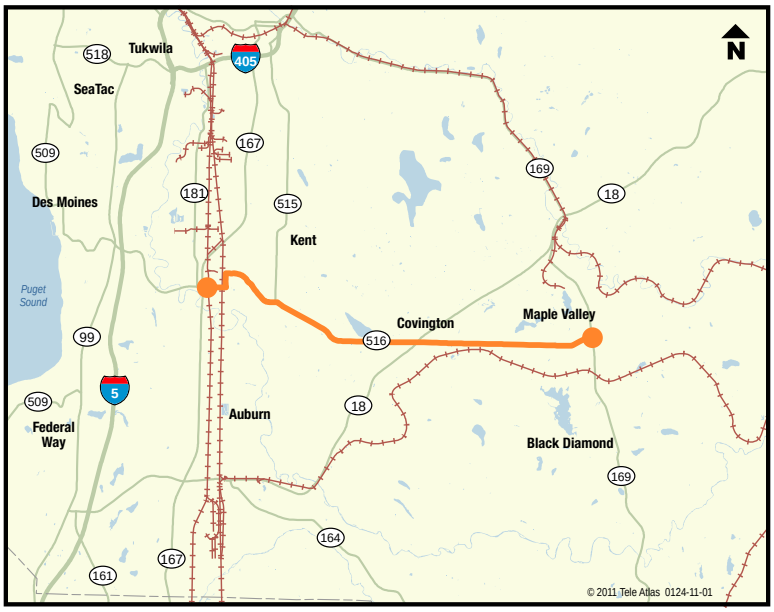
SR 516
CORRIDOR STUDY

SR 167 IN KENT TO SR 169 IN MAPLE VALLEY



Prepared with the assistance of:

City of Black Diamond
City of Covington
City of Maple Valley
City of Kent
King County METRO
Puget Sound Regional Council

January 2013

Washington State Department of Transportation

Urban Planning Office | Seattle, WA 98104-2887

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Urban Planning Office
Seattle, Washington

SR 516 CORRIDOR STUDY

Project Limits:

SR 516 / SR 167 Interchange to the
SR 516 /SR 169 Intersection

SR Mile Post 4.65 to 16.22

January 2013

Lorena Eng, P.E.
Northwest Region Administrator

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Washington State Department of Transportation
Urban Planning Office

SR 516 CORRIDOR STUDY

Study Limits

SR 167 to SR 169 (SRMP 4.65 to SRMP 16.22)

Approved by:

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WSDOT Northwest Region Administrator

1/17/13
Date

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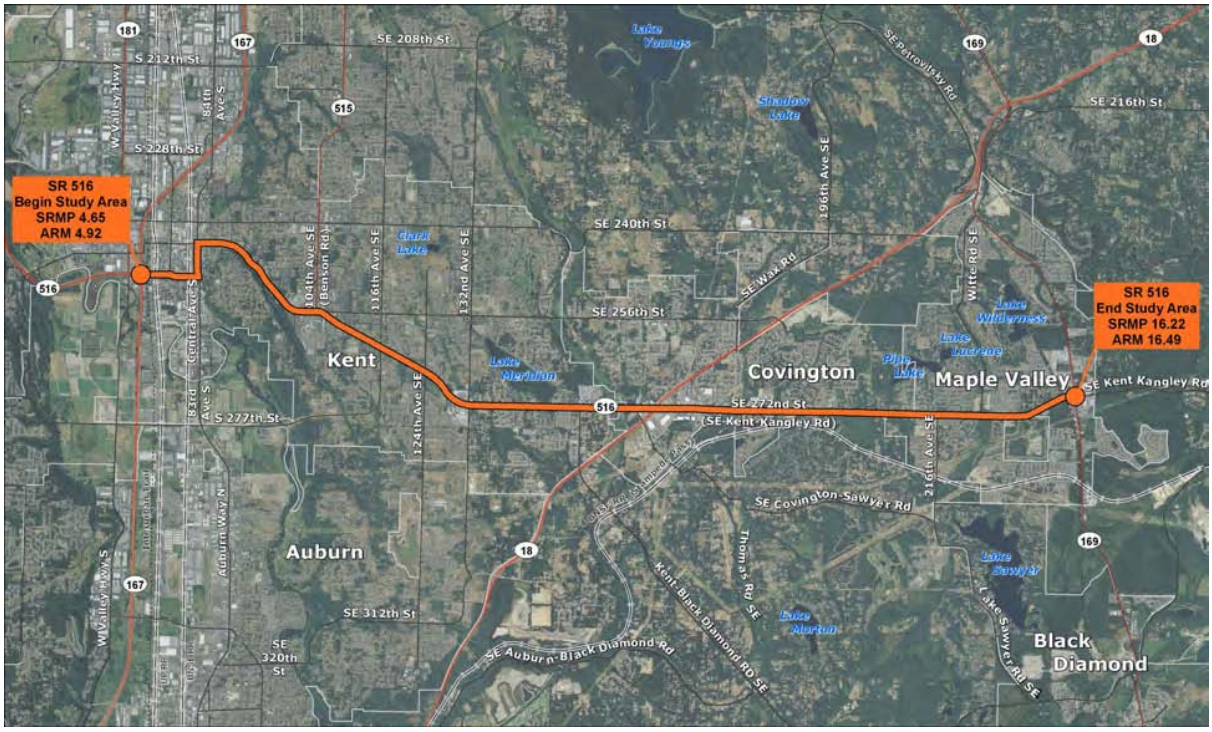
EXECUTIVE SUMMARY

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



What is the SR 516, SR 167 to SR 169, Corridor Study?

The SR 516 Corridor Study is a planning level analysis that assesses current and future conditions along the corridor and then develops improvement recommendations to address those conditions. Conditions studied include mobility, growth, maintenance, operations, safety, and the environment. The study process included developing a corridor vision, gathering input from local officials and the public regarding traffic conditions they see affecting the corridor; reviewing existing regional and local comprehensive plans for planned population and employment growth and funded transportation improvements;

collecting and analyzing traffic data such as traffic volumes and safety conditions along the corridor; projecting future travel demand; and developing improvement recommendations. This corridor plan provides WSDOT with a strategy, when funding is available, for improving the corridor through the year 2030. The end result is a list of near-, mid-, and long-term improvement recommendations. These recommendations are specific to the corridor, and funding has not been allocated to any of the improvement recommendations. The improvement recommendations listed in this corridor study will need to compete and prioritize against other statewide transportation needs for funding opportunities.

The SR 516 Corridor Planning Study area begins in the city of Kent, at the interchange area of SR 516, SR 181, and SR 167 (SR Mile Post 4.65) The study corridor extends easterly almost 12 miles through the cities of Kent and Covington and terminates at the SR 516 and SR 169 intersection in the city of Maple Valley (SR Mile Post 16.22). SR 516 is located in King County, Washington. The full length of the route is from Des Moines to Maple Valley.

The study corridor was divided into six segments to model for speed comparisons and capacity. Traveling eastward, the segments are as follows:

Segment 1, SR 167 I/C to Jason Avenue, is an urban section in Kent.
Segment 2, Jason Avenue to 101st Avenue, is slightly less urban in character than Segment 1.
Segment 3, 101st Avenue to 160th Avenue SE, is more suburban in character.
Segment 4, 160th Avenue SE to slightly west of 188th Avenue SE, is the urban core of Covington.
Segment 5, slightly west of 188th Avenue SE to 216th Ave SE transitions to a more suburban character
Segment 6, 216th Ave SE to SR 169, is the most rural segment but is still suburban with urban development at SR 169.

All six segments are located within the urban growth area and within the Kent, Covington, and Maple Valley incorporated city limits. There are 34 signalized intersections along the study route and two, signalized, gate controlled, at grade railroad crossings.

Why did WSDOT study this segment of SR 516?

The 2010 Washington State Legislature passed ESSB 6381. The bill language stated "$150,000 of the motor vehicle account--state appropriation is provided solely for a corridor study of state route number 516 from the eastern border of Maple Valley to state route number 167 to determine whether improvements are needed and the costs of any needed improvements."

