and interconnected with the city system if warrants are met.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $ 1,344,512 in safety benefits associated with this project.			
202	US 2	99.89 to 100.24	US 2/Leavenworth Vicinity - Signal management	Current	$200,000
	Solution:	Adaptive signal management			
	Expected Benefits:	Congestion relief through better traffic flow management			
205	US 2	118.54 to 119.99	US 2/School St to Odabashian Bridge - Median barrier	Future	$60,000
	Solution:	Extend median barrier in the vicinity of School St. intersection to turn School St. intersection into a right in right out only intersection.			
	Expected Benefits:	Congestion relief through better traffic flow management			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
216	SR 285	0 to 5	SR 285, SR 285 Couplet/E Wenatchee to US 2 - Signal management	Current	$1,000,000
	Solution:	Adaptive signal management and camera use to better manage traffic flows through the segment and better access management practices.			
	Expected Benefits:	Congestion relief through better traffic flow management			
218	SR 285	2.2 to 5	SR 285, SR 285CO/North Wenatchee Avenue - Study	Current	$6,000,000
	Solution:	Study needs to be conducted to clarify solutions and address access management.			
	Expected Benefits:	Congestion relief with alternative traffic corridors for traffic entering or leaving Wenatchee to East Wenatchee or to the West.			
219	SR 4	58.71 to 60.78	SR 4/32nd Ave to Washington Way - Access Management	Current	$2,100,000
	Solution:	Access management (median curb, where feasible) between 32nd Avenue and Washington Way			
	Expected Benefits:	A significant reduction in intersection related accidents is projected. The mobility benefits are hard to quantify; but safety benefits alone give this project a benefit cost ratio (B/C) of 2.09.			
220	I-5	6.8 to 8.23	I-5/I-205 - NE 134th St Interchange, Stage II	Current	$35,000,000
	Solution:	Partnership with Clark County to widen NE 134th St structure over I-205 and to construct ramps to I-205 Southbound			
	Expected Benefits:	Alleviation of congestion and delays			
221	I-5	8.8 to 81.27	I-5 Corridor - Install ITS	Current	$4,000,000
	Solution:	(1) From MP 8.8 to 10.5, Infill ITS (Intelligent Transportation Systems) technology (fiber / conduit, data stations, and CCTV), with data stations approximately every half mile (2) From MP 20.5 to 21 (I-5 Woodland Interchange): wireless communications, traffic cameras, and data stations			
	Expected Benefits:	The proposed ITS facilities will reduce trip time (8% to 48% delay reduction), air pollution (5% to 13% CO emission reduction), and energy consumption (6% to 12% fuel consumption reduction); increase travel reliability; enhance the ability to communicate during emergencies (40% incident response time reduction); and improve safety (10% fatal accident reduction in urban areas).			
222	I-5	78.64 to 81.89	I-5/Chamber Way to Mellen Street - Add Lanes and Rebuild Structures	Future	$153,000,000
	Solution:	Widen to six general purpose lanes, with additional auxiliary lane between interchanges, and rebuild bridges and interchanges as necessary to accommodate increased capacity. Lessen potential flooding damage and delays by raising the roadway or building a levee.			
	Expected Benefits:	The widening project will increase interstate capacity, improve safety, encourage regional economic development and reduce delay due to congestion, growth projections and flooding.			
223	SR 14	0 to 18.13	SR 14/I-5 to Washougal East City Limit - Install ITS	Current	$6,700,000
	Solution:	(1) Variable message sign (VMS) at ARM 3.00 WB; ARM 4.6 (west of Ellsworth) WB; 205 WB (close to ARM 6); ARM 7.0 WB (cost: $1,292,400) (2) CCTV at intersections, interchanges and blind spots (cost: $582,000)			
	Expected Benefits:	Depending on the location, benefits for ITS facilities vary. It is widely acknowledged that ITS has positive impacts on mobility, safety, and environment. For example, nationwide studies indicate ramp metering can increase speeds from 16% to 62%, and decrease collisions from 15% to 50%.			
224	SR 14	5.58 to 5.59	SR 14/SE Ellsworth Ave - Install Signal	Current	$523,000
	Solution:	Add signal at SR 14 EB Ramp and SE Ellsworth Rd.			
	Expected Benefits:	This project will improve the intersection LOS from E to B using 2006 traffic volume. Additionally, reductions are expected for delay (68%), property damage collisions (30%), and injury/fatal collisions (50%).			
225	SR 14	6.96 to 8.31	SR 14/I-205 to SE 164th Ave - Add Auxiliary Lanes	Current	$25,500,000
	Solution:	Re-stripe and extend ramps between I-205 and 164th Ave., including lengthening/widening WB on ramp from 164th			
	Expected Benefits:	Based on the WSDOT Mobility Projects Prioritization Process (MPPP) estimates, this project will bring $87 million mobility benefits and $15 million safety benefits in 20 years, with a B/C ratio of 5.76. The delay reduction is estimated to be 74% (Benefit Collision Delay Program); and the collision reduction is estimated to be 30% to 50% (MPPP software). The ratio of peak hour speed to posted speed in 2025 will be increased from 58% under no-build scenario to at least 83% under build scenario (Highway Segment Analysis Program).			
226	SR 14	14.64 to 14.65	SR 14/SE Union St - Complete Interchange	Current	$25,000,000
	Solution:	Complete the interchange to full build-out at SR 14/Union St. SWR proposes to complete full build-out of this interchange before building new interchanges elsewhere along the corridor.			
	Expected Benefits:	Anticipated collision reduction is 30%. This project is a component of increasing capacity while decreasing delay and accidents through greater control and fewer access points.			
227	I-205	3.66 to 4.31	I-205/SR 500 - Construct Flyover Ramp	Current	$33,000,000
	Solution:	Build flyover from SR 500 WB to I-205 SB			
	Expected Benefits:	This flyover will alleviate some weaving problems, increase driving speed, and improve safety.			
228	I-205	4.9 to 6.32	I-205/SR 500 to Padden Parkway - Add Lanes	Current	$100,000,000
	Solution:	Widen roadway from SR 500 to Padden Parkway to 8 lanes (6 general purpose, 2 auxiliary)			
	Expected Benefits:	This widening project will reduce year 2026 delay time by 84%, and increase year 2026 driving speed to 91% of posted speed.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
229	I-205	6.41 to 10.41	I-205 Corridor - ITS Improvements	Current	$2,000,000
	Solution:	Install ITS technology (fiber / conduit, data stations, CCTV, and VMS), with devices at approximately every half mile			
	Expected Benefits:	The proposed ITS facilities will help redistribute volumes in the system, reduce trip time, increase travel reliability; enhance communication during emergencies; and improve safety.			
230	SR 411	11.77 to 12.27	SR 411/PH No 10 Rd - Install Signal and Construct Turn Lane	Current	$800,000
	Solution:	Replace four-way stop with signal and channelization.			
	Expected Benefits:	Approximately $800,000 in mobility benefits and $160,000 in safety benefits are expected.			
231	SR 500	0 to 5.96	SR 500/I-5 to NE Fourth Plain Blvd - Install ITS	Current	$2,220,000
	Solution:	(1) CCTV at intersections, interchanges and blind spots (Cost: $568,000) (2) Data stations every 1/2 mile and at interchanges/intersections (Cost: $679,000)			
	Expected Benefits:	Depending on the location, benefits for ITS facilities vary. Overall it is widely acknowledged that ITS has positive impacts on mobility, safety, and environment. For example nationwide studies/projects indicate ramp metering can increase speed from 16% to 62%, and decrease collisions from 15% to 50%.			
232	SR 500	0.38 to 0.42	SR 500/NE 15th Ave - Install Signals	Current	$1,230,000
	Solution:	Add two signals at SR 500/15th Ave intersection. Note: further study is needed to determine final solutions.			
	Expected Benefits:	The benefit cost ratio is 2.95. Benefits are seen in a delay reduction for 2007 of 68%. Anticipated collision reduction ranges from 30% ~ 50%. The average intersection delay and vehicles-to-capacity ratio were determined using Synchro software (for both build and no-build scenario). Accidents occuring on related ramps (type LX, Q1 and R1) are included in the safety benefits.			
233	SR 500	1.8 to 2.38	SR 500/NE 42nd Ave and NE 54th Ave - Construct Interchange	Current	$51,000,000
	Solution:	Build 42nd Ave bridge and 54th Ave interchange A. ARM 1.80, 42nd Ave (Falk Road) bridge (cost: $14 million; B/C: 32.61) B. ARM 2.38, 54th Ave Interchange (cost: $37 million; B/C: 2.32)			
	Expected Benefits:	This project will improve mobility by removing two signalized intersections on a high-volume corridor. Upon the completion of the project, the whole corridor will become a full control limited access highway with a delay reduction of 64%.			
234	SR 500	5.09 to 5.26	SR 500/I-205 - Add Ramp Lane	Current	$2,000,000
	Solution:	Add 1 additional on ramp lane from WB 500 to NB 205			
	Expected Benefits:	This project will reduce the weaving problem between the two interchanges.			
235	SR 500	5.94 to 5.98	SR 500/SR 503 and NE Fourth Plain Blvd - Construct Turn Lanes	Current	$1,000,000
	Solution:	NB to EB dual right turns at Fourth Plain Rd.			
	Expected Benefits:	The initial benefit cost ratio is 5.42. In-depth benefit analysis is expected in the funded $100,000 study.			
236	SR 503	0 to 4.31	SR 503/NE Fourth Plain Blvd to NE 149th St - Access Management	Current	$1,300,000
	Solution:	Add median curb, where feasible, from Fourth Plain to 149th Street			
	Expected Benefits:	The benefit cost ratio is estimated to be 7.88 based on the assumption that median curb can reduce driveway/median related accidents by 70%.			
237	SR 503	0 to 9.13	SR 503/NE Fourth Plain Blvd to NE 244th St - Install ITS	Current	$5,300,000
	Solution:	(1) CCTV at intersections, interchanges and blind spots from SR 500 to SR 502 (cost: $1,486,000) (2) Data stations every ½ mile and at intersections and interchanges SR 500 to SR 502 (cost: $ 1,583,000)			
	Expected Benefits:	Depending on each corridor/location, benefits for ITS facilities vary. Overall it is widely acknowledged that ITS has positive impacts on mobility, safety, and environment.			
238	SR 503	0.77 to 1.27	SR 503/Padden Parkway and SR 500 - Construct Interchange	Current	$32,000,000
	Solution:	Build an interchange at Padden Parkway			
	Expected Benefits:	The benefit cost ratio is 1.33. The benefit estimations are calculated through WSDOT Mobility Projects Prioritization Process (MPPP) program.			
239	SR 503	1.02 to 2.02	SR 503/Padden Parkway - Install Directional Signs	Current	$140,000
	Solution:	Directional signs (overhead signs) to route traffic to I-205 via the Padden Parkway			
	Expected Benefits:	Alleviation of congestion along SR 503 SB and SR 500 WB to SB I-205.			
240	SR 503	7.85 to 7.89	SR 503/SR 502 - Construct Turn Lanes	Current	$2,100,000
	Solution:	Add right turn channelization on east leg, west leg, and north leg			
	Expected Benefits:	Expected benefits include a delay reduction of 50% (comparison year: 2026) and collision reduction of 10% to 40%.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
241	SR 503	53.68 to 54.11	SR 503/N Goerig St to I-5 - Access Management	Current	$234,000
	Solution:	Control access: install median curb where feasible			
	Expected Benefits:	The benefit cost ratio is 3.36. Only safety benefits are included in the BC analysis.			
242	SR 503	53.97 to 53.98	SR 503/Millard St - Re-align Intersection and Install Signal	Current	$3,900,000
	Solution:	Realign and grade East CC Street to Millard Street and signalize intersection at Millard Street			
	Expected Benefits:	This project has a benefit cost ratio (B/C) of 3.65. With the new alignment, East CC Street joins A Street. This realignment would eliminate the East CC Street intersection that is closely spaced with the NB off ramp/Atlantic Street intersection. The intersection at A Street and SR 503 would become signalized. An anticipated delay reduction of 50% was determined through Synchro. Only the PM peak hour was modeled. This time savings was multiplied by 2 to get a rough estimate of total benefits.			
243	SR 503	53.97 to 54.06	SR 503/E CC St to Atlantic St - Improve Intersections	Current	$5,900,000
	Solution:	(1) ARM 53.97, intersection improvements, possible roundabout, at East CC Street and Lewis River Rd (2) ARM 54.06, intersection improvements, possible roundabout, at Lewis River Road, Atlantic St and Goerig Street			
	Expected Benefits:	BC Ratio 2.32; delay reduction: 50%; collision reduction: 25%. The roundabouts show a very significant time savings in the base year. There is an acceptable LOS through the year 2021. However, it is very important to note that there are failing movements for both roundabouts in year 2026. Despite these failing movements, it still performs better than the no build alternative. The results of the PM peak were multiplied by 2 to get a rough estimate of time savings over the day.			
244	SR 503	54.06 to 54.07	SR 503/I-5 Southbound Onramp- Construct Turn Lane	Current	$351,000
	Solution:	Construct additional (second) left turn lane from WB 503 to SB Pacific Ave/I-5 on ramp			
	Expected Benefits:	The benefit cost ratio (B/C) is 5.17. Delay reduction of 23% is estimated. The purpose of this project is to decrease delay as well as queuing between signalized intersections. A more detailed study is needed to determine how long this fix will last before the intersections fail.			
265	US 2	0 to 28.87	US-2 - I-5 to Goldbar - Intelligent Transportation Systems (ITS) improvements	Current	$9,600,000
	Solution:	Intelligent Transportation Systems (ITS) improvements - Closed Circuit Television (CCTV), DATA Stations, Highway Advisory Radio System (HARS), Ramp Meter, fiber optics.			
	Expected Benefits:	The addition of ITS improvements will help improve operations on US-2 and will help to address mobility and safety deficiencies here.			
271	US 2	21.37 to 24.17	US-2 - City of Sultan - I/S improvements and access management	Current	$3,602,000
	Solution:	Intersection improvements and access management with specific improvements at Old Owen Road, Main Street and 339th Avenue.			
	Expected Benefits:	With less stop and go traffic, vehicle emissions will be reduced and access to recreational facilities along US-2 will be enhanced.			
273	SR 3	27.66 to 28.78	SR 3 - Mason/Kitsap County Line Vicinity to Lake Flora Road Vicinity - Widening	Current	$13,537,000
	Solution:	Concept A: 4 lane divided highway and Northbound right turn lane at Lake Flora Road. This project will widen State Route 3 from a 2 lane facility to a 4 lane divided facility from the Mason/Kitsap County Line through Lake Flora Road. It does not include intersection signal at Lake Flora as recommended in a 1992 Design Study, but does propose a northbound right turn lane at Lake Flora.			
	Expected Benefits:	GP for ~$7,346,000, intersection benefits of ~$967,600, and safety benefits of ~$8,257,300 for total benefits of ~$16,571,000. There are 2 existing storm water outfalls within the project limits.			
274	SR 3	32.31 to 34.18	SR 3 - SR 3 between Sunnyslope Road and SR 16/Gorst Spur - Widening	Current	$24,308,000
	Solution:	Concept A: 4/5 lane divided highway (5 with SB auxiliary climbing lane). This project will widen SR 3 from a 2/3 lane (climbing) facility to 2 lanes Northbound and 3 lanes Southbound between Sunnyslope Road and SR 16/Gorst Spur Vicinity (4 lanes in Gorst). It does not include intersection signal at Sunnyslope as recommended in a 1992 design study, but does propose channelization at Sunnyslope Intersection (Retain SB left turn, SB accel lane, and provide a NB right turn lane).			
	Expected Benefits:	GP for ~$6,155,000,safety benefits for ~$7,265,000, climbing lane benefits for ~$10,650,000, and intersection benefit for ~$234,000 for total benefits of ~$24,304,000. 3 existing storm water outfalls, 1 fish passage, and T-2 route near SKIA hauls between 4 million to 10 million tons of freight per year. Special events may include a proposed NASCAR facility south of this segment.			
276	SR 3	34.15 to 36.59	SR 3 - SR 3 between SR 16 and SR 304 - ITS	Current	Unknown
	Solution:	Intelligent Transportation Systems (ITS) Master Plan Improvements			
	Expected Benefits:	Unknown at this time			
282	SR 3	56.03 to 57.09	SR 3 - Pioneer Way to Kinman-Big Valley Roads - truck/climbing lane	e to vertical curve and hi	$6,121,000
	Solution:	Concept A: Southbound (decreasing) truck/climbing lane on SR 3 between Pioneer Way and Kinman-Big Valley Roads.			
	Expected Benefits:	Climbing lane benefit of $3,800,000 and safety benefit of $97,000 (30% placeholder reduction of all accidents).			
283	SR 3	57.09 to 60.02	SR 3 - Kinman/Big Valley Road to SR 104 - add a NB lane	Future	$23,347,000
	Solution:	Concept B: This project will add a NB general purpose lane between Big Valley and the SR 3/SR 104 intersection.			
	Expected Benefits:	GP for ~$8,954,000, holding lane for ~$3,060,000, safety for ~$8,349,000, and intersection for ~$724,000. Air quality enhanced since fewer vehicles wait in holding queues, Port accessibility for northbound vehicles bound for Kingston Ferry terminal will not be impeded by bridge openings, at least one fish passage barrier repair (total 3			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
284	SR 3	60.02 to 60.03	SR 3 - SR 3/SR 104 Intersection Vicinity - Flyover jug-handle	when Hood Canal Bridg	$14,200,000
	Solution:	Concept A: Flyover jug-handle with holding area per VE Report			
	Expected Benefits:	Unknown at this time. This conceptual solution is a placeholder for a bottleneck/chokepoint location.			
287	I-5	115 to 123.64	I-5 - Thurston/Pierce County Line to Thorne Lane - ITS	Current	$5,170,000
	Solution:	Construct Intelligent Transportation System (ITS) improvements per ITS Master Plan.			
	Expected Benefits:	The implementation of the ITS system components here will help to improve mainline flow on I-5.			
288	I-5	116.77 to 131.25	I-5 - Mounts Road to 48th Street - Install ramp metering on ramps where warranted.	Current	$6,138,000
	Solution:	Install ramp metering on ramps where warranted.			
	Expected Benefits:	Ramp metering will reduce delay			
293	I-5	122.89 to 123.39	I-5 - Mounts-Old Nisqually Rd I/C to Gravelly Lake Drive I/C - Construct auxiliary lanes and noise walls	t level of service segmen	$8,000,000
	Solution:	Concept B: Northbound Auxiliary Lane. This project will modify weave, merge, and diverges between two interchanges by increasing distance for these movements with installation of a Northbound auxiliary lane between Berkeley on-ramp and Thorne Lane off ramp (MP 122.89 to MP 123.39). Thorne Lane Interchange is near the location of a future urban interchange that will serve a new SR 704. A noise wall could be a negotiated item for additional right-of-way easement from Fort Lewis Military Base.			
	Expected Benefits:	GP for ~$69,800,00 and Safety benefits of ~$3,000,000 (Assumes auxiliary lane acts as 4th freeway lane)			
306	I-5	147.23 to 149.23	I-5 - I-5 at 272nd Street Interchange - Construct a SB auxiliary lane between SR 516 and S 272nd with	Current	$14,479,000
	Solution:	Construct a southbound auxiliary lane between SR 516 and S 272nd Street with a two lane off ramp to 272nd Street.			
	Expected Benefits:	The provision of a SB auxiliary lane will provide additional capacity and improve traffic flow through this I/C.			
308	I-5	164.02 to 165.69	I-5 - I-5 at I-90 Interchange - Construct a two lane off-ramp from NB I-5 to EB I-90.	Current	$20,976,000
	Solution:	Construct a two lane off-ramp from NB I-5 to EB I-90.			
	Expected Benefits:	The addition of a 2-lane off-ramp will improve vehicle flow through the I-5/I-90 I/C, which is currently very congested.			
320	SR 9	4.03 to 29.57	SR 9 - 176th St. SE to SR 530 - ITS	Current	$20,000,000
	Solution:	Construct Intelligent Transportation Systems (ITS) improvements.			
	Expected Benefits:	The addition of ITS improvements here will improve SR 9 operations and help to address mobility and safety deficiencies.			
327	SR 16	14.86 to 15.75	SR 16 - Burnham Drive Interchange to SR 302 Bridges - Construct EB and WB auxiliary lanes	and short distance betwe	$3,933,000
	Solution:	Concept A: Eastbound and Westbound auxiliary lane between Burnham Drive Interchange and SR 302 Bridges. The short distance between on and off ramps 210-ft and 950-ft, respectively, combined with pipeline traffic volumes will result in a failing LOS weave (22 mph) with the auxiliary lane additions. This is an interim conceptual solution that will help reduce traffic weaving impacts.			
	Expected Benefits:	Unknown at this time. This conceptual solution is a placeholder for an emerging bottleneck/chokepoint location.			
328	SR 18	2.21 to 28.41	SR 18 - SR 167 to I-90 - ITS	Current	$37,980,000
	Solution:	Install Intelligent Transportation Systems (ITS) including Closed Circuit Television (CCTV), data station, Highway Advisory Radio System (HARS), Highway Advisory Radio Transmitter (HART), ramp meter, Variable Message Sign (VMS), and fiber optic line.			
	Expected Benefits:	The addition of ITS improvements here will improve SR 18 operations and help to address mobility and safety deficiencies here.			
329	SR 18	2.87 to 27.91	SR 18 - I-5 to I-90 - Intersection improvements and signalization	Current	$2,500,000
	Solution:	Install signals as planned by Northwest Region Traffic.			
	Expected Benefits:	The addition of ITS improvements here will improve SR 18 operations and help to address mobility and safety deficiencies on this SR 18 corridor segment.			
343	SR 99	0 to 0.2	SR 99 - Hwy 99 at I-5 Interchange - Widening and intersection improvements	Current	$2,583,000
	Solution:	Add a southbound thru lane on Hwy 99 from 54th to NB On Ramp to I-5. Improve intersection of HWY 99 and 54th Avenue.			
	Expected Benefits:	Additional SB thru lane and I-5 interchange improvements will improve capacity and vehicle flow through this I/C segment.			
344	SR 99	39.77 to 39.99	SR 99 - Hwy 99 at SR 104 Interchange - Construct Business Access and Transit (BAT) lanes	Current	$32,549,000
	Solution:	Add one lane each direction to connect with Business Access and Transit (BAT) lanes that cities have built or are planning to build on each side of the HWY 99 and SR 104 Interchange.			
	Expected Benefits:	BAT lane and I/C enhancement will improve transit, HOV and GP movement through this I/C.			