This route provides an east-west connection to multiple cities and eastern King County residents for both local trips and to transportation corridors to and from the urban cores of the Puget Sound area to the west. The area continues to see population growth. Between the period of 2009 and 2030, PM peak hour demand grows 1.8% annually in the eastbound direction of SR 516 in Kent. Covington and Maple Valley segments in the eastbound direction show a 1.7% annual growth rate. In the westbound direction, the growth is forecasted at 2% annually for the segment in Covington and Maple Valley. Additional growth could occur if several large developments within Maple Valley and Black Diamond move forward.

Who was involved in the study?

The study was led by the WSDOT Urban Planning Office with assistance from a stakeholders group, formed by WSDOT, to provide input and insight into the transportation concerns of their respective agencies. The stakeholders group also acted as a sounding board for the development of the recommendations.

The stakeholders group was composed of representatives from the city of Black Diamond, the city of Covington, the city of Kent, the city of Maple Valley, King County Metro Transit, Puget Sound Regional Council, plus staff from WSDOT's NW Region, Strategic Planning, and Capital Programming and Development.

The Corridor Plan Vision

In September 2010, a Corridor Working Group (CWG) consisting of transportation stakeholders representing various jurisdictions, a regional planning agency, and transit convened to commence the SR 516 Corridor study. One of the first acts of the CWG was to adopt a vision for the study recommendations. The adopted vision states:

> **SR 516 Corridor Plan Vision**
> *A set of consensus-based, multimodal, and sustainable recommendations for SR 516 between SR 167 and SR 169 that are based on improved safety, improved throughput of people and goods, managed access, and preparation for future population and employment growth.*

This vision provided a focus for the CWG while conducting the study of the SR 516 corridor. The CWG met three times over the life of the study. The vision was maintained through direct involvement of the Corridor Working Group in the development and acceptance of the alternatives evaluation criteria and, ultimately, the corridor plan

recommendations. The evaluation criteria included safety, local interest, congestion/mobility, feasibility/constructability, and environmental impact.

The CWG's efforts were supported by information and technical data gathered and prepared by Washington State Department of Transportation (WSDOT) staff.

Moving Washington

Moving Washington is the WSDOT's framework for making decisions for transportation investments that focus on keeping people and goods moving and supporting a healthy economy, environment, and communities.

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

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

Operate Efficiently – This approach gets the most out of existing highways by using traffic-management tools to optimize the flow of traffic and maximize available capacity. Strategies include using traffic technologies such as ramp meters and other control strategies to improve traffic flow and reduce collisions, deploying Incident Response to quickly clear collisions, optimizing traffic signal timing to reduce delay, and implementing low-cost/high-value enhancements to address immediate needs.

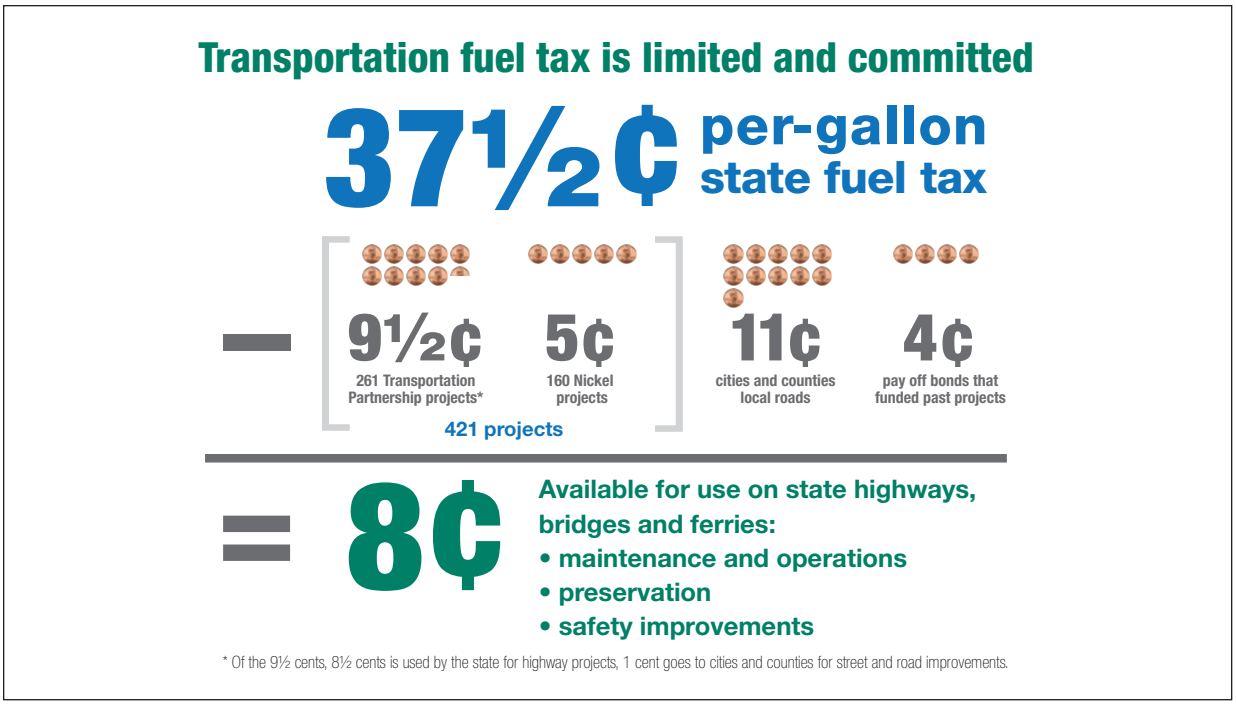
Manage Demand – Whether shifting travel times, using public transportation or reducing the need to travel altogether, managing demand on overburdened routes allows our entire system to function better. Strategies include using variable-rate tolling in ways that reduce traffic during the most congested times and balance capacity between express and regular lanes, improving the viability of alternate modes, and providing traveler information to allow users to move efficiently through the system.

Add Capacity Strategically – Targeting our worst traffic hotspots or filling critical system gaps to best serve an entire corridor, community or region means fixing bottlenecks that constrain the flow. Upgrading a failing on-ramp merge or hard-shoulder running during peak periods can free up the flow of traffic through a busy corridor. From improving rail crossings and ferry service to working with transit agencies to connect communities, from building direct access ramps for carpools and transit to including paths for pedestrians and bicycles, capacity improvements require strong partnerships with a shared vision for the corridor.

For more information on Moving Washington, visit:
www.wsdot.wa.gov/movingwashington/

Why do Moving Washington?

At its basic level Moving Washington is a budgeting and investment strategy that is more important now than ever, given declining transportation revenue and growing demands on our state's highways, ferries and rails. The state is not in a position to build everything everyone wants so the state must have a way to prioritize its transportation needs and find the most efficient solutions that support and enhance Washington's economic vitality. As the exhibit demonstrates, only 8 cents (21%) of the 37.5 cents gas tax collected on each gallon of fuel is available to operate, maintain, and improve the transportation system. Given this challenging financial situation it is necessary for the WSDOT, and its partners to think of, and approach, transportation investments in a strategic manner.



Recommendations and Planning Level Cost Estimates

In addition to levels of service and speed performance of the system the evaluation criteria also considered how a proposed improvement affected "Economy, Transportation, and Community" or "ETC." The intent of looking at ETC was to get a fuller picture of how a recommended improvement would benefit the community as a whole, not just the study corridor itself. For example, would a proposed recommendation enhance freight movement or improve access to Transit Oriented Development, promote energy conservation, or improve safety? Further discussion of the evaluation criteria can be found in Chapter 5: "Improvement Recommendations."

The recommendations identified for the SR 516 corridor between SR 167 and SR 169 were developed recognizing the current financial situation and adhering to the Moving Washington policy goals of safety, maintenance & preservation, efficiency, demand management, and strategic capacity improvements.

Maintenance – The current pavement management system program and maintenance needs identification using the maintenance work log for the facility should continue.

Safety – There are currently no collision analysis locations, collision analysis corridors, or intersection analysis locations on the study segment of SR 516. Recommend monitoring the results of the grant improvements, once completed. Continue enforcement of traffic laws and monitoring collision data along the corridor to determine if any segment or location exhibits a need for additional analysis. To make the corridor safer, WSDOT encourages jurisdictions to manage access, consider roundabouts where applicable, and consider the elimination of two way left turn lanes for roadway segments over 25,000 average daily traffic volumes. The city of Kent has received a safety grant to look at and improve a portion of the corridor for bicyclists and pedestrians near the Kent-Meridian HS. Completion date for the grant work is estimated to be July of 2013.

Efficiency – This report again recommends a continued focus on access management for the full length of the study corridor. Signal operations should be optimized, with both WSDOT operated and city operated signals being coordinated throughout the study corridor. Only after the efficiency of the existing facility had been maximized, were any strategic capacity improvements additionally recommended.

Demand Management DM – Demand management options should be considered and incorporated whenever possible with new development or as adopted policy within local ordinances. Recommendations to expand DM for this corridor include expanded bus service, vanpool promotion, employer engagement, vanpool relocation with coaching, and

outreach and incentives for commuters. A continued focus on completing the walk and bike routes along the corridor will also help in reducing vehicular demand.

Strategic Capacity addition – Capacity recommendations were sequenced by short, mid, and long term. Recommendations were based on performance standards not being met. Timing of recommendations looks at the projected mobility needs, establishes the timeframe that the needs will exist within the corridor, and offers a logical sequence for future improvement implementation. These time periods are not associated with actual funding and those recommendations with a relative low benefit to cost ratio (B/C) will not prioritize well for funding from the state transportation budget. This plan identifies one near term, two mid term, and eight long term recommendations for strategic capacity additions. Cost estimates for the near and mid term recommendations range between $3.5M to $19.5M and are in 2011 dollars. All cost estimates are based on less than one percent design. Prior to implementation, these recommendations will require more analysis and design to determine the most cost effective solutions. As the economy recovers or traffic conditions change, the data should be updated or reevaluated if future conditions along the corridor evolve differently than anticipated in this study.

Strategic Capacity Recommendations for SR 516

The proposed improvement recommendations in this study will need to compete with other proposed improvements around the state for funding based on performance outcome. Partner agencies can use the list of proposed improvement recommendations along the study corridor to solicit funding from local, and federal sources; and from the private sector for project design, environmental review, right-of-way acquisition, and construction.

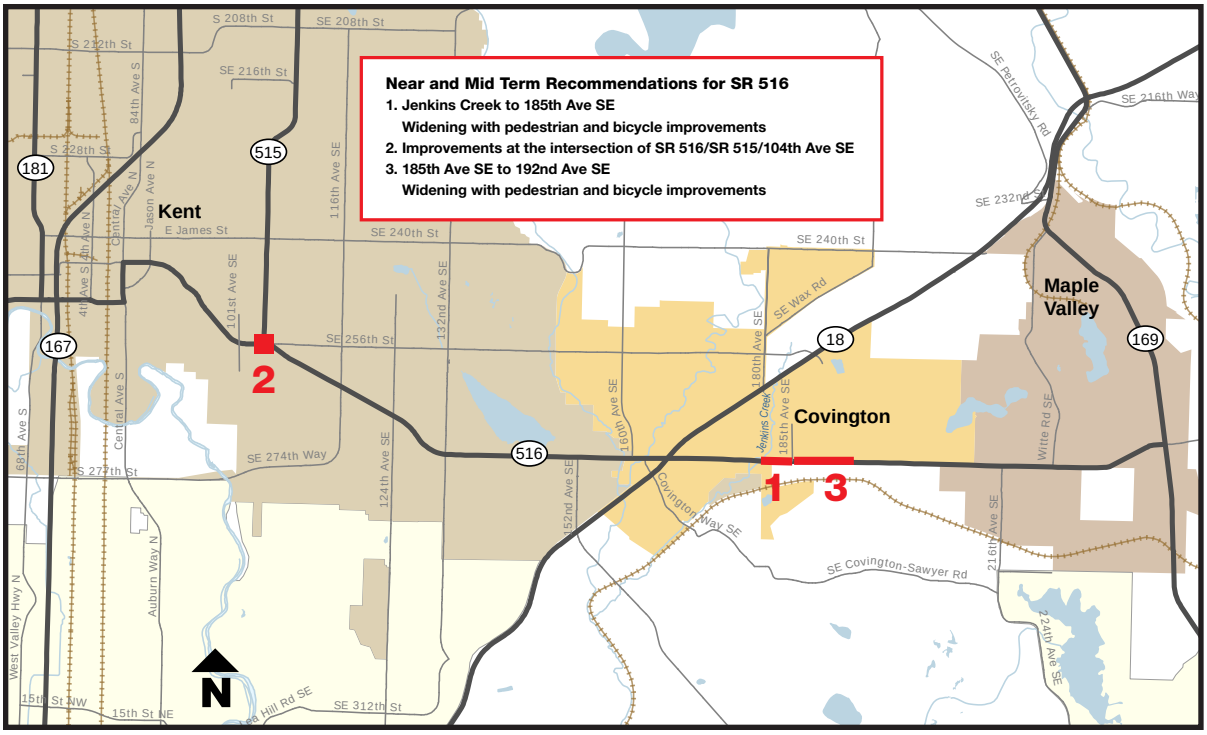
Improvement	Location	Cost Estimate (2011 dollars)*	B/C estimate***	Other benefits
Near Term – Widening to five lanes, with bike lanes and sidewalks	West of Jenkins Creek to 185th Ave SE	$10.6M to $15.2M	0.9 to 0.6 (Ratio does not include past or current investments in this area. Ratio will improve if these are considered.)	Fish barrier removal, improved safety (motorized and non motorized), increased non-motorized access and usage of the corridor (sidewalks and bike lanes), transit reliability, safe routes to school, support local economic development.
Mid Term – Intersection Improvements	SR 515/ 104th Ave SE	$3.5M** to $19.5M	7.5** to 5.7	Improved safety (motorized and non motorized), and transit reliability.
Mid Term – Widening to five lanes, with bike lanes and sidewalks	185th Ave SE to 192nd Ave SE	$10.2M to $13.6M	0.7 to 0.6 (Travel time savings extend beyond this segment, but are not included in the ratio shown)	Improved safety (motorized and non motorized), increased non-motorized access and usage of the corridor (sidewalks and bike lanes), transit reliability, safe routes to school, and support local economic development.

* *Due to other, existing, state transportation needs and limited budget, local funding may be needed for implementation.*

** *Lower cost improvements with higher B/C are more likely to be considered for state funding.*

*** *Only travel time savings within the segment recommended for improvement are included in the benefit to cost ratio (B/C) calculation. B/C is only one of several factors considered in making the recommendations. Other benefits exist that may be less tangible from a purely economic standpoint, but important to society as a whole.*

Near and Mid Term Recommendation Locations



Long term Recommendations *

Intersection improvements at SR 516/Central Avenue N
Intersection improvements at SR 516/SE 256th St
Intersection improvements at SR 516/108th Avenue SE
Intersection improvements at SR 516/132nd Ave SE
Intersection improvements at SR 516/152nd Avenue SE
Intersection improvements at SR 516/172nd Avenue SE
Intersection improvements at SR 516/SE Wax Road
Capacity improvements from 192nd Ave SE to 216th Ave SE

* *Long term needs are identified, but specific improvements strategies are not supplied due to a high level of uncertainty associated with those needs. This approach allows greater flexibility in addressing future needs when they occur, and allows the use of future technology to improve traffic operations and provide better transportation mobility.*

Railroad Crossing Analysis
One of the objectives of this study was to analyze the interchange area of SR 516, SR 181, SR 167 and the traffic interactions with the at grade crossings at the Union Pacific and BNSF rail lines within the vicinity of these interchanges. The principal focus was on the UP line due to its proximity to the interchange area. This study did not find justification for making a recommendation for grade separated crossings at those locations. The study and analysis for this area did not model for any improvements on SR 167, nor increases in rail traffic. Should improvements move forward on SR 167, or railway traffic increase in the future, further study by the responsible agency should be conducted to determine impacts on traffic flow and emergency vehicle access in regards to railroad crossing operations.