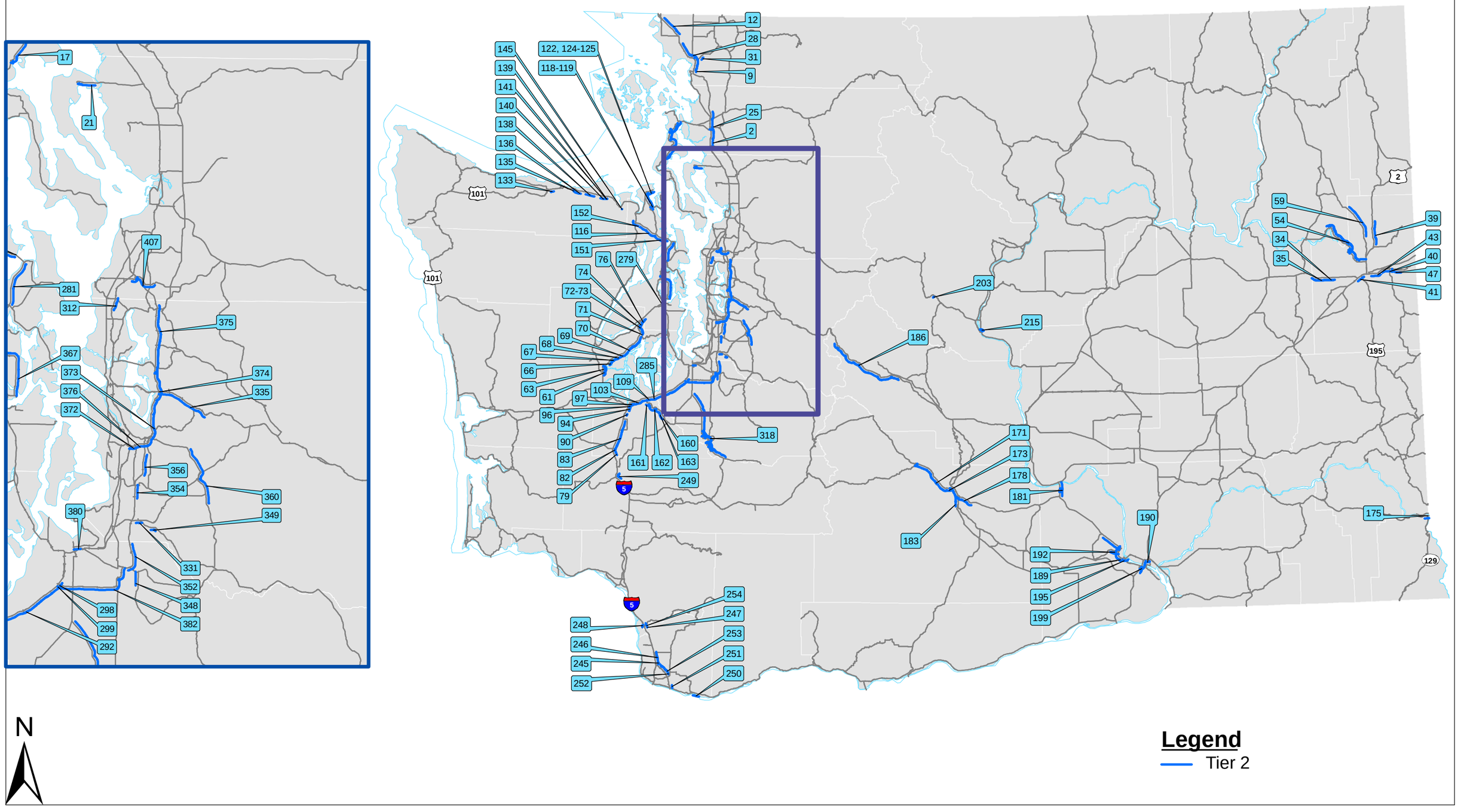
Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
345	SR 104	20.58 to 24.45	SR 104 - SR 307 (Bond Road) to Kingston Ferry - SR SR 104 Alternative Analysis (widening and tunn raffic (Fri, Sat. Sun. duri		$1,500,000
	Solution:	SR 104 Alternative Analysis (widening and tunnel options).			
	Expected Benefits:				0
346	SR 104	22 to 24.41	SR 104 - Miller Bay to Kingston Ferry - Construct a new park and ride/remote ferry holding lot	Current	$12,000,000
	Solution:	Construct a new park and ride/remote ferry holding lot for passenger ferry traffic and seasonal peaks in automobile ferry traffic.			
	Expected Benefits:	New Park-and-ride will allow for more WSF walk-on and transit trips.			
347	SR 104	31.45 to 31.75	SR 104 - Intersection of SR SR 104 and SR SR 522 (Lake City Way) - Widening and intersection char	Current	$7,661,350
	Solution:	Add one lane each direction on SR 104 from 178th to SR 522 with intersection channelization improvements at 178th, 175th and SR 522.			
	Expected Benefits:	Intersection channelization and added lane in each direction will improve vehicle flow and safety through the SR 104/SR 522 I/S.			
351	SR 167	7.03 to 28.6	SR 167 - Puyallup to Renton -ITS	Current	$29,000,000
	Solution:	Install Intelligent Transportation Systems (ITS) including Closed Circuit Television (CCTV), data station, Highway Advisory Radio System (HARS), Highway Advisory Radio Transmitter (HART), ramp meter, Variable Message Sign (VMS), and fiber optic line.			
	Expected Benefits:	The provision of ITS project improvements here will improve SR 167 mainline operations and will help address congestion and safety deficiencies.			
358	SR 169	3.76 to 5.16	SR 169 - SE 383rd St. to Green River - Construct a southbound truck climbing lane.	Current	$9,803,000
	Solution:	Construct a southbound truck climbing lane.			
	Expected Benefits:	Improvement of freight and general GP traffic flow.			
359	SR 169	5.3 to 6.32	SR 169 - Green River to Crest of Hill (ARMP 6.32) - Construct NB truck climbing lane	Current	$6,328,000
	Solution:	Replace the existing northbound truck climbing shoulder with a truck climbing lane and extend it to the north.			
	Expected Benefits:	Improvement of freight and general GP traffic flow.			
361	SR 169	16.02 to 17.02	SR 169 - Near Cedar River - Construct a SB truck climbing lane.	Current	$2,929,000
	Solution:	Construct a southbound truck climbing lane.			
	Expected Benefits:	Improvement of freight and general GP traffic flow.			
363	SR 204	0 to 2.28	SR 204 - US-2 to SR 9 - Relocate Frontier Village access	Current	$5,247,000
	Solution:	Relocate Frontier Village access out of intersection with SR 9 and look at removing signal at 91st. Add storage for traffic from eastbound SR 204 to northbound SR 9.			
	Expected Benefits:	Access management and intersection treatments here will address congestion deficiency and improve traffic flow.			
365	SR 303	0 to 5.59	SR 303 - SR 304 to Brownsville Hwy. - Construct intersection improvements and Traffic System Mana	Current	$1,500,000
	Solution:	Construct Traffic System Management (TSM) improvements including signal coordination, channelization at intersections where needed and signal priority.			
	Expected Benefits:	The addition of ITS improvements will help improve operations on SR 303 and will help address mobility and safety deficiencies here.			
366	SR 303	0 to 9	SR 303 - SR 304 to Clear Creek Rd. - ITS	Current	$11,200,000
	Solution:	Install two Closed Circuit Television (CCTV) units near Clear Creek Rd. and conduit from SR 304 to Clear Creek Rd.			
	Expected Benefits:	The addition of ITS improvements will help improve operations on SR 303 and will help address mobility and safety deficiencies here.			
369	SR 303	2.91 to 3.91	SR 303 - SR SR 303/Riddell Road to McWilliams Road - Access management and intersection improv	Current	$3,098,000
	Solution:	Access management and intersection improvements.			
	Expected Benefits:	Access management and intersection improvements here will improve vehicle flow and address safety deficiencies associated with heavy turn movements in the center lane.			
370	SR 305	0 to 7.03	SR 305 - Bainbridge Ferry Terminal to Suquamish Way - Intersection improvements with transit queue	Current	$3,109,000
	Solution:	Intersection improvements with transit queue jump lanes.			
	Expected Benefits:	Intersection improvements will improve traffic flow and transit queue jumps will improve transit service reliability here.			

Tier I Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
371	SR 305	9.69 to 10.7	SR 305 - Knoll Road to Poulsbo City Limits - Add Channelization at Noll Rd., SR SR 305. and Johnso	Current	$1,043,000
	Solution:	Channelization: Noll Rd. - Add left turn lane and center merge lane to SR 305. Johnson Way - Add left turn lanes to SR 305.			
	Expected Benefits:	Channelization and addition of LT/Center lanes will improve traffic flow and reduce congestion.			
377	SR 410	0.27 to 1.43	SR 410 - SR 167 to SR 162 - WB Auxiliary Lane	Current	$9,355,000
	Solution:	Construct a westbound auxiliary lane from SR 162 to East Main Avenue.			
	Expected Benefits:	Provision of WB auxiliary lane will improve traffic flow and reduce congestion.			
379	SR 410	11.84 to 11.85	SR 410 - SR 410 at SR 165 Intersection - Intersection Improvements and Signalization	Current	$1,100,000
	Solution:	Signalize the intersection of SR 165 and SR 410. Construct an eastbound SR 410 to southbound SR 165 turn lane which bypasses the signal.			
	Expected Benefits:	Intersection signalization and EB turn lane provision here will reduce congestion and improve safety and operations at this intersection.			
381	SR 512	0 to 12.06	SR 512 - Lakewood to Puyallup - ITS	Current	$14,000,000
	Solution:	Install Intelligent Transportation Systems (ITS) including Closed Circuit Television (CCTV), data station, Variable Message Sign (VMS), conduit and fiber optic line.			
	Expected Benefits:	The provision of ITS improvements here will improve SR 512 mainline operations and help address congestion and safety deficiencies.			
384	SR 512	5.85 to 5.86	SR 512 - SR-512 at Canyon Road Interchange - Two Lane Eastbound Off-Ramp	Current	$5,108,000
	Solution:	Construct a two lane eastbound off-ramp to Canyon Road.			
	Expected Benefits:	The addition of 2 lane EB off-ramp here will improve SR 512 mainline operations and help reduce congestion.			
385	SR 512	5.86 to 5.87	SR 512 - SR-512 at Canyon Road Interchange - Two Lane Westbound Off-Ramp	Current	$3,930,000
	Solution:	Construct a two lane westbound off-ramp to Canyon Road.			
	Expected Benefits:	The addition of a 2 lane WB off-ramp here will improve SR 512 mainline operations and help reduce congestion.			
388	SR 518	0 to 3.42	SR 518 - SR 509 to I-5 - ITS	Current	$6,000,000
	Solution:	Closed Circuit Television (CCTV), DATA Stations, Highway Advisory Radio System (HARS), Ramp Meter, Variable Message Sign (VMS), Fiber			
	Expected Benefits:	The addition of ITS improvements will help improve SR 518 operations and will help address mobility and safety deficiencies here.			
397	SR 520	10.73 to 11.79	SR 520 - 51st to West Lake Sammamish Parkway - Eastbound Auxiliary Lane	Current	$2,733,000
	Solution:	Construct an eastbound auxiliary lane from the 51st Street eastbound on-ramp to the eastbound off-ramp at West Lake Sammamish Parkway.			
	Expected Benefits:	The addition of an EB auxiliary lane will reduce congestion and improve operations on SR 520			
401	SR 522	11.1 to 24.68	SR 522 - I-405 to US-2 (Monroe) - ITS	Current	$23,000,000
	Solution:	Install Intelligent Transportation Systems (ITS) including Closed Circuit Television (CCTV), data station, Highway Advisory Radio System (HARS), Highway Advisory Radio Transmitter (HART), ramp meter, Variable Message Sign (VMS), and fiber optic line.			
	Expected Benefits:	Provision of ITS improvements here will improve SR 522 operations and help address congestion and safety needs.			
406	SR 524	0 to 11	SR 524 - Edmonds to Bothell - ITS	Current	$9,860,000
	Solution:	Install Closed Circuit Television (CCTV), intersection loop detection, and fiber optics.			
	Expected Benefits:	The addition of ITS improvement s will help improve SR 524 operations and will help address mobility and safety deficiencies here.			
411	I-705	0 to 0.72	SR 705 - I-5 to SR 509 - ITS	Future	$1,575,000
	Solution:	Construct Intelligent Transportation System (ITS) improvements per ITS Master Plan (see note).			
	Expected Benefits:	The implementation of the ITS system components here will help to improve mainline flow on I-5.			