At the conclusion of this study a proposal surfaced to increase coal shipments on the BNSF line from the Montana and Wyoming areas to a terminal in Bellingham. This proposal should be closely monitored. If it moves forward, the RR/roadway analysis will need to be updated to determine the effects increased rail activity could have on traffic operations of the SR 516 corridor.

Next Steps

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

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

CHAPTER 1

Introduction and Background

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CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 What Is the Purpose of a Corridor Planning Study?

A corridor planning study is used by WSDOT and local jurisdictions to identify existing and emerging transportation related issues along a specific state highway and to develop project recommendations to address those issues. The projects may be implemented over a 20 year period as funding becomes available. Corridor studies are part of the WSDOT long-range planning program and are intended to identify potential investments in WSDOT-owned facilities and ensure alignment with the Highway System Plan and Moving Washington. The corridor plan can also be used by transportation stakeholders such as local agencies and regional transportation planning organizations in their planning processes.

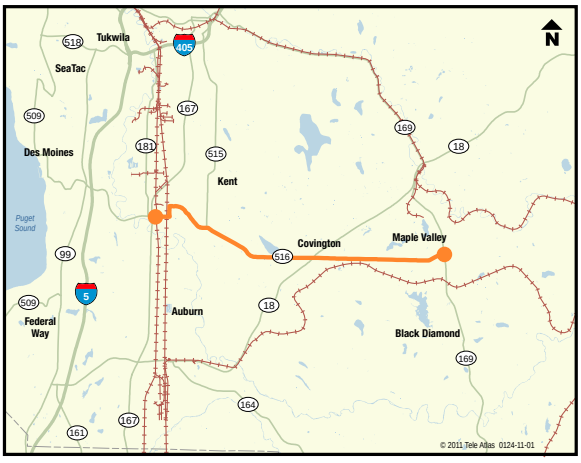
A corridor study analyzes operating conditions, environmental constraints, population and employment growth, land use development, right of way needs, and other elements that affect a highway's traffic operations.

To ensure that the study recommendations are consistent with the corridor vision, the corridor plan includes a public participation process. This process seeks public involvement on multiple levels, from the creation of a stakeholders group, briefings to elected officials, and creation of a study website. This website is utilized to keep the public informed of the study's progress and post material pertinent to the study.

The study's website is www.wsdot.wa.gov/planning/Studies/SR516Corridor

1.2 The SR 516 Corridor Planning Study (SR 167 to SR 169)

The State Route (SR) 516 Corridor Planning Study covers approximately 12 miles of SR 516 from just west of the SR 167 interchange area in Kent to SR 169 in Maple Valley. The study area is a mixture of urban city center areas and suburban communities.



1.3 Who Was Involved in the SR 516 Corridor Study?

The study was led by WSDOT's Urban Planning Office with assistance from a study-area specific stakeholders group to provide input and insight into the transportation concerns of their respective cities and agencies. The stakeholders group also acted as a sounding board for the development of the recommendations. The stakeholders group was composed of a mix of transportation planners, engineers, managers, and policy makers from the cities of Black Diamond, Covington, Kent , and Maple Valley; along with regional planning and transit agencies.

The Stakeholders included:

- City of Black Diamond
- City of Covington
- City of Kent
- City of Maple Valley
- King County Metro Transit
- Puget Sound Regional Council
- WSDOT

1.4 The Corridor Plan Vision and Study Goals

At the beginning of the corridor study, the Stakeholders adopted a vision for the corridor plan that would help guide the development of recommendations for the corridor that would allow it to continue to operate over the coming decades. This corridor vision is in alignment with the Governor's Connecting Washington Task Force's ten year strategy to promote principle based investments critical to Washington's economic future. The vision is also in agreement with WSDOT's Moving Washington principles and strategies.

The SR 516 corridor plan vision is:

> *A set of consensus-based, multimodal, and sustainable recommendations for SR 516 between SR 167 and SR 169 that are based on improved safety, improved throughput of people and goods, managed access, and preparation for future population and employment growth.*

The following goals support the vision and helped guide the study process and influenced development of the recommendations.

Develop improvement recommendations that:

- comply with ESHB 1175
- implement Moving Washington by developing improvement recommendations that are sus-tainable and focus on maintenance, preservation, safety, efficient operations, demand management, and adding capacity strategically
- leverage funding from public and private resources
- promote economic development and job creation
- advance the Connecting Washington investment principles
- are in alignment with the legislature's six investment guidelines found in RCW 47.04.280. Those guidelines are: economic vitality, preservation, safety, mobility, environment, and stewardship.

1.5 What are the Key Topics Reviewed by the Corridor Study?

- Future population growth along the corridor
- Existing choke point at Jenkins Creek in Covington
- Two, at grade, railroad crossings in Kent, especially the Union Pacific line and its close proximity to the SR 167 ramps
- Existing environmental conditions

1.6 What was the Planning Process for the SR 516 Corridor Study?

The study process engaged local jurisdictions and agencies to help identify transportation-related needs and develop, evaluate, and select recommendations. To identify transportation needs the following areas of interest were considered:

- population and employment growth
- where future development is planned to occur
- environmental issues and constraints

- future travel demand and projected deficiencies
- public and local agency input.

The typical planning process is shown in Figure 1-1 and includes the following steps:

Establish a Stakeholders or Corridor Working Group composed of staff from local and regional agencies. The stakeholders provide input on the transportation safety and mobility needs and potential projects for the SR 516 Corridor Planning Study area.

Compile and analyze data regarding existing and projected traffic conditions, existing roadway design compared to current design standards, the surrounding natural and built environment, and future population and employment growth in the area.

Identify needs and potential projects to improve safety and address preservation and mobility needs within the limits of the SR 516 study area.

Evaluate potential projects using criteria based on RCWs, planning policies, and guidelines in the corridor planning study.

Formulate draft recommendations based upon results of evaluation of potential projects.

Stakeholders review the proposed recommendations for the SR 516 Corridor Planning Study.

Issue draft corridor planning study documenting the study process, findings, and proposed recommendations.

WSDOT publishes the SR 516 Corridor Planning Study final report.

Figure 1-1: Typical Corridor Planning Study Process

1.7 State Policies

The study recommendations are consistent with the six investment guidelines set forth in RCW 47.04.280 which states that public investments in transportation should support achievement of the following six policy goals:

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

The recommended improvements are also consistent with RCW 47.06.050, which requires that WSDOT first assess strategies to enhance operational efficiency of the existing system before expanding the system. Strategies to improve operational efficiencies include transportation systems management in the form of signal timing optimization. Transportation demand management strategies are also included.

Moving Washington:
Moving Washington is WSDOT's framework for making decisions for transportation investments that focus on keeping people and goods moving and supporting a healthy economy, environment, and communities. This framework is anchored by the Department's highest priority: maintaining and preserving the safe and long-lasting performance of existing infrastructure, facilities and services. This is the heart of Moving Washington and the primary target of the Department's investments.

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

Following is a brief description of the Moving Washington strategies.

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

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

Washington Transportation Plan

The 2007-2026 Washington Transportation Plan (WTP) is the long range, multimodal transportation plan for the state.

The WTP covers all modes in the transportation system and is required by state and federal law. The current plan covers the period from 2007-2026. Because the plan projects nearly $38 billion in unfunded needs, it has established guiding principles for investments in current and future facilities. The guiding principles in the WTP largely reflect the policy goals adopted by the State Legislature in RCW 47.04.280 (see discussion on previous page under "Transportation Policy Goals"). According to the 2007-2026 Washington Transportation Plan, current law funding for the 20-year WTP period provides approximately $29 billion for transportation projects, including the 2003 Nickel Package and the 2005 Transportation Partnership Act (TPA).

WSDOT Highway System Plan

The Washington State Highway System Plan (HSP) is the state highway component of the Washington State Multimodal Transportation Plan (SMTP). The SMTP is the state's overall transportation plan that includes facilities the state owns and operates and those in which the state has an interest. The HSP is updated every two years and serves as the basis for the six-year highway program, the two-year biennial budget request to the state legislature, and the ten-year Capital Improvement and Preser-vation Program. The HSP update is

accomplished through the coordination and integration of specific components from many corridor plans state wide. The HSP is also aligned to the Washington Transportation Plan (WTP), which outlines the policies adopted by the Washington State Transportation Commission. The SR 516 Corridor Plan advances and refines recommendations within the WSDOT HSP by providing a more in-depth analysis of current and future needs along this specific corridor.

WSDOT's goal is to create a long-range plan that provides decision-makers with the most cost-effective strategies to maintain the state wide transportation system's integrity, safety, and user mobility. This is accomplished through a continual system-wide performance measuring and monitoring program, where WSDOT collects and analyzes data to determine current and future performance of the highway system. Assets that do not meet established performance threshold criteria are identified as needs. WSDOT develops cost-effective strategies, based on analysis of performance outcomes and best management practices (both national and international), to provide high benefit solutions for identified needs. WSDOT's policy, Moving Washington, aims first to keep the transportation system safe, maintain and preserve the system, and improve the operating efficiency of the existing highway system before considering strategically adding capacity.

The funding process at WSDOT includes four major programs: Maintenance, Operations, Preservation, and Improvement. Operational, maintenance and preservation schedules were evaluated for the study segment prior to looking into improvement scenarios. The current programs were reviewed, and recent and future work under those categories was considered. Any programmed improvements for the corridor are included within the future traffic analysis for this corridor study. The Operations, Maintenance and Preservation program develops projects that are prioritized by WSDOT using analytic processes that maximize benefit for the funding available. The Improvement funding program at WSDOT has five subprograms: Highway Mobility (I-1), Highway Safety (I-2), Economic Initiatives (I-3), Environmental Retrofit (I-4), and Public/Private Partnerships. Projects requiring funding within the programs are identified and included in the HSP. Apart from highway funding programs, some other important aspects of the corridor transportation system such as demand management, transit, and local roads are funded through other programs like regional mobility grants, vanpool investment program grants, safe route to schools, and others.

There are no SR 516 projects listed in the 2007-2026 HSP.

WSDOT Programming and Prioritization Process

The Washington State Department of Transportation has a process for prioritizing projects to ensure that taxpayers get the most value for the dollars spent. This prioritization process is spelled out in the Revised Code of Washington (RCW 47.05). A simplified explanation of this process includes the following steps:

1. Identify a problem or deficiency
2. Explore possible solutions
3. Develop a scope for the project, which takes into consideration possible environmental impacts, roadway design issues, and stakeholder concerns
4. Based on the project scope, develop a cost estimate or estimated range
5. Determine the benefit the project will provide
6. Compare the costs and benefits of this project with other projects of its type to determine its order of rank and priority.

1.8 Consistency with Other Plans

The planning of a state owned transportation facility must include coordination with all the affected users and participants. As such, the SR 516 CPS has reviewed and considered local and regional plans in the process of creating this planning document.

Regional Plans

Vision 2040

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

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

Transportation 2040

Transportation 2040 is the region's 30-year transportation plan that will assist Puget Sound in moving forward by making transportation decisions and investments that move the region in the direction of sustainability, mobility, and environmental responsibility. Transportation 2040 is the current transportation plan adopted by PSRC. This regional plan focuses on the transportation system investments needed to provide an integrated, multimodal transportation system in the Central Puget Sound. For transportation projects to receive federal funding, they must be consistent with and included in this regional transportation plan. The regional plan incorporates several options for managing congestion and sustaining mobility into the future. These options are in general agreement with Moving Washington and include; land use planning, managing system demand, transportation system management and operations, and finally, strategic ca-pacity expansion. Specific capacity improvements within the plan include the following listed projects, sponsor, estimated cost, current status, and a brief description of the project:

KENT
Willis St grade (RR) separations – SR 167 to Central Ave. / Kent sponsored / $81,000,000 estimated cost
Description – Provides a critical, grade-separated link through the commercial/ industrial/central area of Kent. Links the valley warehouse/industrial center to SR 167 and I-5.
(Note – Willis Street is the local name for SR 516. This project includes both Union Pacific & BNSF railroad line grade separations. The status of this project is "candidate" which means it is included within PSRC's constrained plan, but not yet approved for right of way or construction funding.)

COVINGTON
SR 516 – Jenkins Creek to 185th Pl. / Covington sponsored / $13,000,000 estimated cost
Description – This project is to widen and reconstruct a portion of SR 516 (SE 272nd St) between Jenkins Creek and 185th Place SE. This project will include the crossing of Jenkins Creek with a new structure for the stream, widening the street from 2-lanes to 5-lanes including curb and gutter, 8' sidewalks, access control features, landscaping and provisions for u-turns.
(Note – The city of Covington has received some funding for, and is currently working on portions of the design for this project. They are actively seeking additional funding for its com-pletion. The status of this project is "candidate" which means it is included within PSRC's constrained plan, but not yet approved for right of way or construction funding.)

MAPLE VALLEY
SR 516 – 213th Pl SE to SR 169 / Maple Valley sponsored / $4,000,000 estimated cost
Description – Widening from 2 to 4 lanes, center turn lane/ left turn pockets, bike lanes and sidewalks (from 213th SE to SR 169).
(Note – This project may be modified to match the updated version of Maple Valley's comprehensive plan seen below. The status of this project is "unprogrammed" which means it is not yet admitted to PSRC's constrained plan, and only eligible for study funding.)

Visit the following websites for more information on Vision 2040 and Transportation 2040:

http://psrc.org/growth/vision2040
http://psrc.org/transportation/t2040

In general, the HSP and T-2040 are consistent. Differences occur primarily due to the time span being considered (20 years for the HSP versus 30 years for the T-2040). The updated edition of the HSP will contain all projects on state facilities listed in T-2040, with those not within the 20 year timeframe of the HSP listed as unprogrammed (unfunded) regional plans and projects.

Local Comprehensive and Transportation Plans

Local planning serves to emphasize the anticipated needs of the population located closest to the study area. Local plans include the Transportation Element within the Comprehensive Plan as well as a Transportation Improvement Plan (TIP). Each jurisdiction's planning documents serve as a tool that helps guide their growth, as well as a reference to adjoining jurisdictions and service providers (such as WSDOT) of what the different city's goals are.

The city of Covington's transportation element includes the following projects within their 20 year horizon (December 2009 Comprehensive Plan).

Table 1-1: Covington Transportation Plan List of SR 516 Projects (Unfunded)

Street	Limits	Description
SE 272nd St (SR 516)	SE Wax Rd. to 192nd Avenue SE	Add 2 Through Lanes, Turn lanes, Sidewalks and median
SE 272nd St (SR 516)	160th Ave SE to 164th Ave SE	Add 2 Right Turn Lanes, Bike Lanes, Sidewalks

In October of 2011, the city of Maple Valley updated the transportation element of its comprehensive plan. The following is a copy of the city's current plan related to projects involving SR 516:

Table 1-2: Maple Valley Transportation Plan List of SR 516 Projects (Unfunded)

SR 516 Improvements (SE Kent-Kangley Road)		
Location	**Description**	**Estimate in $1,000**
SR 516 (213th Ave SE to 218th Ave SE) Phase A	Widen to 3 lanes. Add EBR turn lane at 216th Ave SE intersection. Install new curb, gutter, bike lane, and sidewalk on the north side for the entire length and the south side west of 216th Ave SE.	$4,600
SR 516 207th Ave SE to 216th Ave SE) Phase B	Construct second EB lane on SR 516 from west city limit to 216th Ave SE. Construct second WB lane on SR 516 from 1,000 ft east of 216th Ave SE to west city limit. Include curb, gutter, bike lanes, and sidewalks. Provide center left turn lane/ pockets where warranted. Improve 216th Ave SE intersection.	$4,320
SR 516 (218th Ave SE to 228th Ave SE) Phase C	Widen to 3 lanes. Install new curb, gutter, bike lane, and sidewalk on the south side for the entire length and the north side west of Witte Road. Con-struct center left turn lane/pockets, where warranted. Construct NB right-turn lane. Left-turn signal pockets and signal phasing provided at each approach.	$4,860
SR 516 (228th Ave SE to 236th Pl SE) Phase D	Widen to 3 lanes. Install new curb, gutter, bike lane, and sidewalk on both sides. Construct center left-turn lane/ pockets, where warranted.	$3,870

1.9 History of SR 516

In 1937, the Secondary State Highway (SSH) 5A was added to the state highway system of Washington. This route began at a junction with the Maple Valley branch of Public State Highway (PSH) 5 (now SR 169) at Summit, (now the Four Corners area in Maple Valley), and headed west via Kent to a junction with PSH 1 (now SR 99) at Midway. Another segment, SSH 1K, was a highway between Des Moines and I-5. In 1964, SSH 1K and SSH 5A combined and became SR 516.