2007-2026 DRAFT Mobility Implementation Plan: Solutions



Tier II Solutions

Key	*Highway Number*	*Milepost*	*Title*	*Current or Future Problem*	*Cost Estimate*
2	I-5	221.19 to 232.95	I-5/Old Highway 99 to Anderson Rd - Freeway Improvements	Future	$45,000,000
	Solution:	Upgrade the Old Highway 99 interchange to a full-diamond interchange. Increase the freeway mainline from 4 to 6 lanes, from Old Highway 99 to Anderson Road. Add auxiliary lanes at 4 location in the corridor.			
	Expected Benefits:	20% reduction in accidents, 20% reduction in delay.			
9	I-5	250.87 to 262.69	I-5/ Fairhaven to Ferndale - Auxilliary Lanes and Ramp Improvements	Future	$57,000,000
	Solution:	Add auxiliary lanes at six locations, along with ramp improvements at two interchanges.			
	Expected Benefits:	20% reduction in accidents, 20% reduction in delay.			
12	I-5	266.1 to 273.98	I-5/Birch Bay-Lynder Rd - New Interchange	Future	$30,000,000
	Solution:	A re-constructed interchange at Birch Bay-Lynden Road.			
	Expected Benefits:	20% reduction in accidents, 10% reduction in delay.			
17	SR 20	30.05 to 47.01	SR 20/S Oak Harbor to Sharpe's Corner - Mid Term Improvements	Current	$110,000,000
	Solution:	Some intersection and spot capacity improvements will be needed to address congestion/delay issues. These improvements could include signals, roundabouts, turn lanes, and auxiliary lanes. Some local street enhancements will be needed to address traffic operation problems which will arise in the future. These enhancements will allow drivers			
	Expected Benefits:	Better flow of traffic using existing facilities as much as possible. Improve local roads to reduce highway trips. Widen Deception pass bridges to improve safety for peds and auto/trucks.			
21	SR 532	0 to 2.91	SR 532/Sunrise Dr to County Line - Corridor Improvements (Moderate)	Current	$15,000,000
	Solution:	Some intersection and spot capacity improvements will be needed to address congestion/delay issues. These improvements could include signals, roundabouts, turn lanes, and auxiliary lanes.			
	Expected Benefits:	Better flow of traffic using existing facilities as much as possible.			
25	SR 538	0 to 1.27	SR 538/I-5 to LaVenture Rd - Corridor Improvements (Moderate)	Future	$60,000,000
	Solution:	Some intersection and spot capacity improvements will be needed to address congestion/delay issues. These improvements could include signals, roundabouts, turn lanes, and auxiliary lanes. Some local street enhancements will be needed to address traffic operation problems which will arise in the future. These enhancements will allow drivers to have a choice of routes, and will reduce the demand on the State Route. The interchange of SR 538 and I-5 will need to be improved in order to improve the efficiency of vehicle movement and processing.			
	Expected Benefits:	Keep traffic flowing using by maximizing the existing roadway as much as possible. Improve the interchange to eliminate the existing bottleneck (widen college to 6-lanes underneath I-5).			
28	SR 539	0 to 0.87	SR 539/I-5 to Kellogg Rd - Corridor Improvements (Moderate)	Current	$145,000,000
	Solution:	Some local street enhancements will be needed to address traffic operation problems which will arise in the future. These enhancements will allow drivers to have a choice of routes, and will reduce the demand on the State Route. Reconstruction of the interchange with I-5 and widening of I-5 will be required to address mobility and traffic operation issues. Some minor widening of SR 539 will be required to alleviate mobility issues.			
	Expected Benefits:	Better flow of traffic using existing facilities as much as possible. Improve local roads to reduce highway trips. Improve the interchange to help traffic flow more efficiently.			
31	SR 542	1.74 to 2.79	SR 542/McLeod Rd to Britton Rd - Corridor Improvements (Moderate)	Future	$55,000,000
	Solution:	Incorporating access management strategies in the corridor will help to reduce accidents and delays caused by the many driveways which exist here. Intelligent Transportation Systems (ITS) strategies will help to make the corridor more efficient by providing real-time information to drivers, as well as the traffic management center. Transportation Demand Management will help to reduce the demand of vehicles using the corridor. This solution will include new Park and Ride lots at Britton Rd, and in Nugent's Corner. Roundabout will help to improve traffic flow and safety.			
	Expected Benefits:	Better flow of traffic maximizing existing facilities as much as possible. Eliminating left turns out of driveway will reduce accidents.			
34	US 2	259.21 to 266.89	US 2/Fairchild Air Force Base to I-90 - Construction of Frontage and Backage Roads	Future	$18,000,000
	Solution:	The construction of frontage and backage roads to remove traffic from US 2 has been proposed. These roads would be located between large trip generators and provide opportunity for motorists to avoid US 2 in traveling between various shopping, employment and recreational destinations. Purchase of access control has also been proposed as a longer-term solution to improve traffic flow by reducing conflict.			
	Expected Benefits:	The removal of local trips from US 2 will improve travel delay in the corridor.			
35	US 2	259.21 to 266.89	US 2/Fairchild Air Force Base to I-90 - ITS and Incident Response Deployment	Future	$3,700,000
	Solution:	Deployment of ITS capabilities in the corridor to alert motorists to traffic delays caused by incidents, accidents, or congestion, along with Incident Response coverage.			
	Expected Benefits:	Additional ITS capabilities will enhance safe operations of the facility through motorist awareness of delay caused by incidents on the facility.			
39	US 2	290.2 to 298.03	US 2/Woolard Rd Vicinity - Construct I/C with Frontage Roads	Current	$14,000,000
	Solution:	Construct grade separated interchange, in the vicinity of Woolard Rd., in conjunction with frontage roads, to eliminate direct access to US 2 at Colbert and Glen/Elk-Chattaroy roads.			
	Expected Benefits:	Safety improvements and improved mobility through this portion of the corridor.			

Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
40	SR 27	87.75 to 88.84	SR 27/32nd Ave to I-90 - I/S Improvements	Current	$2,000,000
	Solution:	Improvement management strategies for this route segment include capacity improvements at intersections as well as additional lanes.			
	Expected Benefits:	Capacity improvements at intersections will provide for improved LOS at the intersection as well as improved travel time for the route segment.			
41	I-90	274.79 to 277.8	I-90/US 195 I/C to Liberty Park I/C - Enhanced ITS and Incident Response Capabilities	Current	$1,000,000
	Solution:	Provision of enhanced ITS systems in the corridor along with additional Incident Response capabilities.			
	Expected Benefits:	Additional ITS capabilities will enhance safe operations of the facility through motorist awareness of delay caused by incidents on the facility.			
43	I-90	280.57 to 288.13	I-90/Sprague I/C to Sullivan I/C - Enhanced ITS and Incident Response Capabilities	Future	$1,500,000
	Solution:	Continued development of ITS capabilities and enhanced Incident Response program.			
	Expected Benefits:	Provision of ITS and enhanced Incident Response will help to maintain acceptable operating conditions on this route segment prior to the construction of general purpose lanes in the longer term.			
47	I-90	289.13 to 291.59	I-90/Barker I/C to Harvard I/C - Construct General Purpose Lanes	Current	$80,000,000
	Solution:	Additional lane in each direction between Barker Rd. interchange and Harvard Rd. interchange, including the cost to reconstruct Barker and Harvard interchanges.			
	Expected Benefits:	Additional capacity will result in a reduction in delay of approximately 6% according to recent travel demand modeling done for this route segment.			
54	SR 291	0 to 22.31	SR 291/US 2 to Scott's Valley Rd - I/S Improvements	Current	$5,000,000
	Solution:	Minimum fixes that will generate significant mobility benefits, and can be accomplished in the near-term, as identified in the Route Development Plan, include signal timing coordination and improvements, various channelization improvements at intersections, retail driveway consolidation, lane extensions to provide storage, signal and/or roundabout construction and construction of two-way left turn lanes.			
	Expected Benefits:	Congestion reduction, reducing delay at signalized intersections and safety benefits through removal and minimization of conflict points.			
59	US 395	176.79 to 188.48	US 395/Fender Rd Vic to Stevens Co Line - Traffic Management Strategies	Current	$2,000,000
	Solution:	Provision of Park & Ride facilities as well as ITS and Incident Response capabilities in the corridor.			
	Expected Benefits:	The improvements will help to maintain acceptable operating conditions on US 395 in the near term.			
61	SR 3	0 to 1.58	SR 3/US 101 to Shelton South Corporate Limits - Widening	Future	$19,769,000
	Solution:	Widen from 2 lanes to 4 lanes (divided highway)			
	Expected Benefits:	General purpose lane benefits of ~$5,557,411, Arcadia intersection benefits of ~$273,514, and Safety benefits of ~$5,007,915 for total benefits based upon 2005 to 2025 being ~$10,838,840.			
63	SR 3	1.58 to 2.71	SR 3/Shelton South Corporate Limits to Railroad Ave - Widening	Future	$18,813,000
	Solution:	NFS - Widen from 2/3 lanes to 4/5 lanes or alternate route in Shelton CBD (couplet via 7th and Alder)			
	Expected Benefits:	General purpose lane benefits of ~$5,602,878, total intersection benefits of ~$4,716,603, and Safety benefits of ~$4,526,150 for total benefits based upon 2005 to 2025 being ~$14,845,631.			
66	SR 3	5 to 7.24	SR 3/2 Miles S of Johns Prairie Rd to Mason Lake Rd - Passing Lanes and SB Right Turn lane at Johns	Current/Future	$15,987,000
	Solution:	Staggered passing lanes and southbound right turn lane at Johns Prairie Road			
	Expected Benefits:	General purpose lane benefits of ~$2,228,741, safety benefits of ~$1,305,999, and intersection benefits of ~$22,954 for total benefits of ~$3,557,694.			
67	SR 3	7.24 to 10.76	SR 3/Mason Lake Rd to Pickering Rd - Widening	Current/Future	$66,845,000
	Solution:	Widen from 2 lanes to 4 lanes (divided highway)			
	Expected Benefits:	General purpose lane benefits of ~$13,294,970 and safety benefits of ~$9,631,913 for total benefits based upon 2005 to 2025 being ~$22,926,883.			
68	SR 3	9.08 to 10.76	SR 3/Agate Rd to Pickering Rd - Passing Lanes	Future	$3,752,000
	Solution:	Interim Staggered Northbound Climbing and Southbound Passing Lanes. Construct a Northbound climbing lane from MP 9.08 to MP 9.96 and a Southbound passing lane from MP 9.96 to MP 10.76.			
	Expected Benefits:	Northbound climbing lane benefits of ~$1,135,093, Southbound general purpose passing lane benefits of ~$599,581, and safety benefits of ~$3,735,212 for total benefits based upon 2005 to 2025 being ~$5,469,885.			
69	SR 3	10.76 to 20.32	SR 3/Pickering Rd to Grapeview Loop Rd - Widen Shoulders, SB Left Turn Lane at S Grapeview Loop R	Future	$39,809,000
	Solution:	Widen shoulders and travel lanes (interim). This project will widen the existing 3-ft shoulders and 11-ft travel lanes to 8-ft shoulders and 12-ft travel lanes prior to implementing staggered passing lanes. Channelization is assumed at the two Grapeview Loop Road connections (SB left turn at the south connection and a NB right turn at the north connection)			
	Expected Benefits:	General purpose lane benefits (for widening shoulders and traveled lanes) is ~$7,922,740 and safety benefits are~$27,944,483 for total benefits of ~$35,867,223.			

Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
70	SR 3	14.2 to 20.32	SR 3/Mason and Benson Rd to Grapeview Loop Rd - Passing Lanes	Future	$12,779,000
	Solution:	Passing lanes. This solution will provide four staggered passing lanes. The northbound passing lanes are proposed from MP 14.20 to MP 14.83 (0.63 mile) and from MP 18.83 to MP 19.70 (0.87 mile). The southbound passing lanes are proposed from MP 14.83 to MP 15.70 (0.78 mile) and from MP 19.70 to MP 20.32 (0.62 mile).			
	Expected Benefits:	General purpose lane benefits (passing lanes) is ~$568,281 and safety benefits are ~$5,205,650 for total benefits of ~$5,773,931.			
71	SR 3	21.17 to 22.45	SR 3/E N Bay Rd to E Homestead Dr - NB Passing Lane and NB Right Turn Lane at E N Bay Rd	Future	$10,765,000
	Solution:	Northbound climbing/passing lane. This project proposes a northbound climbing/passing lane from MP 21.28 to MP 22.45 (1.17 miles). A SR 3 northbound right turn lane (~400 feet long) is assumed for vehicle turning movements toward E. N. Bay Road (Old SR 302).			
	Expected Benefits:	Climbing lane benefits of ~$1,683,367 and safety benefits of ~$5,191,380 for total benefits of ~$6,874,747.			
72	SR 3	23.27 to 27.97	SR 3/SR 302 Vic to Belfair Yard Rd Vic - Four Lane Bypass	Future	$136,000,000
	Solution:	Four-Lane Belfair Bypass			
	Expected Benefits:	Unknown at this time			
73	SR 3	23.27 to 27.97	SR 3/SR 302 Vic to Belfair Yard Rd Vic - Two Lane Bypass	Current/Future	$0
	Solution:	Two-Lane Belfair Bypass			
	Expected Benefits:	Unknown at this time.			
74	SR 3	24.88 to 24.89	SR 3/SR 106 Jct - Signal Modification and Channelization	Current	$976,000
	Solution:	Concept B: Intersection improvements. This project will modify a signal system, add an eastbound left turn lane on SR 106 (or an eastbound right turn lane on SR 106), and a southbound right turn lane on SR 3 (Consider a NB acceleration lane on SR 3 if no signal installed).			
	Expected Benefits:	Intersection benefits can range from a low of ~$1,645,000 to a high of ~$3,089,000 with safety benefits of ~$1,786,000 (30% reduction placeholder). Assume maximum benefit of ~$4,875,000 with signal and channelization.			
76	SR 3	25.98 to 26.35	SR 3/NE Romance Hill Rd to SR 300 - Park and Ride Lot	Current	$1,380,000
	Solution:	Belfair Park and Ride Lot. A new 50 stall lot (replacing 30 stall leased site) is proposed in the vicinity of NE Romance Hill Road or near SR 300.			
	Expected Benefits:	Park and ride lot benefits of ~$687,410.			
79	I-5	85.58 to 98.69	I-5/Lewis County Line to 93rd Ave SW Vic - Rural Intelligent Transportation System Master Plan	Future	Unknown
	Solution:	Implement rural elements of the Intelligent Transportation System (ITS) Master Plan. Also consider supplementing this plan with ITS kiosk information booths at the Scatter Creek and Maytown Safety Rest Areas.			
	Expected Benefits:				
82	I-5	87.64 to 95.77	I-5/Prairie Creek Br Vic to Maytown I/C Vic - Scatter Creek Safety Rest Area and Maytown Safety Rest A	Current	Unknown
	Solution:	Safety Rest Area Improvements at Maytown and/or Scatter Creek (increase number of freight stalls and/or provide recreational vehicle dump stations).			
	Expected Benefits:				
83	I-5	88.4 to 88.41	I-5/Grand Mound I/C Vic - Expand Park and Ride Lot	Future	Unknown
	Solution:	Expand the existing 44-stall park and ride lot by 36-stalls in the US 12 West (Grand Mound) Interchange Vicinity (Transportation Demand Management solution).			
	Expected Benefits:				
90	I-5	101 to 101.69	I-5/Tumwater Blvd I/C - Partial Cloverleaf or Other Interchange Modification	Current	Unknown
	Solution:	Phase 2 design concerns could address items like loop ramps and bridge widening since Tumwater Boulevard Interchange would be approaching or exceeding congestion with just Phase 1 bottleneck/chokepoint improvements. Also implement urban elements of the Intelligent Transportation System (ITS) Master Plan for this segment.			
	Expected Benefits:				
94	I-5	102.86 to 115	I-5/Trosper Rd I/C to Pierce County Line - Urban Intelligent Transportation Systems Master Plan (Other T	Current/Future	Unknown
	Solution:	Intelligent Transportation System improvements other than ramp metering between Trosper Rd I/C and Thurston/Pierce County Line.			
	Expected Benefits:	Unknown at this time			
96	I-5	104.12 to 104.13	I-5/N 2nd Ave Off Ramp I/S - Signal and Acceleration Lane	Current	Unknown
	Solution:	A signal with acceleration lane or other alternative at Desoto/N 2nd Ave./US 101 off ramp and I-5 off ramp to N 2nd Ave. to improve LOS (LOS E with stop signs)			
	Expected Benefits:				

Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
97	I-5	104.89 to 106.24	I-5/Capitol Blvd Vic to Plum St - High Capacity Transit Improvements	Current	Unknown
	Solution:	High Capacity Transit Southbound off ramp and bridge to Eastside Street. Consider/study extending this proposed facility as a high-level ribbon ramp structure to US 101 off ramp for transit and/or HOV use (Exit 105 City Center/Plum connecting to Eastside Street and possibly into off ramp into US 101).			
	Expected Benefits:				
103	I-5	108.53 to 109.03	I-5/College St Vic - High Capacity Transit Ramps	Current	Unknown
	Solution:	High Capacity Transit Ramps (i.e. northbound off and southbound on) between Sleater Kinney Undercrossing and College Street Undercrossing (in median).			
	Expected Benefits:				
109	I-5	112.01 to 112.02	I-5/Marvin Rd I/C - Park and Ride Lot	Current/Future	Unknown
	Solution:	Install 400+ park and ride lot in the vicinity of the Marvin Road (SR 510) I/C.			
	Expected Benefits:				
116	SR 19	0.09 to 0.1	SR 19/SR 104 Jct Vic - Park and Ride Lot	Future	Unknown
	Solution:	Improve existing 40-stall park and ride lot			
	Expected Benefits:				
118	SR 19	9.09 to 9.1	SR 19/Center Rd Vic - Park and Ride Lot	Future	Unknown
	Solution:	New 20-stall park and ride lot near Chimacum/Center Road			
	Expected Benefits:				
119	SR 19	9.09 to 14.09	SR 19/Center Rd to SR 20 - Widening	Future	Unknown
	Solution:	Widen from 2/3 lanes to 4 lanes			
	Expected Benefits:				
122	SR 20	8.26 to 10.83	SR 20/Old Fort Townsend Rd to Hendricks St - Parallel Rd Extensions and Access Management	Current/Future	Unknown
	Solution:	Parallel road extensions and access management (per 1991 Port Townsend Gateway Development Plan)			
	Expected Benefits:				
124	SR 20	9.21 to 10.78	SR 20/ Old CMSTP&P Railroad Br to Sherman St - Shoulder Widening	Future	Unknown
	Solution:	Widen shoulder to five feet minimum (Bike touring route and nearby schools)			
	Expected Benefits:				
125	SR 20	10.83 to 12.52	SR 20/Hendricks St to Port Townsend Ferry Terminal - WB Truck Climbing Lane	Current/Future	Unknown
	Solution:	Westbound Truck climbing lane (Eastbound ferry holding lane funded by a Port Townsend Ferry Terminal Project #90000126)			
	Expected Benefits:				
133	US 101	242.11 to 243.37	US 101/Laird Rd to Reddick Rd - Widening	Future	Unknown
	Solution:	Widen from 2/3 lanes to 4 lanes			
	Expected Benefits:				
135	US 101	252.27 to 252.28	US 101/Deer Park Rd - At Grade Separation	Future	$5,000,000
	Solution:	Construct Deer Park and Buchanan Road Undercrossing per PRTPO priority (leaving right in-right out access)			
	Expected Benefits:				
136	US 101	252.35 to 254.37	US 101/Deer Park Rd to O'Brien Rd - Park and Ride Lot	Future	Unknown
	Solution:	New 50-stall park and ride lot at Deer Park or O'Brien Road.			
	Expected Benefits:				
138	US 101	256.19 to 259.39	US 101/Shore Rd to Kitchen Rd - Widening and Interchange	Future	$41,867,000
	Solution:	Widen from 2 lanes to 4 lanes, interchange			
	Expected Benefits:				

Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
139	US 101	261.59 to 263.8	US 101/Dungeness River to Sequim Ave I/C - Widening	Future	Unknown
	Solution:	Widen from 2 lanes to 4 lanes			
	Expected Benefits:				
140	US 101	262.29 to 262.3	US 101/River Rd Interchange Vic - Park and Ride Lot	Future	Unknown
	Solution:	New 50-stall park and ride lot near River Road Interchange			
	Expected Benefits:				
141	US 101	263.8 to 263.81	US 101/Sequim Ave Interchange Vic - Park and Ride Lot	Future	Unknown
	Solution:	New 50-stall park and ride lot near Sequim Avenue Interchange			
	Expected Benefits:				
145	US 101	270.26 to 270.27	US 101/Woods Intersection - Interchange	Future	$17,659,000
	Solution:	Construct a full diamond interchange at Woods/Blyn Vicinity.			
	Expected Benefits:	New interchange benefits of ~$3,543,000 and safety benefits of ~$421,000 for total benefits of ~$3,964,000. There are two fish passage barriers that require repair in the vicinity of the proposed interchange.			
151	SR 104	0 to 13.73	SR 104/US 101 to Hood Canal Br - Passing Lanes	Current/Future	Unknown
	Solution:	Staggered passing lanes (begin with a Westbound climbing/passing lane immediately west of the SR 19 Intersections)			
	Expected Benefits:				
152	SR 104	4.14 to 4.15	SR 104/Center Valley I/C Vic - Park and Ride Lot Improvement	Future	Unknown
	Solution:	Improve the existing dirt park and ride lot at Center Valley Interchange (paving and drainage improvements)			
	Expected Benefits:				
160	SR 510	1.73 to 10.75	SR 510/Marvin Rd to Mudd Run Rd Vic - Widening	Future	Unknown
	Solution:	Widen from 2 lanes to 4 lanes (divided highway with full access at ~10 major intersections, exception being Nisqually Reservation where master plan will provide guidance)			
	Expected Benefits:				
161	SR 510	4.36 to 4.37	SR 510/Meridian Rd SE Vic - Park and Ride Lot	Future	Unknown
	Solution:	New park and ride lot in the Tri-Lakes Vicinity			
	Expected Benefits:				
162	SR 510	6.5 to 6.68	SR 510/Reservation Rd SE to Yelm Highway SE Vic - Intersection Realignment and Signal	Future	Unknown
	Solution:	Realign Reservation Road to line up with Yelm Highway and install signal			
	Expected Benefits:				
163	SR 510	7.4 to 8.34	SR 510/Nisqually Indian Tribe Reservation - Master Plan Improvements	Future	Unknown
	Solution:	Implement improvements from Master Plan in development by the Tribe (Improvements could include a separated pedestrian crossing, park and ride lot, future SR 510 alignment alternatives, etc.)			
	Expected Benefits:				
171	US 12	184.7 to 202.13	US 12/I-82 I/C - Widen Ramp and Extend Taper	Future	$19,200,000
	Solution:	Extend merge lane one eastbound US 12 to eastbound I-82. Widen US 12/16th Avenue interchange, and make ramp improvements. Improve access control through Naches with curb, gutter and sidewalk. Safety improvements include rumble strips and widening s			
	Expected Benefits:	Extending the US 12 eastbound merge lane onto eastbound I-82 will provide additional lane length for the N. 1st Street traffic to merge with the eastbound US 12 traffic before both traffic streams merge onto eastbound I-82. This will significantly impro			
173	US 12	201.03 to 202.12	US 12/16th Ave I/C - Widen Ramp and Br	Current	$1,665,000
	Solution:	Widen US 12/16th Avenue interchange bridge to accommodate an additional lane, and make ramp improvements including adding a lane, a double left turn or a roundabout.			
	Expected Benefits:	Making these interchange improvements will reduce backups on the WB ramp.			
175	US 12	429.24 to 430.67	US 12/SR 128 to SR 129 - Add Lanes	Future	$10,403,000
	Solution:	This improvement project will upgrade intersections and install signals through the Clarkston area. It will also construct two GP lanes through the corridor			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $ 3,235,780 in GP lane benefits and $8,876,103 in Safety bene			

Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
178	SR 24	0.08 to 5.52	SR 24/Riverside Rd to Faucher RD - Add Lanes	Future	$15,300,000
	Solution:	Extend the 4-lane section of SR 24 from Riverside Road to Faucher Road. Add right-turn lanes to all intersections (Birchfield, Beaudry, Bell, Rivard, and Faucher Roads). Signalize Bell, Rivard, and Faucher Roads intersections. Install rumble strips.			
	Expected Benefits:	Extending the 4-lane section of SR 24 past Moxee will significantly increase the capacity for this important region link. The land along this segment is poised for substantial development. The additional capacity will accommodate this growth. Signal			
181	SR 24	38.43 to 43.51	SR 24/SR240 to Columbia River - Realign and Add Lanes	Future	$8,679,000
	Solution:	This Solution would re-align this section of SR 24 and add 2 GP lanes from the junction of SR 24 to the Columbia River.			
	Expected Benefits:	This solution will do the most to ensure that SR 24 will remain a high speed free flow facility by reducing delay in this section of steeply graded highway. There are $1,162,179 in GP lane benefits associated with this project in addition to $7,494,883 in Safety benefits.			
183	I-82	30.69 to 38.45	I-82/SR 823 to US 97 - Add Lanes	Future	$39,700,000
	Solution:	Replace left-hand Selah exit with conventional right-hand exit. Widen I-82 to six lanes			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations.			
186	I-90	56.56 to 84.47	I-90/Keetchelus Dam to East Easton I/C - Add Lanes	Future	$435,000,000
	Solution:	MP 58.23 to MP71.56: Widen the interstate from 4 lanes to six lanes for capacity improvement from the funded Keechelus Dam project to Exit 71.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations.			
189	I-182	3.94 to 5.67	I-182/SR 240 to George Washington Way - Add Lanes	Future	$60,000,000
	Solution:	Add two GP lanes to this section of highway			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay.			
190	I-182	13.46 to 14.92	I-182/4th Ave I/C to US 395/SR 397 I/C - Add Lanes	Future	$19,100,000
	Solution:	Add two GP lanes to this section of highway and widen two overcrossing structures.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay.			
192	SR 224	6.82 to 10.15	SR 224/62nd Pl to SR 240 I/S - TWLTL	Future	$4,071,000
	Solution:	This medium cost proposal will add a TWLTL in the two lane section as well as adding two signal systems and right turn lanes at three intersections			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $5,894,000 in TWLTL benefits and $20,195,763 in safety benefi			
195	SR 240	21.43 to 34.38	SR 240/Horn Rd to By-Pass Highway - Add Lanes	Current/Future	$14,010,000
	Solution:	This project will add two lanes to the section from MP 21.43 to MP 28.82. Intersections will be channelized and illuminated and signal systems will be constructed.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $119,496,794 in GP lane benefits and $ 36,040,873 in Safety b			
199	US 395	22.32 to 27.04	US 395/19th Ave to I-182 - Add Lanes and Replace Br	Future	$279,427,000
	Solution:	This project will upgrade intersections, and construct two GP lanes from MP 15.56 to MP 20.59. The structure crossing the Columbia River will also be replaced and the US 395/SR 240 interchange will be reconstructed.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $ 109,702,275 in GP lane and $ 105,866,296 in Safety benefits			
203	US 2	99.89 to 100.24	US 2/Leavenworth Vicinity - Improved parking and pedestrian overcrossing	Future	$5,000,000
	Solution:	Improved parking capacity/alternatives and install pedestrian overcrossing			
	Expected Benefits:	Congestion relief through increased safety for pedestrians, improved traffic flow, and access management.			
215	SR 285	0 to 1.14	SR 285/W end George Sellar Bridge to Chehalis St - Interchange Improvement	Future	$35,000,000
	Solution:	Improved interchange at the West end of the George Sellar Columbia River Bridge.			
	Expected Benefits:	Congestion relief with improved traffic flow patterns			
245	I-5	7.24 to 11.6	I-5/NE 139th St to NE 219th St - Add Auxiliary Lanes	Future	$22,000,000
	Solution:	Add auxiliary lane SB from 139th St. to 179th St. and add auxiliary lane in both directions from 179th St. to 219th St.			
	Expected Benefits:	Reduce collisions and delays due to existing limited weave distance.			
246	I-5	8.91 to 9.94	I-5/NE 179th St - Rebuild Interchange	Future	$40,000,000
	Solution:	Rebuild 179th St. interchange (likely a diverging diamond interchange).			
	Expected Benefits:	Adequate capacity and reduction of projected delays at this interchange.			

Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
247	I-5	20.71 to 22.19	I-5/SR 503 - Rebuild Interchange	Current	$50,000,000
	Solution:	Rebuild I-5 / SR 503 interchange (likely an urban interchange).			
	Expected Benefits:	The possible urban interchange will remove one signalized intersection and modify the vertical slope, thus improving mobility and safety.			
248	I-5	21.4 to 21.8	I-5/SR 503 - Construct New Crossing	Current	$21,000,000
	Solution:	Build additional local access across I-5 near West Scott and Scott Avenues.			
	Expected Benefits:	This new crossing would create a more direct route for residents east of I-5 traveling to destinations west of I-5. A full traffic study is needed to determine the likely impact of this project on SR 503 traffic flows. Additional volume and intersection data is needed to properly quantify the benefits for the SR 503 corridor.			
249	I-5	76.22 to 79.57	I-5/13th St to Chamber Way - Add Lanes and Rebuild Structures	Future	$245,000,000
	Solution:	Widen to six general purpose lanes, with additional auxiliary lane between interchanges, and rebuild bridges and interchanges as necessary to accommodate increased capacity.			
	Expected Benefits:	This widening project will increase interstate capacity, improve safety, and encourage regional economic development.			
250	SR 14	14.64 to 17.06	SR 14/SE Union St to 32nd St - Add Lanes and Construct Interchanges	Current	$119,000,000
	Solution:	Widen roadway, construct interchanges, and limit access: A. Widen to 4 lanes from Union to 32nd;			
	Expected Benefits:	Upon completion of the project, the whole section from MP 0.00 to 17.06 on SR 14 will become a highway with controlled access; delay will be reduced by 80%. Overall this project will bring $100 million mobility benefits and $22 million safety benefits in 20 years. The B/C ratio is 1.93.			
251	I-205	0.25 to 1.1	I-205/SR 14 - Rebuild Interchange	Current	$100,000,000
	Solution:	Rebuild I-205 / SR 14 interchange.			
	Expected Benefits:	Alleviate delay and accidents associated with the tight weave of closely spaced on/off ramps			
252	I-205	5.06 to 10.57	I-205/Padden Parkway to NE 134th St - Add Lanes	Current	$90,000,000
	Solution:	Widen I-205 from Padden to 134th from four to six lanes.			
	Expected Benefits:	Delay Reduction: 44% ~51%; Collision Reduction: 11% ~ 31%			
253	I-205	5.99 to 6.94	I-205/Padden Parkway - Rebuild Interchange	Current	$30,000,000
	Solution:	Rebuild interchange at Padden Parkway and construct NB off ramp and connection to 72nd Ave.			
	Expected Benefits:	Increase capacity and offer additional exit point to decrease congestion beyond the interchange			
254	SR 503	53.46 to 54.11	SR 503/Lewis River Hwy to I-5 - Add Lanes	Future	$4,800,000
	Solution:	Widen to five lanes.			
	Expected Benefits:	Estimated delay reduction is 52%.			
279	SR 3	36.34 to 36.72	SR 3 - SR 3 and SR 304 - Widening and Ramp meter WB SR 304 onto SR 3 and extend on ramp to SB S	Current	$10,732,000
	Solution:	Widen SB SR 3 under bridge and Ramp meter WB SR 304 onto SR 3 and extend on ramp to SB SR 3.			
	Expected Benefits:	The preliminary analysis results indicate the proposed solutions will provide reductions in collisions and travel delay.			
281	SR 3	52.81 to 60.02	SR 3 - SR 305 to SR 104 - Widening and I/S signalization	Future	Unknown
	Solution:	Widen to a 4-lane divided multilane facility with 3 signalized intersections at Pioneer Hill, Pioneer Way, and Kinman-Big Valley Intersections (2 modifications, one new).			
	Expected Benefits:				
285	I-5	111.94 to 127.48	I-5 - SR 510 to SR 512 - Network Analysis Study	Current and Future	$1,500,000
	Solution:	Network Analysis Study			
	Expected Benefits:				
292	I-5	120.93 to 123.64	I-5 - Fort Lewis to Thorne Lane - Construct SB and NB auxiliary lanes	Current	$33,396,000
	Solution:	Construct a southbound auxiliary lane from Thorne Lane to Berkeley Street and a northbound auxiliary lane from the Fort Lewis CD System to Thorne Lane.			
	Expected Benefits:	Reduce backups onto the freeway and improve traffic flow on mainline.			
298	I-5	126.84 to 127.99	I-5 - I-5 & SR 512 Interchange, NB I-5 to EB SR 512 - Widen off ramp and add an auxiliary lane on SR 5	Current	$23,277,000
	Solution:	Widen on ramp to two lanes and add an auxiliary lane on SR 512 to E Steele St.			
	Expected Benefits:	Reduce backups onto the freeway and improve traffic flow on mainline.			

Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
299	I-5	127.09 to 128.35	I-5 - I-5 and SR 512 Interchange, EB SR 512 to NB I-5 on ramp - Widen on ramp and add an auxiliary la	Current	$17,551,000
	Solution:	Widen on ramp to two lanes and add an auxiliary lane on SR 512 from E Steele St.			
	Expected Benefits:	Reduce backups onto the freeway and improve traffic flow on mainline.			
312	I-5	176.37 to 177.7	I-5 - I-5 at Snohomish County Line - Construct SB auxiliary lane (SR 104 to NE 175th)	Current	$16,426,000
	Solution:	Construct a southbound auxiliary lane on I-5 from SR 104 down to NE 175th Street.			
	Expected Benefits:	This will improve transit access to I-5 and will improve traffic flow on SR 104. This will also help to improve overall transit operations on this corridor.			
318	SR 7	16.82 to 47.42	007 - SR 7: SR 706 to SR 507 (Roy Wye) - Route Development Plan	Future	$500,000
	Solution:	Route Development Plan			
	Expected Benefits:				
330	SR 18	3.41 to 3.42	SR 18 - SR 18 at SR SR 167 Interchange - Provide missing NB SR SR 167 to WB SR 18 and EB SR 18	Current	$100,000,000
	Solution:	Provide missing northbound SR 167 to westbound SR 18 and eastbound SR 18 to southbound SR 167 freeway-to-freeway ramps.			
	Expected Benefits:	This will improve freeway-to-freeway connections between SR 167 / SR 18 and will help move freight.			
331	SR 18	4.22 to 4.77	SR 18 - SR SR 164 to C Street - Add an Auxiliary lanes each direction	Current	$30,850,000
	Solution:	Add an Auxiliary lane each direction on SR 18 from C Street to SR 164.			
	Expected Benefits:	This will improve SR 18 mainline operations and will enhance safety at the SR 164 I/C.			
335	I-90	8.4 to 15.71	I-90 - Eastgate to Sunset I/C - Extend the WB HOV Lane to Sunset interchange.	Current	$17,939,000
	Solution:	Extend the westbound HOV Lane to Sunset interchange.			
	Expected Benefits:	This will improve mainline operations on I-90 and improve traffic flows and transit access to Sunset Way.			
339	I-90	14.61 to 15.21	I-90 - SR 900 to Front Street - Construct an EB auxiliary lane from SR 900 to Front Street AND two lane	Current	$10,094,000
	Solution:	Construct an eastbound auxiliary lane from SR 900 to Front Street with a two lane eastbound off-ramp to Front Street.			
	Expected Benefits:	This auxiliary lane will improve I-90 mainline operations and will improve safety at the I-90/Front Street I/C.			
348	SR 162	0 to 1.57	SR 162 - SR SR 410 to 96th Street East - Add a SB lane	Current	$12,624,000
	Solution:	Add a southbound lane from the SR 410 eastbound on/off ramps to 96th Street East.			
	Expected Benefits:	The addition of this SB lane on SR 162 will relieve congestion on SR 162 and improve safety and operations.			
349	SR 164	1.95 to 2.55	SR 164 - Dogwood to Auburn City Limits - Widening and access management improvements	Current	$14,681,000
	Solution:	Add capacity from Dogwood Street (MP 2.28) to Academy Drive (MP 4.37) expanding the highway to two lanes in each direction. Install access management improvements where appropriate. Where such access must be restricted by a median or C Curb the design shall allow for a U-Turn at the next stop controlled intersection.			
	Expected Benefits:	The access-management treatments will improve safety, reduce accidents and improve traffic operations through this segment of SR 164.			
350	SR 166	4.76 to 4.98	SR 166 - Jackson Avenue to Mile Hill Drive - Add one lane WB and improve intersection.	Current	$1,349,000
	Solution:	Add one lane westbound and improve intersection.			
	Expected Benefits:	Additional lane and intersection improvements will improve traffic flow through this intersection.			
352	SR 167	7.5 to 12.45	SR 167 - Puyallup to Pierce/King Co. Line - Complete the Core HOV system on SR SR 167.	Current	$237,000,000
	Solution:	Complete the Core HOV system on SR 167.			
	Expected Benefits:	This will provide congestion relief on SR 167 and will improve HOV / transit operations and reliability.			
354	SR 167	19.25 to 20.94	SR 167 - SR 516 to S. 277th Street - Construct auxiliary lanes between interchanges.	Current	$42,400,000
	Solution:	Construct auxiliary lanes between interchanges.			
	Expected Benefits:	The addition of auxiliary lanes will improve SR 167 mainline operations and will help improve safety on SR 167.			

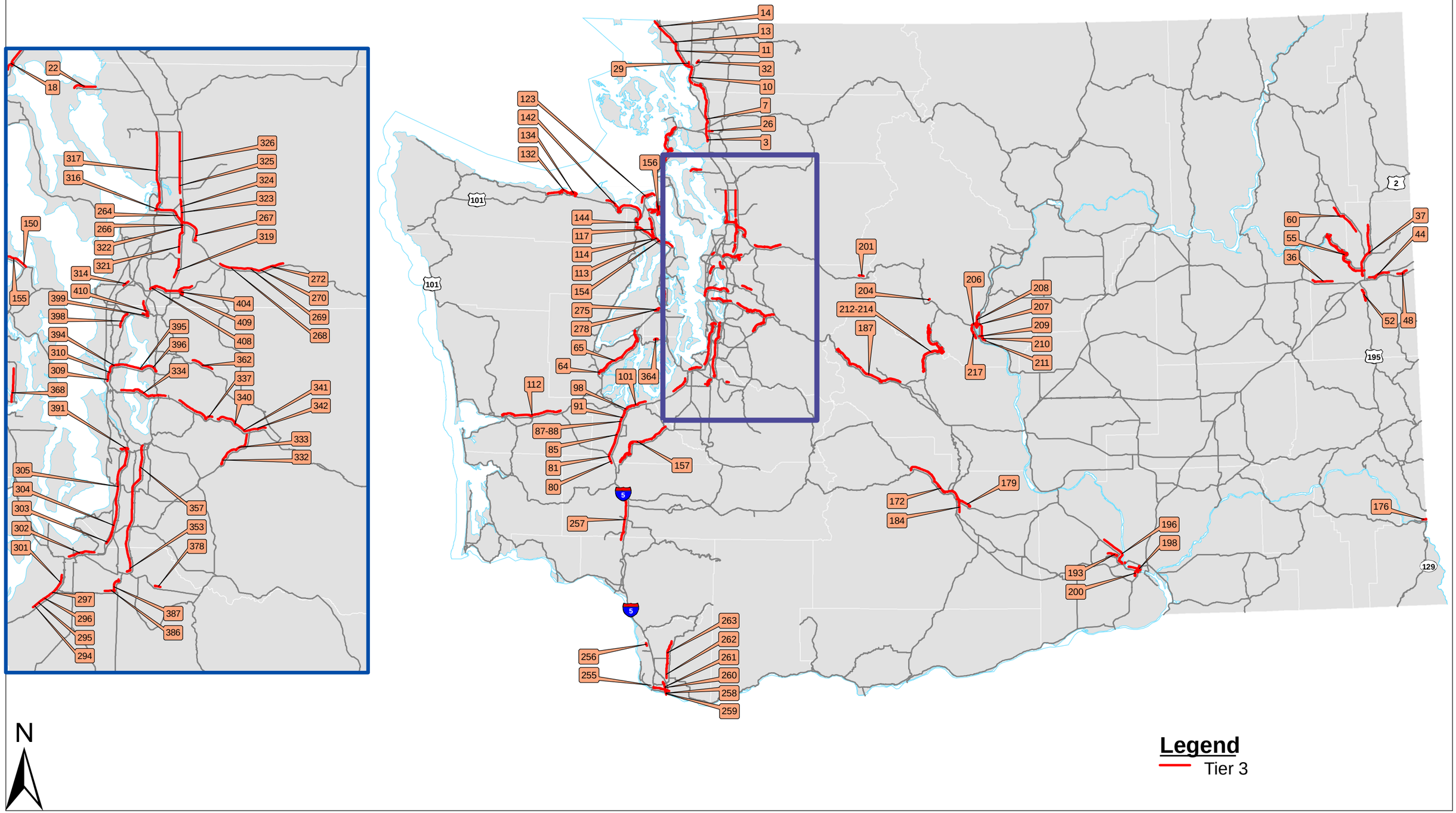
Tier II Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
355	SR 167	19.26 to 19.27	SR 167 - SB SR-SR 167 at exit for 277th Street - Widen the southbound off-ramp to two lanes.	Current	$3,753,000
	Solution:	Widen the southbound off-ramp to two lanes.			
	Expected Benefits:	This solution will improve SR 167 mainline operations and improve safety at this interchange.			
356	SR 167	22.65 to 25.74	SR 167 - 84th Ave. S. to S. 180th Street. - Construct auxiliary lanes between interchanges.	Current	$152,600,000
	Solution:	Construct auxiliary lanes between interchanges.			
	Expected Benefits:	This solution will increase capacity and improve mainline operations on SR 167.			
360	SR 169	10.02 to 19.22	SR 169 - SR 516 to SE 231st - Widening	Current	$106,910,000
	Solution:	Widen to 4 lanes with turn lanes where warrented.			
	Expected Benefits:	This solution will address mobility deficiencies and improve safety and operations on this section of SR 169.			
367	SR 303	0 to 9.16	SR 303 - SR SR 303 Corridor Analysis (Bremerton to Silverdale) - This study would include Phase 2 wor	Current & Future	$2,000,000
	Solution:	This study would include Phase 2 work to determine whether a Findings of No Significant Impact or Environmental Impact Statement (EIS) would be appropriate for the proposed action.			
	Expected Benefits:				
372	I-405	0 to 4	I-405 - I-5 to SR SR 169 - Widening and Rebuild SR 181, SR 167, SR 169 interchanges	Current	$1,226,000,000
	Solution:	Add one lane northbound and southbound and Rebuild SR 181, 167, 169 interchanges.			
	Expected Benefits:	This will provide congestion relief and enhanced safety and operations on I-405.			
373	I-405	4 to 11.15	I-405 - SR 169 to I-90 - Widening and Interchange Improvements at I-90	Current	$1,193,000,000
	Solution:	Add two lanes northbound and southbound and Rebuild Sunset, SR 900, 30th, 44th, 112th, Coal Creek interchanges. Construct I-90 braided ramps. Construct direct access ramps and park-and-ride facilities near N 8th St (Renton). Construct additional Intelligent Transportation Systems (ITS) improvements.			
	Expected Benefits:	This will provide significant congestion relief on I-405 and will improve freeway operations and safety.			
374	I-405	11.2 to 14.86	I-405 - I-90 to SR 520 - Widening and Interchange Improvements at SR 520	Current	$531,000,000
	Solution:	Add one lane northbound and southbound and Rebuild SE 8th, Main interchanges. Construct braided ramps between I-405 and SR 520. Construct new ramps at NE 10th St..			
	Expected Benefits:	This will provide congestion relief and safety/operations enhancements on this section of I-405 through the Bellevue CBD.			
375	I-405	14.86 to 23.53	I-405 - SR 520 to SR 522 - Widening	Current	$648,000,000
	Solution:	Add one lane northbound and southbound and rebuild the NE 70th St., NE 85th St. and NE 160th St. interchanges. Construct direct access ramps and a park-and-ride lot at NE 80th St. Construct ramps at NE 160th St. and NE 130th St.			
	Expected Benefits:	Congestion relief on I-405 and improved safety and freeway operations.			
376	I-405	23.53 to	I-405 - Canyon Park and Ride - Park and Ride Expansion	Current	$16,000,000
	Solution:	Construct park and ride expansion and transit facility amenities.			
	Expected Benefits:	This will provide for additional parking capacity and allow for enhanced transit use on this section of the I-405 corridor.			
380	SR 509	0 to 0.5	SR 509 - SR 509 at East D Street - Half Diamond Interchange	Current	$28,961,000
	Solution:	Construct a half diamond interchange at East D Street.			
	Expected Benefits:	This will improve freeway operations on SR 509 and will improve safety and operations at this interchange.			
382	SR 512	0 to 12.06	SR 512 - East Pierce County - Network Analysis Study	Current and Future	$1,750,000
	Solution:	Network Analysis Study			
	Expected Benefits:				
383	SR 512	2.22 to 2.23	SR 512 - SR 512 at SR 7 (Pacific Ave) Interchange - Two Lane Eastbound Off-Ramp	Current	$7,728,000
	Solution:	Construct a two lane eastbound off-ramp to SR 7.			
	Expected Benefits:	This will improve SR 512 mainline operations and will improve safety at this interchange.			
392	SR 518	3.42 to 3.43	SR 518 - I-5 (Tukwila) Interchange - Add Second Eastbound Lane	Current	$7,000,000
	Solution:	Add a second eastbound lane from the I-5 southbound drop lane to the I-5 northbound add lane at the Tukwila I/C.			
	Expected Benefits:	This will provide congestion relief on SR 518 and improve safety and operations at the Tukwila I/C.			

Tier II Solutions

Key	*Highway Number*	*Milepost*	*Title*	*Current or Future Problem*	*Cost Estimate*
405	SR 522	18.6 to 18.61	SR 522 - SR 522 at Fales/Echo Lake Rd. - New Interchange	Current	$78,000,000
	Solution:	Construct a new interchange to provide grade separation between SR 522 and Fales/Echo Lake Rd.			
	Expected Benefits:	This will improve traffic flow and operations on SR 522 and will improve safety on SR 522 and Paradise Lake Road.			
407	SR 524	5.99 to 9.62	SR 524 - 24th Ave. W to SR 527 - Widening	Current	$65,940,000
	Solution:	Widen to five lanes adding two general purpose lanes and a two-way-left-turn-lane.			
	Expected Benefits:	This will provide congestion relief on SR 524 and improve safety on this corridor segment.			

2007-2026 DRAFT Mobility Implementation Plan: Solutions



Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
3	I-5	224.96 to 232.95	I-5/Anderson Rd to Cook Rd - Freeway Improvements	Current/Future	$280,000,000
	Solution:	Increase the freeway mainline from 4 to 6 lanes, from Anderson Road to Cook Road, and re-constructed interchanges at four locations.			
	Expected Benefits:	20% reduction in accidents, 30% reduction in delay.			
7	I-5	232.95 to 250.87	I-5/Cook Rd to Fairhaven - Freeway Improvements	Future	$100,000,000
	Solution:	Increase the freeway mainline from 4 to 6 lanes from Cook Road to SR 11 (Old Fairhaven Parkway), and a re-constructed interchange at North Lake Samish.			
	Expected Benefits:	20% reduction in accidents, 30% reduction in delay.			
10	I-5	250.87 to 262.69	I-5/ Fairhaven to Ferndale - Freeway Widening and Improvments	Future	$250,000,000
	Solution:	Increase the freeway mainline from 4 to 6 lanes, from SR 11 to Axton Road, and re-construct interchanges at five locations.			
	Expected Benefits:	20% reduction in accidents, 30% reduction in delay.			
11	I-5	262.69 to 266.1	I-5/Ferndale to Grandview Rd - Freeway Improvements	Future	$50,000,000
	Solution:	Increase the freeway mainline from 4 to 6 lanes, from Axton Road to SR 548 (Grandview Road), and construction of a new interchange at Thornton Road, in conjunction with the closure of the Portal Way interchange.			
	Expected Benefits:	20% reduction in accidents, 30% reduction in delay.			
13	I-5	266.1 to 273.98	I-5/Grandview Rd to Blaine - Freeway Improvements	Future	$20,000,000
	Solution:	Increase the freeway mainline from 4 to 6 lanes, from SR 548 (Grandview Road) to Dakota Creek.			
	Expected Benefits:	10% reduction in accidents, 30% reduction in delay.			
14	I-5	273.92 to 276.62	I-5/Blaine to Canadian Border - Freeway Improvements	Future	$50,000,000
	Solution:	Increase the freeway mainline from 4 to 6 lanes, from Dakota Creek to the International Boundary., and re-construct the interchange at Exit 274.			
	Expected Benefits:	20% reduction in accidents, 30% reduction in delay.			
18	SR 20	30.05 to 47.01	SR 20/Deception Pass - Bridge Replacement	Current	$250,000,000
	Solution:	The existing Deception Pass/Canoe Pass Bridges will be need to be replaced to improve the mobility and safety of the corridor.			
	Expected Benefits:	The replacement of the Deception pass bridges will increase capacity for vehicles and the safety of pedestrians.			
22	SR 532	0 to 2.91	SR 532/Sunrise Dr to County Line - Corridor Improvements (Maximum)	Current	$35,000,000
	Solution:	A significant level of capacity improvements will be required as the area develops. Some local street enhancements will be needed to address traffic operation problems which will arise in the future. These enhancements will allow drivers to have a choice of routes, and will reduce the demand on the State Route.			
	Expected Benefits:	Better flow of traffic by adding capacity to the existing facility.			
26	SR 538	0 to 1.27	SR 538/I-5 to LaVenture Rd - Corridor Improvements (Maximum)	Future	$90,000,000
	Solution:	The interchange of SR 538 and I-5 will need to be replaced in order to improve the efficiency of vehicle movement and processing. A change to a limited access facility will be needed in order to alleviate mobility and safety concerns. Capacity improvements throughout the corridor will be needed to adequately serve the demand on the facility.			
	Expected Benefits:	Re-build interchange to a SPUI, make SR 538 limited access to beyond RR tracks at MP 0.51. This will create a free-flow traffic situation to get cars away from the interstate as efficiently as possible.			
29	SR 539	0 to 0.87	SR 539/I-5 to Kellogg Rd - Corridor Improvements (Maximum)	Current	$85,000,000
	Solution:	Capacity improvements to the highway will be required, as well as a change to a limited access facility.			
	Expected Benefits:	Better flow of traffic by creating a limited access, free-flow situation.			
32	SR 542	1.74 to 2.79	SR 542/McLeod Rd to Britton Rd - Corridor Improvements (Maximum)	Future	$20,000,000
	Solution:	This corridor will need to be widened in order to accommodate the volume of traffic that will be using the roadway in the future.			
	Expected Benefits:	Better flow of traffic by adding capacity to the existing facility.			
36	US 2	259.21 to 266.89	US 2/Fairchild Air Force Base to I-90 - Add General Purpose Lanes	Future	$18,000,000
	Solution:	The maximum fix for this route segment may be the construction of additional lanes. However, other potential solutions have been proposed, such as an alternate route (bypass), and the construction of a new facility by Spokane County that may reduce traffic on the most heavily congested portions of the route segment. Further study, in collaboration with local jurisdictions, is needed to determine the appropriate long-range solutions for the facility.			
	Expected Benefits:	The construction of additional lanes will improve operating speeds and travel times through the City of Airway Heights.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
37	US 2	280.8 to 299.31	US 2/Deer Rd to Pend Orielle Co Line - Add General Purpose Lanes	Current	$130,000,000
	Solution:	Replace existing US 2/SR 206/Market St. at-grade intersections with a diamond, single point urban interchange, or roundabout, possibly entailing realignment of the US 2 facility in this vicinity. Construct grade- separated interchange at Dennison-Chattaroy Rd. with implementation of full access control with frontage roads. Purchase partial access control and construct four-lane divided highway in portion of route that is currently two-lane.			
	Expected Benefits:	These solutions do the most to ensure that US 2 will remain a high speed free flow facility by reducing delay at a major intersection (SR 206), constructing grade separated interchanges, and by extending the existing two-lane divided facility further north to the Pend Orielle County line. There is an existing four-lane divided segment of US 2 that begins at the County line that the new four-lane section would connect to, providing for a contiguous section, with a minimum of four lanes, between I-90 and southern Pend Orielle County.			
44	I-90	280.57 to 288.13	I-90/Sprague I/C to Sullivan I/C - Construct General Purpose Lanes	Future	$150,000,000
	Solution:	Construct an additional lane, in each direction, between Sprague Ave. interchange and Sullivan Rd. interchange.			
	Expected Benefits:	Construction of an additional lane will allow the facility to operate at adequate service levels.			
48	I-90	291.13 to 295.22	I-90/Harvard I/C to Idaho State Line - Construct General Purpose Lanes	Future	$42,000,000
	Solution:	Construction of one general purpose lane, in each direction, between the Harvard Rd. interchange and the Idaho State Line. This will provide for, at a minimum, a contiguous 3 lane section, in each direction, between Sprague Ave. I/C and the State Line.			
	Expected Benefits:	Construction of additional capacity will enable the facility to operate at acceptable service levels through the remainder of the HSP planning horizon.			
52	US 195	85.96 to 90.75	US 195/Hatch Rd to I-90 - I/C Construction	Current	$34,000,000
	Solution:	Construction of fully directional interchanges at Hatch Rd. and Meadowlane Rd.			
	Expected Benefits:	Accident reduction and mobility improvement through the elimination of minor street traffic conflicts with high speed mainline through movements. Elimination of delay for minor street movements to access US 195.			
55	SR 291	0 to 22.31	SR 291/US 2 to Swenson Rd - Construct General Purpose Lanes and Four-lane Divided Facility	Current	$23,240,000
	Solution:	The maximum fix for this portion of the facility is the construction of additional lanes in the urban section as well as the construction of a new 4-lane alignment in the suburban/semi-rural area of the route segment. A new four-lane section would be constructed on a new alignment between the vicinity of Charles Rd. and Swenson Rd. (Suncrest community).			
	Expected Benefits:	Construction of additional general purpose lanes in the urban area as well as the construction of a new alignment in the rural area will improve travel times significantly while also creating a much safer facility for motorists as well as other highway users. Relocating a portion of the facility further away from the Spokane River should enhance the natural beauty of the area.			
60	US 395	181.52 to 193.27	US 395/Fender Rd Vic to Stevens Co Line - Construct General Purpose Lanes	Current	$75,000,000
	Solution:	The maximum solution for this facility is the construction of additional lanes to provide for a four lane divided facility with the construction of three grade separated interchanges at Half Moon Rd., Monroe-Crawford Rd. and Spotted Rd. Construct four grade separated crossings at Staley/Dennison-Chattaroy Rd., Burroughs/Dalton Rd.,			
	Expected Benefits:	Elimination of accidents at existing at-grade intersections. Reduced delay at intersections, which are projected to operate at LOS F in the 2020 forecast year. Reduction of delay on mainline, which is currently functioning at LOS E, with portions of the route segment functioning at LOS F in the forecast year.			
64	SR 3	2.38 to 2.93	SR 3/Turner Ave to Pine St - Alternate Route	Current/Future	Unknown
	Solution:	Create an alternate route through the Shelton Core Business district (Pine to 7th to Turner to US 101)			
	Expected Benefits:				
65	SR 3	2.93 to 24.42	SR 3/Pine St to SR 106 - Widening	Current/Future	Unknown
	Solution:	Widen to a four-lane divided facility with the exceptions of steep terrain and commercially developed areas such as Shelton, Allyn, and Belfair.			
	Expected Benefits:				
80	I-5	85.58 to 100.59	I-5/Lewis County Line to Tumwater S Corporate Limit - Rural Feasibility Study	Future	$1,500,000
	Solution:	I-5 HOV and/or C-D Feasibility Study in Rural Thurston County.			
	Expected Benefits:				
81	I-5	87.57 to 95.7	I-5/Prairie Creek Br Vic to Maytown I/C Vic - Widening	Future	Unknown
	Solution:	Consider additional High Occupancy Vehicle lanes that revert to general purpose use in the off peak period.			
	Expected Benefits:				
85	I-5	95.7 to 99.55	I-5/Maytown I/C Vic to 93rd Ave SW Vic - Widening	Future	$48,069,000
	Solution:	Consider additional High Occupancy Vehicle lanes that revert to general purpose use in the off peak period. Assume Aldrich Road replacement and 5 fish passage extensions.			
	Expected Benefits:	HOV benefits of $15.5 million and $4.8 million in safety for total benefits of $20.3 million. T-1 freight route.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
87	I-5	100.59 to 102.59	I-5/Tumwater S Corporate Limit to Trosper Rd I/C Vic - Widening	Future	$38,332,000
	Solution:	Consider additional High Occupancy Vehicle lanes that revert to general purpose use in the off peak period. Other options could include auxiliary lanes between interchanges or local frontage road improvements (e.g. Tyee Drive Extension on west side of I-5).			
	Expected Benefits:	HOV benefits of $0.13 million and $4.56 million in safety for total benefits of $4.68 million. T-1 freight route.			
88	I-5	100.59 to 112.01	I-5/Tumwater S Corporate Limit to SR 510 I/C Vic - Urban Feasibility Study	Current/Future	$2,500,000
	Solution:	I-5 HOV and/or C-D Feasibility Study in Urban Thurston County.			
	Expected Benefits:				
91	I-5	101.37 to 101.38	I-5/Tumwater Blvd I/C - Park and Ride Lot	Current/Future	Unknown
	Solution:	New 100-stall park and ride lot near Labor and Industries building on East side of I-5 near Tumwater Boulevard Interchange.			
	Expected Benefits:				
98	I-5	104.89 to 106.24	I-5/Capitol Blvd Vic to Plum St - Feasibility Study	Current	Unknown
	Solution:	Study feasibility of adding a deck or lid over I-5 in this vicinity (Between 14th and Eastside undercrossings). An Olympia lid could provide an express transit facility, park and ride lot, an public space that would reconnect the Northeast and Southeast City of Olympia neighborhoods without the expense of purchasing high cost right-of-way. It could be a partnership project involving several agencies. Consider other alternative corridors and improvements (e.g. Commerce Corridor for trucks, ring road, and extension of Woodland Trail).			
	Expected Benefits:				
101	I-5	107.94 to 107.95	I-5/Lilly Rd Vic - Park and Ride Lot	Current	Unknown
	Solution:	New 80 stall park and ride lot near Lilly Road undercrossing. Consider location near Chehalis Western Class 1 Trail for dual use as a possible trailhead to this facility and our nearby Class 1 bike path along I-5.			
	Expected Benefits:				
112	US 12	0 to 20.99	US 12 and SR 8/Aberdeen to Olympia - At Grade Separation Study	Future	$1,000,000
	Solution:	US 12 (portion between Aberdeen and Elma) and SR 8 (entire route) - Study at-grade separations for enhancing economic vitality.			
	Expected Benefits:				
113	SR 19	0 to 0.01	SR 19/SR 104 Jct - Interchange	Future	Unknown
	Solution:	Construct interchange at SR 19 and SR 104.			
	Expected Benefits:				
114	SR 19	0 to 2.33	SR 19/SR 104 to Old Beaver Valley Rd - Widening	Future	Unknown
	Solution:	Widen from two lanes to four lanes			
	Expected Benefits:				
117	SR 19	2.33 to 9.09	SR 19/Old Beaver Valley Rd to Center Rd - Widening	Future	Unknown
	Solution:	Widen from two lanes to four lanes			
	Expected Benefits:				
123	SR 20	8.26 to 12.57	SR 20/Old Fort Townsend Rd to Port Townsend Ferry Terminal - Widening	Current/Future	Unknown
	Solution:	Assume widening to 4/5 lanes (two-way left turn lane or raised median along portions of SR 20) in a 50-year configuration			
	Expected Benefits:				
132	US 101	241.89 to 252.35	US 101/SR 112 to Deer Park Rd - Traffic Circulation and Access Plan Study	Current/Future	$1,500,000
	Solution:	US 101 Traffic Circulation and Access Plan (SR 112 to Deer Park Road). Modify the discontinued US 101 Port Angeles Alternative Study (Initiative 695) to match these limits and focus on circulation and access issues.			
	Expected Benefits:				
134	US 101	245.35 to 252.35	US 101/SR 117 to Deer Park Rd - Alternative Route	Current/Future	Unknown
	Solution:	Port Angeles Alternative Route south of the core business district from SR 117 Vicinity to Deer Park/Buchanan Drive Vicinity			
	Expected Benefits:				