Current day SR 516 starts at SR509 at the intersection of Marine View Dr and Kent-Des Moines Rd in Downtown Des Moines. SR 516 heads east, crossing SR 99/Pacific Hwy S and I-5 at Midway. Since April 1, 1992, SR 509 has shared the same roadway with SR 516 from Downtown Des Moines to SR 99. This section of highway is only posted as SR 516, however. Continuing east, SR 516 descends into the Green River Valley and goes through Kent, connecting to SR 181 and SR 167. Originally, SR 516 passed through Downtown Kent. The highway was upgraded to a 4 lane divided expressway from I-5 to W Meeker St and a new expressway was built from W Meeker to SR 167 in the 1980s. This allowed SR 516 to skirt the south and east sides of downtown Kent. Continuing easterly from downtown Kent, SR 516 climbs back out of the Green River Valley. At the top of the hill, SR 516 intersects with SR 515. SR 516 continues easterly along the Kent-Kangley Rd., intersects with SR 18 at Covington, and ends at SR 169 in Maple Valley. The Kent-Kangley Rd continues to the east as a city street/county road to Kangley. Today, SR 516 is 16.49 miles long.

CHAPTER 2

The Study Process and Methodology

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CHAPTER 2: THE STUDY PROCESS AND METHODOLOGY

The study process consisted of collecting data about the study corridor. The general corridor vicinity data included current and future land uses, anticipated population growth, local traffic systems, long range local plans, and transit service. Specific highway data collected included maintenance, preservation, safety, environmental, and mobility conditions associated with the facility. In keeping with Moving Washington, WSDOT's principles for making reliable, responsible and sustainable decisions; maintenance, safety, and preservation practices and procedures were examined first. Then the corridor is studied to determine if there are operational changes that will make the existing corridor operate more efficiently. Next, strategies are looked at to determine if demand for the available capacity can be managed better. Finally, travel demand modeling is then applied to determine if any capacity improvements may be justified. The current conditions are entered into a model which forecasts a future conditions scenario utilizing local and regional long range plans as well as any recommendations and expected benefits derived from the earlier work. The model helps to determine if mobility needs will exist and when they may be expected. If justified, strategic capacity modifications to the transportation network are then considered and recommended. In making any recommendation, environmental issues, costs, local interest, risks, and other factors are considered as an integral part of the identification of needs process.

The public participation process used in developing the SR 516 Corridor Plan consisted of a Corridor Working Group (CWG) comprised of interested stakeholder jurisdictions along the study corridor. The CWG members represented their community's and elected officials perspectives and interests on issues facing the study corridor. A project website [www.wsdot.wa.gov/planning/Studies/SR516Corridor] was developed to inform the public of the study's progress. Communication with the public was accomplished using the website and distribution to the stakeholder jurisdictions of an information sheet with website and contact information. The Muckleshoot and Yakama tribes were invited to participate in the study, as well as local, county, state, and federal elected officials representing the affected jurisdictions.

2.1 Stakeholder Involvement

Early in the corridor planning process, the Washington State Department of Transportation (WSDOT) staff met with or contacted various parties to inform them of the up-coming study and obtain their input about transportation issues along the corridor. The parties

contacted by WSDOT were: the cities of Black Diamond, Covington, Kent, and Maple Valley; King County Metro, Puget Sound Regional Council, Sound Transit, Yakama Tribe, Muckleshoot Tribe, Cascade Bicycle Club, Middle Green River Coalition, and elected representatives.

These outreach efforts were made to publicize the study and engage individuals with a strong interest in transportation issues to represent their jurisdictions or agencies on the Corridor Working Group (CWG) committee. The CWG acted as both a focus and advisory group that helped build the vision for the corridor, generate solutions for corridor improvements, consider community opinion, and support the recommendations to be included in the final plan.

The CWG members' understanding and appreciation of the transportation issues regarding their particular areas of interest were an important component in informing WSDOT staff of local transportation issues and developing recommendations inclusive of their diverse interests.

2.1.1 Corridor Working Group Membership and Meetings

The CWG represented the communities along and near the corridor. The consistent attendance and commitment on the part of the CWG members was a crucial factor in the success of the study. The committee met three times between September 2010 and November 2011. The corridor working group consisted of the following members:

City of Black Diamond
City of Covington
City of Kent
City of Maple Valley
King County Metro
Puget Sound Regional Council
WSDOT

Formal CWG meetings were held on September 27, 2010; June 16, 2011; and November 16, 2011 at Covington City Hall. There were a number of more informal meetings with individual members as well as multiple phone and e-mail communications.

2.2 Study Methodologies

The study methodologies set the parameters that were used to analyze the performance of the corridor and determine if safety, maintenance, preservation, environmental, and/or operational issues existed along the corridor. The results helped guide the creation of a plan that includes a list of near (first six years), middle (second six years), and long-term (eight years more) needs and possible recommendations addressing existing and future issues along this route, consistent with the plan vision and Moving Washington. In cases of longer term needs, specific recommendations as to the best way to address those needs are not given. The purpose of this strategy is to provide flexibility in determining a solution and allow future technologies and approaches to be considered and utilized if appropriate.

The study area for the traffic analysis includes SR 516 from SR 167 (State Route Mile Post SRMP 4.65) east to the SR 169 intersection in Maple Valley, (SRMP 16.22) for a total of 11.57 miles. The study corridor is within the cities of Kent, Covington and Maple Valley; but the travel demand forecasts were done for a larger area covering the cities of Kent, Covington, Maple Valley and Black Diamond. Figure 2-1 presents the SR 516 corridor section that was analyzed for the study.

A total of 26 intersections were analyzed on this corridor. These intersections were identified by the CWG as being the most critical to the corridor's operation. All of the intersections analyzed were signalized. Figure 2-2 shows the study intersection locations. Intersections were chosen based on demand, consultations with various WSDOT traffic and engineering divisions, and with the Corridor Working Group.

The analysis years were 2009 for current conditions (due to availability of data); 2016, 2022, and 2030 for future conditions. Both AM and PM peaks (rush hours) were modeled for the analysis.

Figure 2-1: Corridor Study Limits

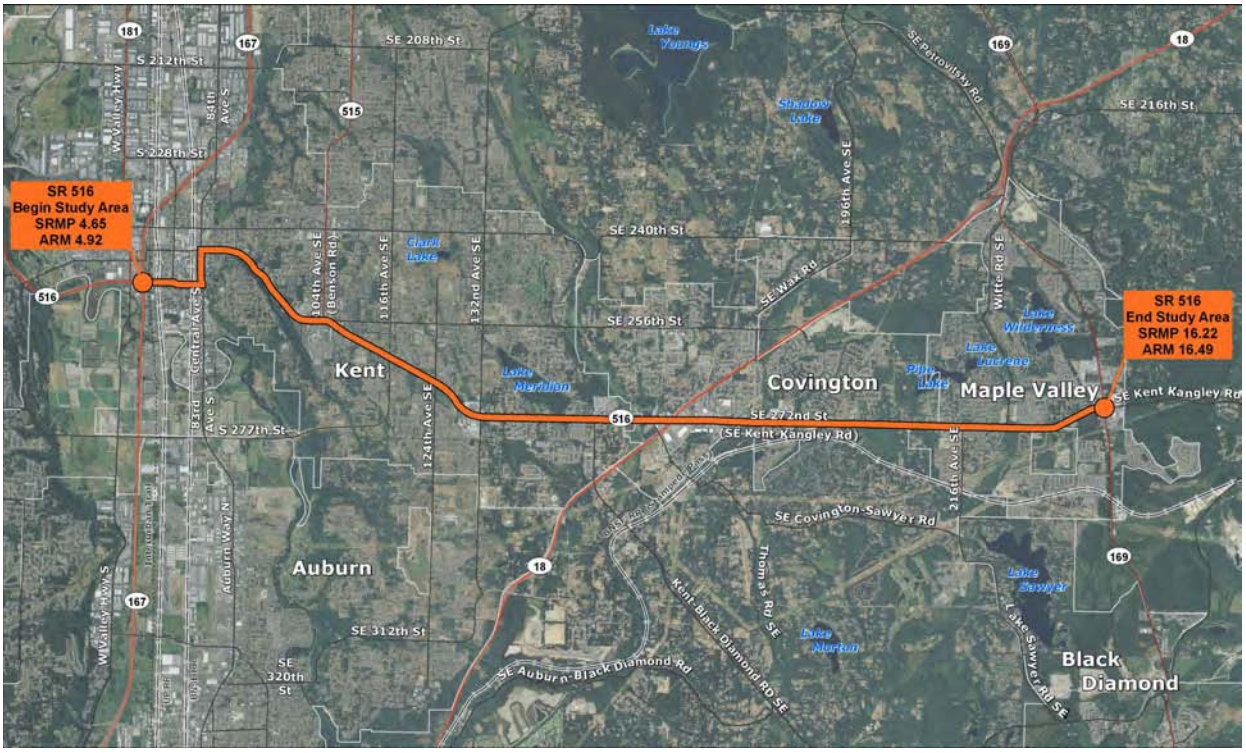


Figure 2-2: Intersections Analyzed

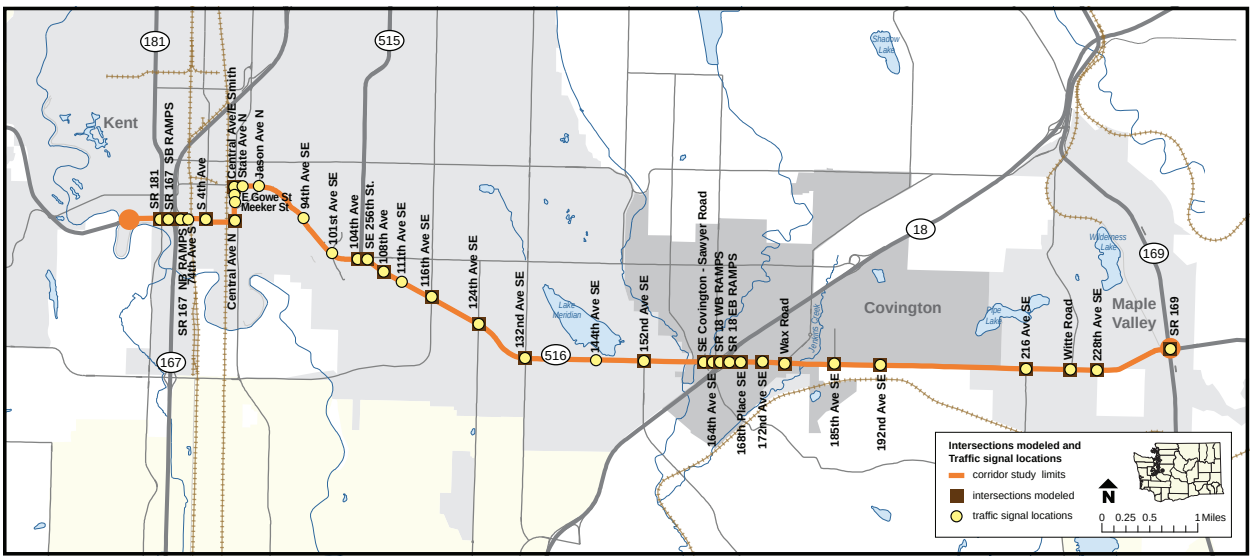


Table 2-1: Intersection Locations

Int. #	SR 516 Corridor Study Intersections	
	MP	LOCATION
1	4.52	SR 181
2	4.66	SR 167 SB RAMPS
3	4.72	SR 167 NB RAMPS
4	4.98	S 4th Ave
5	5.30	Central Ave N
6	5.68	Central Ave/E Smith
7	7.34	104th Ave
8	7.40	SE 256th St.
9	7.62	108th Ave
10	8.18	116th Ave SE
11	8.73	124th Ave SE
12	9.38	132nd Ave SE
13	10.61	152nd Ave SE
14	11.26	SE Covington - Sawyer Road
15	11.37	164th Ave SE
16	11.42	SR 18 WB RAMPS
17	11.51	SR 18 EB RAMPS
18	11.65	168th Place SE
19	11.87	172nd Ave SE
20	12.10	Wax Road
21	12.66	185th Ave SE
22	13.11	192nd Ave SE
23	14.63	216th Ave SE
24	15.10	Witte Road
25	15.38	228th Ave SE
26	16.22	SR 169

2.2.1 Travel Demand Forecast

The travel demand forecasts from the Puget Sound Regional Council's (PSRC) regional travel demand model were used, incorporating data from the Kent and Maple Valley traffic models. The zone structure in the PSRC model is larger than the Kent and Maple Valley models. That is, it looks at the trends of growth and land use from a more regional perspective. The land use used in the city models as input was compared with the PSRC land use model for reasonability for the years modeled. The Kent and Maple Valley models have a finer zone system and better land use distribution information around the more immediate corridor. Using PSRC's model, in conjunction with the Kent and Maple Valley models, provides both a look at the AM and PM conditions, and the most realistic projections for the corridor's future condition.

The combination of the city traffic models' datasets and PSRC's traffic demand model were used to forecast growth factors for the intersections and individual segments on this corridor. The 2016, 2022, and 2030 baseline roadway networks were assumed and modeled to have existing facilities plus road improvement projects that were actually funded. The comprehensive land use plans and transportation improvement programs (TIPs) for the cities of Kent, Covington, and Maple Valley, as well as for King County and WSDOT were used to identify funded projects. As agreed to with the CWG, unfunded projects were considered but not factored into the traffic model analysis. Kent and Maple Valley models forecast demand for the PM peak hour only. The PSRC model was used to estimate AM growth factors. The roadway segments in the study corridor were analyzed using SYNCHRO and SIMTRAFFIC simulation modeling software packages and HCM methodologies. The methods and assumptions are included in Appendix D, Traffic Analysis.