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
142	US 101	263.8 to 266.78	US 101/Sequim Ave I/C to Palo Alto Rd Vic - Widening	Future	Unknown
	Solution:	Widen from 2 lanes to 4 lanes completing Sequim Bypass (East Half)			
	Expected Benefits:				
144	US 101	266.78 to 283.21	US 101/Palo Alto Rd Vic to SR 104 - Widening	Future	Unknown
	Solution:	Widen from 2/3 lanes to 4 lanes (divided highway with appropriate at-grade separations)			
	Expected Benefits:				
150	SR 104	0 to 15.34	SR 104/US 101 to SR 3 - Widening and Interchange Work	Future	Unknown
	Solution:	Widen from 2/3 lanes to 4 lanes (divided highway with appropriate at-grade separations)			
	Expected Benefits:				
154	SR 104	10.8 to 10.81	SR 104/South Point Rd Vic - Park and Ride Lot	Future	Unknown
	Solution:	New park and ride lot at South Point Road Vicinity			
	Expected Benefits:				
155	SR 104	13.72 to 13.73	SR 104/West End of Hood Canal Br - Park and Ride Lot	Current	Unknown
	Solution:	Expand viewpoint at the west end of the Hood Canal Bridge to also serve as a park and ride lot.			
	Expected Benefits:				
156	SR 116	0 to 9.83	SR 116/SR 19 to Fort Flager Park - Route Development Plan Study	Future	$150,000
	Solution:	SR 116 Route Development Plan			
	Expected Benefits:				
157	SR 507	5.4 to 28.2	SR 507/South Thurston County Subarea - Roadway Network Study	Current/Future	$2,000,000
	Solution:	South Thurston County Sub-Area Study (Covering I-5, SR 507, and SR 510)			
	Expected Benefits:				
167	999	to	SR 999/Tribal Partnerships - Access Study	Future	$4,000,000
	Solution:	Tribal Partnerships for "one way in, one way out" operational and access measures.			
	Expected Benefits:				
168	999	to	SR 999/US 101 to Belfair Bypass - Alternative Route	Current/Future	Unknown
	Solution:	A future "SR 101 Connector" from US 101 to the beginning of a Belfair Bypass may be located roughly between and parallel to SR 106 and existing SR 3 in Mason County.			
	Expected Benefits:				
169	SR 8/US 101	to	SR 8 and US 101/Regionwide - Safety Rest Area Site Selection Study	Future	$300,000
	Solution:	Study site feasibility at three locations: SR 8 Westbound at MP 7 Elma Vicinity, Olympic National Forest Vicinity on US 101 at MP 120, and Potlatch Vicinity on US 101 at MP 310.			
	Expected Benefits:				
172	US 12	184.7 to 202.13	US 12/Jct SR 410 to ECL Naches - Add Lanes	Future	$45,900,000
	Solution:	Extend the 4-lane seection of US 12 west to the US 12/SR 410 Wye. Extend merge lane one eastbound US 12 to eastbound I-82. Widen US 12/16th Avenue interchange, and make ramp improvements. Improve access control through Naches with curb, gutter and			
	Expected Benefits:	Extending the 4-lane section of US 12 west through Naches to the SR 410 Wye will provide expanded capacity. US 12 is one of the few year-round routes across the Cascades. SR 410 is a National Scenic Highway, and entryway to Mount Rainier National Park			
176	US 12	429.24 to 430.67	US 12/SR 128 to SR 129 - Bypass Highway	Future	$76,342,000
	Solution:	This improvement project will construct a by-pass highway around the Clarkston/Lewiston downtown area. It will construct an interchange at each end of the corridor and a new bridge crossing of the Snake River. This corridor will be approximately half			
	Expected Benefits:	This project will serve to reduce level of service problems by removing the roadway from the downtown and routing around existing conflict points (intersections, road approaches, and commercial activities). There are $5,940,979 in GP lane benefits and $			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
179	SR 24	0.08 to 5.52	SR 24/Birchfield Rd/Beaudry Rd - Construct I/C's	Future	$24,700,000
	Solution:	Construct two new interchanges, one at Birchfield Road and one at Beaudry Road. Close SR 24/Bell Road intersection, and construct frontage road from Beaudry Road to Bell Road. Build railroad overcrossing over rail line at the SR 24/Beaudry Road inter			
	Expected Benefits:	Constructing the two new interchanges, and closing the Bell Road intersection will significantly enhance the safety, mobility, and operation of SR 24. In addition, constructing the Beaudry Road interchange allow an added benefit. The crossover can be			
184	I-82	30.69 to 38.45	I-82/SR 823 to US 97 - HMA to PCCP		$65,500,000
	Solution:	Replace existing HMA with PCCP			
	Expected Benefits:	Longer pavement life			
187	I-90	56.56 to 84.47	I-90/East Easton I/C to SR 970/SR 903 I/C - Add Lanes	Future	$145,000,000
	Solution:	MP 69.85 to MP 82.49: Widen the interstate from 4 lanes to six lanes for capacity improvement from exit 71 (East Easton I/C) to Exit 85 (SR 970/903 I/C)			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations.			
193	SR 224	6.82 to 10.15	SR 224/62nd Pl to SR 240 I/S - Add Lanes	Future	$8,400,000
	Solution:	This maximum cost proposal will add two new GP lanes and a TWLTL in the two lane section as well as adding two signal systems and right turn lanes at three intersections.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $6,157,325 in TWLTL benefits, $57,885,537 in GP lane benefits			
196	SR 240	21.43 to 34.38	SR 240/Stevens Rd/ Coast Rd - New Urban I/C	Current/Future	$57,382,000
	Solution:	This project will upgrade intersections, add signal and illumination systems, add GP lanes and construct an urban interchange at Coast Rd.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $ 131,617,092 in GP lane benefits and $ 37,657,760 in Safety			
198	SR 240	37.08 to 41.34	SR 240/Columbia Center Blvd to US 395 I/C - Add Laned	Current/Future	$26,688,000
	Solution:	This project will improve the eastbound off ramp connection with Edison St. by adding a lane to the ramp for an additional right turn movement onto Edison. The raised traffic island will be removed so that the existing through, left and right movements will change to a dedicated double right turn with a through and left as the other leg eastbound. A signal would also be added and interconnected with the city system if warrants are met. This project will also add two GP lanes to the main line from Columbia Center Blvd. to the interchange connection with US 395.			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $ 31,893,344 in GP lane benefits and $ 18,337,182 in Safety b			
200	US 395	22.32 to 27.04	US 395/Finley to US 12 - Extend by-pass route	Future	$118,954,000
	Solution:	This project will by-pass the City of Kennewick by connecting to the SR 397 to I-82 Intertie and extending it across the Columbia River and connecting to US 12 in the vicinity of Dodd Road (Most likely between the proposed US 12/SR 124 Interchange, a spa			
	Expected Benefits:	This project will serve to maintain an acceptable level of service on the facility and to enhance safe operations in areas where turning movements are creating congestion and delay. There are $ 589,860,978 in GP lane and $ 102,979,596 in Safety benefits			
201	US 2	56.71 to 58.1	US 2/Deception Creek Vicinity - 4 lanes	Future	$10,000,000
	Solution:	4 lane configuration			
	Expected Benefits:	Reduced congestion by providing additional lanes for slow moving vehicles			
204	US 2	99.89 to 100.24	US 2/Leavenworth Vicinity - Bypass	Future	$40,000,000
	Solution:	Construct bypass			
	Expected Benefits:	Congestion relief by rerouting traffic away from congested business center.			
206	US 2	118.54 to 119.99	US 2/School St to Odabashian Bridge W end - Grade seperation	Future	$120,000,000
	Solution:	Grade seperation at Easy St.			
	Expected Benefits:	Congestion relief by providing alternate traffic flow patterns.			
207	US 2	120.26 to 121.06	US 2/Odabashian Bridge E end to Jct SR 28 - Interchange	Future	$20,000,000
	Solution:	Cascade Avenue Vic. Interchange			
	Expected Benefits:	Congestion relief for US 2 and SR 28 (Sunset highway) by providing alternate traffic flow patterns.			
208	US 2	121.06 to 125.68	US 2/Jct SR 28 to Lincoln Rock State Park - 4 Lanes	Future	$68,000,000
	Solution:	4 lane configuration			
	Expected Benefits:	Reduced congestion by providing additional lanes.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
209	SR 28	0 to 3.67	SR 28/US 2 to 9th St - 4 lanes	Future	$120,000,000
	Solution:	4 lane configuration from Jct. US 2 to 9th Street (MP 3.67B)			
	Expected Benefits:	Reduced congestion by providing additional lanes.			
210	SR 28	3.67 to 4.65	SR 28/9th St to E Wenatchee City Limits - Urban Interchange	Future	$31,000,000
	Solution:	Urban Interchange at Grant Road			
	Expected Benefits:	Congestion relief by providing alternate traffic flow patterns.			
211	SR 28	4.65 to 6.44	SR 28/E Wenatchee City Limits to Rock Island Hydro Park - 4 lanes	Future	$30,000,000
	Solution:	4 lane configuration			
	Expected Benefits:	Reduced congestion by providing additional lanes.			
212	US 97	137.76 to 163.02	US 97/Liberty Road to Ingalls Creek Road - Re-alignment and add truck lane	Future	$72,000,000
	Solution:	Re-Align roadway: MP 171.92 to MP 175.63 Add truck lane: MP 176.62 to MP 177.21			
	Expected Benefits:	Reduced congestion due to slow moving vehicles and Reduce accident potential by reducing the serpentine alignment.			
213	US 97	137.76 to 163.02	US-97/Liberty Road to Ingalls Creek Road - Addition of truck lanes	Future	$120,000,000
	Solution:	Add truck lanes: MP 152.73 to MP 161.71 MP 171.92 to MP 175.63			
	Expected Benefits:	Reduced congestion due to slow moving vehicles			
214	US 97	137.76 to 163.02	US 97/Liberty Road to Ingalls Creek Road - 4 Lanes	Future	$300,000,000
	Solution:	4 lane configuration			
	Expected Benefits:	Reduced congestion by providing additional lanes.			
217	SR 285	1.14 to 5	SR 285, SR 285 Couplet/Chehalis St to US 2 - Additional River Crossings	Future	$330,000,000
	Solution:	Additional (third) Columbia River Crossing. Additional (third) Wenatchee River Crossing.			
	Expected Benefits:	Congestion relief with alternative traffic corridors for traffic entering or leaving Wenatchee to East Wenatchee or to the West.			
255	I-5	1.98 to 1.99	I-5/SR 500 - Construct Flyover Ramps	Current	e to be determined
	Solution:	Build 2 flyovers to create direct connection between I-5 and SR 500			
	Expected Benefits:	This project is part of the on-going Columbia River Crossing study; costs and benefits are to be determined			
256	I-5	16.4 to 17.22	I-5/NW La Center Rd - Rebuild Interchange	Future	$40,000,000
	Solution:	Rebuild I-5 / La Center Rd. Interchange			
	Expected Benefits:	Improve capacity and alleviate future delays.			
257	I-5	56.07 to 72.97	I-5/Toutle Rest Area to Rush Rd - Add Lanes and Rebuild Structures	Current/Future	$625,000,000
	Solution:	Widen to six general purpose lanes and rebuild bridges and interchanges as necessary to accommodate increased capacity.			
	Expected Benefits:	The widening project will increase interstate capacity, improve safety, and encourage regional economic development.			
258	SR 14	0 to 6.01	SR 14/I-5 to I-205 - Add Lanes and Rebuild Structures	Future	$195,000,000
	Solution:	Widen to six lanes and rebuild interchanges A. Widen to six lanes (cost: $90.5 million) B. Arm 3.00 to 3.70, rebuild Evergreen interchange, and relocate EB off-ramp (cost: $47.7 million) C. Arm 3.93 to 4.87, rebuild Lieser Avenue interchange (cost: $30.5 million)			
	Expected Benefits:	This project is a response to the congestion in the future, especially after completion of the Columbia River Crossing project. It is estimated the project can bring $142 million mobility benefits and $39 million safety benefits in 20 years. The B/C ratio is 1.32. Upon completion, the ratio of peak hour speed to posted speed in 2025 will be increased from 32% ~ 64% to over 89%.			
259	I-205	0.25 to 2.38	I-205/SR 14 to SE Mill Plain Rd - Construct Ramps	Current	$40,000,000
	Solution:	Build braided on and off ramps from SR 14 Interchange to Mill Plain Interchange.			
	Expected Benefits:	Reduction in delays and conflicts due to weaving.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
260	I-205	2.75 to 5.06	I-205/NE 28th St to SR 500 - Construct Ramps	Current	$40,000,000
	Solution:	Build NB and SB braided on/off ramps to/from 28th St.			
	Expected Benefits:	Alleviate pressure on SR 500 interchange.			
261	I-205	2.75 to 3.33	I-205/NE 18th St to NE 28th St - Construct Connector Roads	Current	$20,000,000
	Solution:	Construct connector road system between 18th St. and 28th St.			
	Expected Benefits:	Alleviate pressure on interchanges at Mill Plain and SR 500.			
262	SR 503	1.02 to 7.89	SR 503/Padden Parkway to SR 502 - Add Lanes	Future	$132,000,000
	Solution:	Widen to 6 lanes A. Arm 1.04 to 2.82, Widen to six lanes from Padden Parkway to NE 119 St (Urban) (cost: 32 million)			
	Expected Benefits:	The project will reduce delay by 47% (Benefit Collision Delay Program).			
263	SR 503	7.89 to 14.13	SR 503/SR 502 to NE Gabriel Rd - Add Lanes	Future	$34,000,000
	Solution:	Widen to four lanes			
	Expected Benefits:	The widening project from SR 502 to Gabriel Road is a response to congestion and safety concerns. It is estimated the project can bring $29 million mobility benefits and $11 million safety benefits in 20 years. The B/C ratio is 1.35. The delay reduction is estimated to be 76%. Collision reduction is estimated to be 30% to 40% (MPPP software).			
264	US 2	0 to 2.71	US-2 - US-2 Trestle from Interstate 5 - Widening and I/C modifications	Current	$370,000,000
	Solution:	Widen the US-2 Trestle to provide one additional westbound lane from I-5 to SR 204. Make modifications at the I-5 and SR 204 interchanges			
	Expected Benefits:	Congestion relief and safety on US-2.			
266	US 2	2.71 to 5.02	US-2 - SR 204 to SR 9 - Widening, new I/C's at Bickford Ave. (Old US-2) and SR 9, WB HOV lane at tl	Current	$64,000,000
	Solution:	Widen to four lanes from SR 204 to SR 9, with interchanges at Bickford Ave. (Old US-2) and SR 9, a flyover ramp from northbound Bickford Avenue to westbound US-2, and a westbound HOV lane at the SR 204 interchange.			
	Expected Benefits:	This will provide for significant congestion-relief and safety improvements on this section of US-2 and will enhance/improve safety at these interchanges.			
267	US 2	5.02 to 8.8	US-2 - SR 9 to Campbell Rd. - Widening	Current	See Region Notes
	Solution:	Widen to four lanes.			
	Expected Benefits:	This will address congestion need on this section of US-2 and will improve safety.			
268	US 2	14.25 to 16.12	US-2 - Monroe Bypass - See Study.	Current	See Region Notes
	Solution:	Determine Monroe congestion solution. See Study.			
	Expected Benefits:	This will provide for significant congestion-relief and safety improvements on this section of US-2. This will improve safety on this section of US-2 and will provide for a more efficient region function for the US-2 corridor.			
269	US 2	16 to 18.67	US-2 - Monroe (ECL) to Fern Bluff Rd - Widen to four lanes	Current	See Region Notes
	Solution:	Widen to four lanes from City of Monroe (ECL) to Fern Bluff Rd. This will be a median divided highway and will include the purchase access rights.			
	Expected Benefits:	This will address congestion need on this section of US-2 and will improve safety with access management treatments.			
270	US 2	18.67 to 24.22	US-2 - Fern Bluff Rd. to City Sultan (WCL) - Widening	Current	See Region Notes
	Solution:	Widen to a four lane, median divided highway from Fern Bluff Rd. to City Sultan (WCL).			
	Expected Benefits:	This will address congestion deficiency on this section of US-2 and will improve safety here with the provision of median divided highway.			
272	US 2	21.42 to 24.17	US-2 - City of Sultan - Widen to five lanes	Current	See Region Notes
	Solution:	Widen to five lanes thru the City of Sultan.			
	Expected Benefits:	This will provide congestion-relief and safety improvements on this section of US-2. It will also improve safety and operations on US-2 through Sultan.			
275	SR 3	34.15 to 34.95	SR 3 - SR 3 and SR 16 - Eliminate lane drop on SR 16 and extend NB on ramp to northbound SR 3.	Current	$19,932,000
	Solution:	Eliminate lane drop on SR 16 to northbound SR 3 by extending the lane north of the railroad bridge and extending the northbound SR 3 on ramp to northbound SR 3.			
	Expected Benefits:	The lane and on-ramp extension will improve traffic flow through the SR 3/SR 16 interchange.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
277	SR 3	34.41 to 34.42	SR 3 - SR 3/SR 16 Interchange - Reconstruct I/C	Current	$200,000,000
	Solution:	Reconstruct the SR 3/SR 16 Interchange. Other options include bridging Sinclair Inlet and Westerly Corridor Alternatives.			
	Expected Benefits:				
278	SR 3	34.41 to 36.3	SR 3 - SR 3: SR 16 to SR 304 (Gorst to Bremerton) - Widening creating HOV lanes in each direction	Current	$130,000,000
	Solution:	Widen from four to six to eight-lane divided facility (creating two HOV lanes in each direction) between the SR 3/SR 16 Interchange and the SR 3/SR 304 Interchange.			
	Expected Benefits:				
280	SR 3	36.59 to 36.6	SR 3 - SR 3/SR 304 Interchange - Reconstruct the SR 3/SR 304 I/C	particularly for Southbou	$50,000,000
	Solution:	Reconstruct the SR 3/SR 304 Interchange.			
	Expected Benefits:				
294	I-5	123.33 to 124	I-5 - East Tillicum I/C (Thorne Lane U-Xing) - I/C improvements	Current	See Region Notes
	Solution:	Interchange improvements for the future Cross Base Corridor Connection.			
	Expected Benefits:	This will improve safety at this interchange and I-5 mainline operations. It will also enhance regional travel-flows and connections via the Cross-Base Highway (SR 704) corridor connection.			
295	I-5	123.64 to 125.15	I-5 - Thorne Lane U-Xing to Gravelly Lake Dr. - Add SB and NB HOV lanes , new I/C at Gravelly Lake	Current	$42,780,000
	Solution:	Add an HOV lane southbound and northbound, new interchange at Gravelly Lake Dr. and Intelligent Transportation Systems (ITS) facilities.			
	Expected Benefits:	This will address congestion deficiency on this section of I-5 and improve freeway operations. It will also enhance HOV and transit operations on I-5.			
296	I-5	125.15 to 126.47	I-5 - Gravelly Lake Dr. to BN RR U-Xing - Add SB and NB HOV lanes, new I/C at Bridgeport Way and	Current	$47,000,000
	Solution:	Add an HOV lane southbound and northbound, new interchange at Bridgeport Way and Intelligent Transportation Systems (ITS) facilities.			
	Expected Benefits:	This will address congestion deficiency on this section of I-5 and improve freeway operations. It will also enhance HOV and transit operations on I-5.			
297	I-5	126.47 to 128.14	I-5 - BN RR U-Xing to S 96th St. (SR 512 I/C) - Construct Core HOV lanes, a freeway to freeway I/C at	Current	$191,700,000
	Solution:	Construct Core HOV lanes, a freeway to freeway interchange at SR 512 and Intelligent Transportation Systems (ITS) facilities.			
	Expected Benefits:	This will adress congestion deficiency on this section of I-5 and improve freeway operations. It will also enhance HOV and transit operations on I-5. It will also provide improved freeway operations via interchange improvements at I-5/SR 512 I/C.			
300	I-5	127.54 to 127.55	I-5 - I-5 and SR 512 Interchange - Construct a new southbound I-5 to eastbound SR 512 two lane flyov	Current	$78,501,000
	Solution:	Construct a new southbound I-5 to eastbound SR 512 two lane flyover ramp.			
	Expected Benefits:	This solution is expect to reduce backups onto the freeway and improve traffic flow on mainline.			
301	I-5	128.14 to 130.08	I-5 - SR 512 to SR 16 - Construct Core HOV lanes, reconstruct I/C's at S 56th St, S 84th St and S 72nd	Current	$286,800,000
	Solution:	Construct Core HOV lanes, reconstruct interchanges at S 56th St, S 84th St and S 72nd St, modify the S 38th St interchange, replace the S 48th St. Bridge and add Intelligent Transportation Systems (ITS) facilities.			
	Expected Benefits:	This will address congestion deficiency on this section of I-5 and improve freeway operations. It will also enhance HOV and transit operations on I-5.			
302	I-5	133 to 136.6	I-5 - Yakima Avenue to Port of Tacoma - Construct direct access ramp to Tacoma Dome.	Current	See Region Notes
	Solution:	Construct direct access ramp to Tacoma Dome.			
	Expected Benefits:	This will directly improve transit access to I-5 and overall transit operations from Tacoma-Dome P&R to Seattle and points north.			
303	I-5	139.5 to 154.53	I-5 - Pierce/King County Line to I-405 - Construct Core HOV lanes, truck climbing lane, and ITS	Current	$130,813,100
	Solution:	Construct Core HOV lanes, truck climbing lane, and SC&DI from Pierce County line to Tukwila.			
	Expected Benefits:	This will address congestion deficiency on this section of I-5 and improve freeway operations. It will also enhance HOV and transit operations on I-5. It will also enhance freight mobility on this key segment of I-5 that serves the Port of Tacoma.			
304	I-5	140.38 to 143.45	I-5 - Vicinity of the I/5/SR 18 I/C - New I/C at SR 161 with collector-distributor lanes between SR 18 lan	Current	$147,110,000
	Solution:	New Interchange at SR 161 with collector-distributor lanes between SR 18 lanes SR 161. It includes construction of a direct westbound to southbound freeway to freeway ramp connection, construction of a frontage road on the west side of the interchange connecting directly to SR 161, and construction of a direct southbound I-5 to eastbound SR 18 freeway to freeway ramp connection.			
	Expected Benefits:	This improvement will address safety and operational deficiencies on the I-5 mainline, will eliminate the HAL/HAC and will improve traffic flow/operations through the I-5/SR 18 interchange.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
305	I-5	146.48 to 147.28	I-5 - S. 272nd Street I/C - I/C improvements	Current	$77,240,000
	Solution:	Interchange improvements to accommodate increased capacity on S. 272nd Street.			
	Expected Benefits:	This will address I-5 mainline safety and operational deficiencies. This will also provide for improved transit access from the S.272 P&R to I-5.			
307	I-5	162.57 to 163.02	I-5 - South Industrial Way vicinity - HOV direct access connection to South Industrial Way/E3 bus way.	Current	$105,130,000
	Solution:	HOV direct access connection to South Industrial Way/E3 bus way.			
	Expected Benefits:	HOV direct access from I-5 to the S. Industrial/ E-3 busway will enhance transit operations and improve I-5 safety and mainline operations.			
309	I-5	166.4 to 167.8	I-5 - E Denny Way to NE 45th St. - Modify the Mercer St. I/C, SR 520 I/C and I-5	Current	$626,000,000
	Solution:	Modify the Mercer St. I/C, SR 520 I/C and I-5 to eliminate left side I-5 ramps at Mercer St. I/C and SR 520 I/C.			
	Expected Benefits:	This will improve I-5 mainline operations and safety. It will also help address I-5 mainline congestion deficiencies and will improve connections between I-5 and key arterials in the Seattle CBD.			
310	I-5	167.12 to 168.06	I-5 - Mercer St. I/C to SR 520 I/C - Construct a WB to SB freeway-to-freeway Core HOV Connection at	Current	$146,000,000
	Solution:	Construct a westbound to southbound freeway-to-freeway Core HOV Connection at the SR5/SR520 interchange.			
	Expected Benefits:	This will improve I-5 mainline operations and reduce congestion through this section of I-5. It will also improve SR 520 operations and help reduce congestion on SR 520 and the SR 520 floating-bridge.			
311	I-5	170.6 to 171.23	I-5 - I-5 at Lake City Way - Extend drop lane and braid the N 70th on ramp	Current	$66,213,000
	Solution:	Extend right lane that drops to Lake City Way up to the N 85th St. exit and braid the N 70th on ramp into the mainline.			
	Expected Benefits:	This will reduce backups onto I-5 freeway and will improve traffic flow on I-5 and Lake City Way/SR 522.			
313	I-5	179.8 to 180.3	I-5 - 220th St. SW to 44th Ave. W. - Construct NB auxiliary lane.	Current	$6,700,000
	Solution:	Construct a northbound auxiliary lane.			
	Expected Benefits:	This will improve I-5 mainline operations, help reduce congestion and improve safety on this section of I-5.			
314	I-5	181.07 to 182.45	I-5 - SR SR 524 I/C - Operation and safety I/C improvements at the SR SR 524 (196th St.)	Current	$89,580,000
	Solution:	Interchange improvements at the SR 524 (196th St.) interchange. This project would construct Northbound and Southbound collector distributor lanes to improve the operation and safety of the I-5 196th Street Interchange.			
	Expected Benefits:	The I-5/SR 524 I/C improvements will improve I-5 mainline operations, safety and traffic flow through this interchange.			
315	I-5	186.42 to 186.43	I-5 - SR 96/128th St. SW I/C - Construct a new urban interchange.	Current	$73,310,000
	Solution:	Construct a new urban interchange.			
	Expected Benefits:	Urban interchange will be constructed to current design standards and will improve safety and traffic operations on the I-5 mainline and on connecting arterials here (SR 96 / 128th SW)			
316	I-5	193.65 to 199.58	I-5 - US-2 to SR 528 - Construct HOV lanes in each direction.	Current	$471,720,000
	Solution:	Construct HOV lanes in each direction.			
	Expected Benefits:	This will address the congestion deficiency on this section of I-5 and improve freeway operations. It will also enhance HOV and transit operations on I-5 to and from Everett.			
317	I-5	199.58 to 205.63	I-5 - SR 528 to SR 531 - Widening and reconstruct interchange ramps.	Current	$102,570,000
	Solution:	Widen from three to four lanes in each direction and reconstruct interchange ramps.			
	Expected Benefits:	This will address congestion deficiency on I-5 through this section. Interchange ramp-reconstruction will improve I-5 operations by eliminating backups onto the I-5 mainline.			
319	SR 9	4.03 to 6.97	SR 9 - 176th St. SE to SR 96 - Widening	Current	$23,000,000
	Solution:	Widen to four lanes.			
	Expected Benefits:	Congestion relief on SR 9			
321	SR 9	8.42 to 12.14	SR 9 - Marsh Rd. to US-2 - Widing	Current	$95,000,000
	Solution:	Widen to four lanes.			
	Expected Benefits:	This will address congestion deficiency on this section of SR 9.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
322	SR 9	12.14 to 13.88	SR 9 - US-2 to Lake Stevens Road - Widening and improve US-2/SR 9 I/C	Current	$21,000,000
	Solution:	Widen to 4/5 lanes from US-2 to Lake Stevens Road, and improve US-2/SR 9 interchange.			
	Expected Benefits:	This will address congestion deficiency on this section of SR 9 and improve safety/operations at the SR/ US-2 I/C.			
323	SR 9	14.25 to 16.48	SR 9 - 20th Street SE Vicinity to Lundeen Parkway - Widening	Current	$11,000,000
	Solution:	Provide four thru lanes from 20th Street SE Vicinity to Lundeen Parkway.			
	Expected Benefits:	This will address congestion deficiency on this section of SR 9.			
324	SR 9	15.42 to 15.99	SR 9 - SR 9/SR 204 Intersection - Construct an interchange	Current	$93,600,000
	Solution:	Construct an interchange between SR 9 and SR 204.			
	Expected Benefits:	This will address safety and operations needs at the SR 9/SR 204 I/C and will improve operations on SR 9.			
325	SR 9	17.49 to 19.26	SR 9 - SR 92 to SR 528 - Widening	Current	$14,000,000
	Solution:	Widen to four lanes.			
	Expected Benefits:	This will address congestion deficiency on this section of SR 9.			
326	SR 9	19.26 to 26.05	SR 9 - SR 528 to SR 531 - Widening	Current	$56,000,000
	Solution:	Widen to four lanes.			
	Expected Benefits:	This will address congestion deficiency on this section of SR 9.			
332	SR 18	20.84 to 24.11	SR 18 - Issaquah-Hobart Road to Tigergate - Widening	Current	$77,100,000
	Solution:	Widen to four lanes.			
	Expected Benefits:	This will address congestion deficiency on this section of SR 18.			
333	SR 18	24.11 to 28.41	SR 18 - Tigergate to I-90 - Widening	Current	$31,000,000
	Solution:	Widen to four lanes.			
	Expected Benefits:	This will address congestion deficiency on this section of SR 18.			
334	I-90	1.99 to 9.44	I-90 - I-5 to Mercer Island - Convert center roadway to two-way high capacity transit operation. Add H	Current	$100,580,000
	Solution:	Convert center roadway to two-way high capacity transit operation. Add HOV lanes to the mainline.			
	Expected Benefits:	This will help address existing and future congestion deficiencies on I-90 floating bridge.			
336	I-90	9.93 to 9.94	I-90 - I-90/I-I-405 I/C area - Construct a freeway-to-freeway Core lane HOV connection in NE quadrant	Current	See Region Notes
	Solution:	Construct a freeway-to-freeway Core lane HOV connection at SR90/SR405 interchange (NE quadrant).			
	Expected Benefits:	This will address congestion and operational deficiencies through the I-90/405 I/C and will improve freeway mainline operations for GP/HOV/transit users.			
337	I-90	11.14 to 16.85	I-90 - I-90 between Eastgate and Issaquah - Extend HOV lanes to Front Street and add auxiliary lanes	Current	See Region Notes
	Solution:	Extend HOV lanes to Front Street and add auxiliary lanes from Eastgate to Front Street.			
	Expected Benefits:	This will address congestion and operational deficiencies on this section of I-90. This will improve trip reliability for HOV and transit users and will improve I-90 mainline operations.			
338	I-90	13.15 to 13.3	I-90 - West Lake Sammamish Parkway I/C - Construct interchange improvements.	Current	See Region Notes
	Solution:	Construct interchange improvements.			
	Expected Benefits:	This solution will improve I-90 mainline operations by eliminating back-ups onto the I-90 mainline and will improve traffic flow through this interchange and onto West Lake Sammamish Parkway.			
340	I-90	18.38 to 20.75	I-90 - E. Sunset Way I/C to High Point Rd. I/C - Widening and reconstruct interchange ramps	Current	See Region Notes
	Solution:	Widen to four lanes in each direction, maintain truck lanes, and reconstruct interchange ramps.			
	Expected Benefits:	This will address congestion deficiency on this section of I-90 and will improve I-90 mainline operations by eliminating backups onto the I-90 mainline. This solution will also help move freight on this section of I-90.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
341	I-90	20.75 to 22.86	I-90 - High Point Rd. I/C to Jones Rd. I/C - Widening and reconstruct interchange ramps	Current	See Region Notes
	Solution:	Widen to four lanes in each direction, maintain truck lanes, and reconstruct interchange ramps.			
	Expected Benefits:	This will address congestion deficiency on this section of I-90 and will improve I-90 mainline operations by eliminating backups onto the I-90 mainline. This solution will also help move freight on this section of I-90.			
342	I-90	22.86 to 25.65	I-90 - Jones Rd. I/C(SE 82nd St.) to SR 18 - Wideng and construct freeway to freeway interchange at S	Current	timate is $126.4M.
	Solution:	Construct freeway to freeway interchange at SR 18, widen to four lanes in each direction, maintain truck lanes, and reconstruct interchange ramps.			
	Expected Benefits:	This will address congestion deficiency on this section of I-90 and will improve I-90 mainline operations by eliminating backups onto the I-90 mainline. This solution will also help move freight on this section of I-90. I-90/ SR 18 I/C is a major freight connection between two important freight corridors (I-90/SR 18).			
353	SR 167	7.5 to 27.67	SR 167 - Puyallup to Renton - Add two general purpose lanes in each direction from SR SR 512 to I-4	Current	$1,731,000,000
	Solution:	Add two general purpose lanes in each direction from SR 512 to I-405 and construct interchange improvements.			
	Expected Benefits:	This will address the congestion deficiency on this section of SR 167.			
357	SR 167	24.7 to 26	SR 167 - SW 27th St. - Construct HOV direct access ramps at SW 27th St.	Current	$54,000,000
	Solution:	Construct HOV direct access ramps at SW 27th St.			
	Expected Benefits:	This will improve transit direct access to the SR 167 HOV lanes and improve overall transit performance on this section of the SR 167 corridor.			
362	SR 202	10.25 to 12.98	SR 202 - Sahalee Way NE to 244th Ave NE - Widen SR SR 202 to 4/5 lanes.	Current	$32,452,000
	Solution:	Widen SR 202 to 4/5 lanes.			
	Expected Benefits:	This will address mobility deficiencies on SR 202 and improve safety and operations here.			
364	SR 302	10.57 to 12.43	SR 302 - Elgin Clifton Road to SR 16 - Widening and realignment	Current	$18,421,000
	Solution:	Widen SR 302 to 4 lanes from Elgin-Clifton Road to 144th St NW to tie in with planned new alignment from 144th St NW to SR 16.			
	Expected Benefits:	The widening of SR 302 here will address mobility deficiencies and improve safety and operations on this highway.			
368	SR 303	0.42 to 4.66	SR 303 - 11th St. to Fairgrounds Rd. - Construct Business Access and Transit Lanes.	Current	$120,000,000
	Solution:	Construct Business Access and Transit Lanes.			
	Expected Benefits:	This will improve mobility, transit operations, access and safety on SR 303.			
378	SR 410	4.53 to 6.04	SR 410 - 181st Avenue East to 202nd Avenue East - Widening	Current	$24,120,000
	Solution:	Widen to six lanes.			
	Expected Benefits:	This will address mobility deficiencies and improve safety and operations on this section of SR 410.			
386	SR 512	7.4 to 9.1	SR 512 - SR 161 Interchange - Widening	Current	$22,000,000
	Solution:	Widen the westbound off ramp to SR 161 to two lanes, widen the eastbound on ramp from SR 161 to two lanes, widen the SR 512/SR 161 under-crossing from two to six lanes and extend the westbound climbing lane through interchange to tie in with the westbound on-ramp from 94th Ave. SE to SR 512.			
	Expected Benefits:	This will improve SR 512 mainline operations, safety and traffic flow through this interchange.			
387	SR 512	8.74 to 11.24	SR 512 - SR 161 to SR 167 - Auxiliary Lanes	Current	$53,799,000
	Solution:	Construct eastbound and westbound auxiliary lanes from Meridian to Pioneer Way with two lane off-ramps at each Interchange.			
	Expected Benefits:	This will improve mainline operations on SR 512 and will improve safety at this interchange.			
389	SR 518	0.03 to 0.04	SR 518 - SR 509 Interchange - Flyover/Tunnel Ramp	Current	$31,000,000
	Solution:	Construct a southbound to eastbound flyover/tunnel ramp at the SR 509 I/C.			
	Expected Benefits:	This will improve safety and operations at the SR 509/SR 518 interchange. It will also eliminate backups onto SR 509 mainline with the provision of a freeway-to-freeway connection.			
390	SR 518	0.04 to 0.05	SR 518 - SR 509 Interchange - New Interchange	Current	$39,000,000
	Solution:	Construct a new interchange at SR 509.			
	Expected Benefits:	This will improve operations and safety on both SR 509 and SR 518.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
391	SR 518	2.49 to 2.5	SR 518 - SR 99 Interchange - New Interchange	Current	$118,000,000
	Solution:	Construct a new interchange at SR 99 and a new half diamond interchange at 24th Ave. S.			
	Expected Benefits:	This will improve safety and operations at the SR 518 / SR 99 interchange.			
393	SR 518	3.42 to 3.43	SR 518 - I-5 Tukwila Interchange - Relocate I-5 Northbound Ramp	Current	$57,000,000
	Solution:	Relocate the I-5 northbound ramp to the right side and combine I-5 northbound, I-5 southbound and the 51st Ave. S ramps at the Tukwila I/C.			
	Expected Benefits:	This will improve safety and operation on SR 518 and will enhance safety at the Tukwila & I-5 I/C.			
394	SR 520	0 to 1.05	520 - I-5 to Montlake Blvd. - New Six Lane Connection	Current	$655,000,000
	Solution:	Construct new six lane connection between I-5 and Montlake Blvd. This includes reconstruction of the Portage Bay Bridge.			
	Expected Benefits:	This will address major congestion deficiency on SR 520 and will replace a major functionally obsolete bridge. This will also improve safety and operations on this section of SR 520.			
395	SR 520	1.05 to 4.59	SR 520 - Montlake to Hunts Point (Lake Washington) - New Six Lane Bridge	Current	$1,865,000,000
	Solution:	Construct new six lane bridge and approaches from Montlake Blvd. on the west side of the lake to 84th Ave. NE on the east side.			
	Expected Benefits:	This will provide significant congestion relief on this corridor and will replace a functionally obsolete bridge across Lake Washington.			
396	SR 520	4.59 to 6.94	SR 520 - 84th Ave. NE to I-405 - HOV Lanes	Current	$310,000,000
	Solution:	Add HOV lanes between 84th Ave. NE and I-405.			
	Expected Benefits:	This will provide congestion relief and improved operations on this section of SR 520.			
398	SR 522	4.22 to 5.54	SR 522 - SR 523 (NE 145th St.) to 41st Ave. NE. - Eastbound Business Access and Transit (BAT) lan	Current	$7,000,000
	Solution:	Construct an eastbound Business Access and Transit (BAT) lane.			
	Expected Benefits:	Improved mobility and transit operations on SR 522. Improved safety and local access on this section of SR 522.			
399	SR 522	7.79 to 9.1	SR 522 - 73rd Ave. NE to 96th Ave. NE. - Business Access and Transit (BAT) lanes	Current	$31,000,000
	Solution:	Construct Business Access and Transit (BAT) lanes in both directions.			
	Expected Benefits:	This will improve mobility and transit operations on this portion of SR 522. Improved safety, operations and local access.			
400	SR 522	9.51 to 10.08	SR 522 - NE 180th St. to 104th Ave. NE. - New Four Lane Arterial Roadway	Current	$33,000,000
	Solution:	Construct a new four lane arterial roadway to the south of existing SR 522 extending eastward from SR 522 at NE 180th St. and reconnecting with SR 522 near 104th Ave. NE. SR 527 will extend to the south connecting to the new SR 522 alignment.			
	Expected Benefits:	This will improve overall mobility and operations on this portion of SR 522. This will also provide significant congestion-relief through the City of Bothell.			
402	SR 522	12.93 to 12.94	SR 522 - NE 195th St. - Complete Diamond Interchange	Current	$33,000,000
	Solution:	Construct second half of the existing half-diamond interchange making a full diamond interchange.			
	Expected Benefits:	This will provide improved safety and operations at this interchange. Also improved traffic flow on SR 522.			
403	SR 522	16.6 to 16.61	SR 522 - Paradise Lake Rd. - New Interchange	Current	$75,000,000
	Solution:	Construct a new grade separated diamond interchange.			
	Expected Benefits:	This will improve safety and operations at this interchange. This will also improve operations and safety on the SR 522 mainline.			
404	SR 522	16.6 to 18.6	SR 522 - Paradise Lake Rd. to Snohomish River. - Widening and Divided Hwy.	Current	$45,000,000
	Solution:	Add two lanes converting a two lane arterial roadway to a four lane divided highway.			
	Expected Benefits:	This will relieve congestion on this section of SR 522 and provide improved safety and operations.			
408	SR 524	9.62 to 11.05	SR 524 - SR 527 to 35th/39th Ave SE. - Widening	Current	$68,250,000
	Solution:	Widen to five lanes adding two general purpose lanes and a two-way-left-turn-lane. .			
	Expected Benefits:	This project, when completed, will increase capacity, reduce accidents, and provide access management at certain locations.			

Tier III Solutions

Key	Highway Number	Milepost	Title	Current or Future Problem	Cost Estimate
409	SR 524	11.05 to 14.68	SR 524 - 35th/39th Ave. SE to SR 522 (Maltby) - Widening	Current	$52,000,000
	Solution:	Widen to five lanes adding two general purpose lanes and a two-way-left-turn-lane			
	Expected Benefits:	This will improve mobility and safety on SR 524.			
410	SR 527	0.12 to 2.27	SR 527 - SR 522 to I-405 - Widen to 4/5 lanes.	Current	$38,864,000
	Solution:	Widen to 4/5 lanes.			
	Expected Benefits:	This will address mobility deficiency on SR 527 and improve traffic flow and safety on SR 527.			