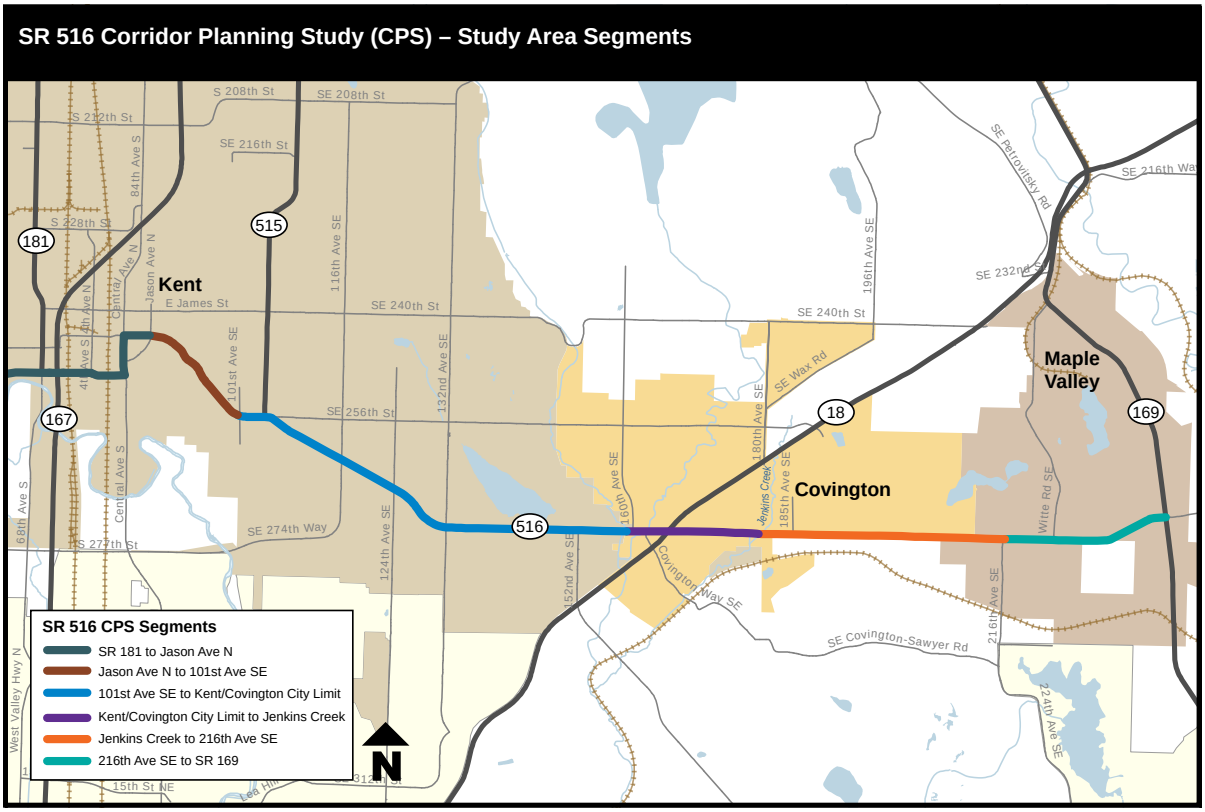
2.2.2 Identification of Potential Operational Issues

Mobility performance measures were established to set a benchmark for establishing potential operational issues along the corridor. Various performance measures to evaluate the corridor are shown below:

- Level of Service at intersections
- Operating speed on segments in future with and without correction measures
- Delay by approach (and movement where necessary) for each intersection
- HCM Corridor LOS by segment
- Vehicle Miles Traveled (VMT) by segment
- Maximum throughput for each segment – before and after comparison
- Travel time on various segments of the corridor

Thresholds for mobility needs identification were established by WSDOT using Moving Washington policies instead of design manual standards. The intersection Level of Service (LOS) was evaluated using an LOS below E as the threshold for evaluating an intersection's performance. In addition, delay in seconds by approach and movement was evaluated for reasonableness. SimTraffic, commercial software for simulation models was used to find the travel time for each segment by direction and was used to measure future segment delay with and without proposed improvements. This information was used to calculate future operating speeds on the corridor by segment with and without proposed correction measures. Segment performance was determined by looking at the operating speeds on the corridor and comparing that to a standard of 70% of posted speed. Segments operating below 70% of posted speed during peak conditions were considered a need and became a prospective candidate for further study. The analyzed segments can be seen in Figure 2-3.

Figure 2-3: Study Segments Used for Analysis



While the thresholds were important to establish a baseline for operational issues and subsequent project consideration, they were not the only parameter used to establish a list of needs. Some mobility needs were offset by other factors such as a low return in increased mobility relative to the cost, environmental concerns, lack of local support, and if a recommendation was not deemed as being feasible.

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CHAPTER 3

Existing Route Characteristics & Conditions

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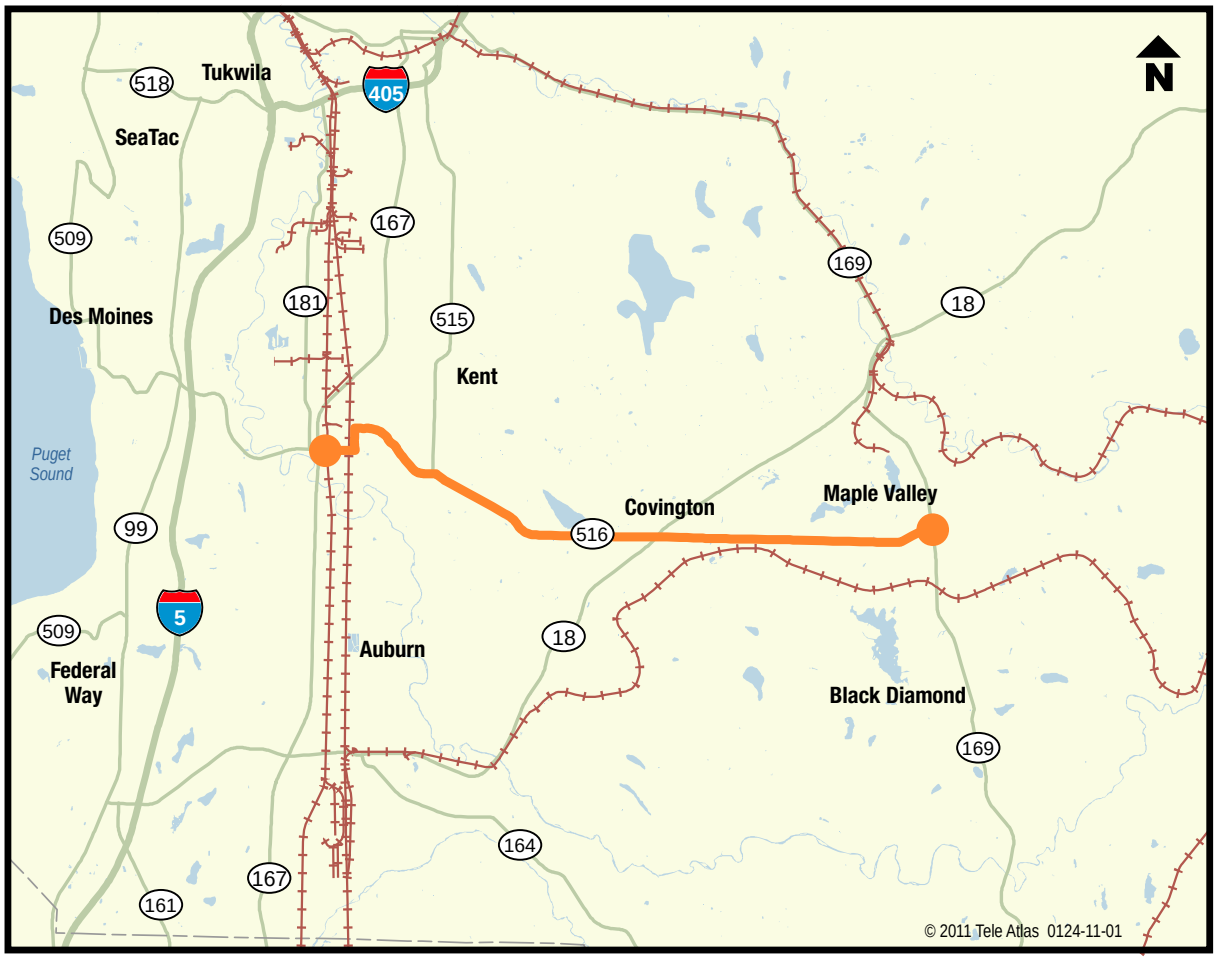
CHAPTER 3: EXISTING ROUTE CHARACTERISTICS AND CONDITIONS

This chapter contains information about the existing conditions and characteristics of SR 516 from SR 167 in Kent to SR 169 in Maple Valley from mile post [SRMP] 4.52 to SRMP 16.22 (see "Study Corridor" map in Figure 3-1.) Traveling east along the study corridor, local names for SR 516 include S Kent Des Moines Road, Willis Street, Central Avenue, E Smith Street, Canyon Drive, SE 256th Street, SE Kent Kangley Road, and SE 272nd Street. The information in this chapter includes the physical and functional characteristics of the corridor, existing roadside and environmental issues, surrounding land use, and traffic operations based on current traffic volumes.

Figure 3-1: Study Corridor Map



3.1 SR 516 and the Transportation Network

SR 516, located in King County, is an east-west arterial that begins at the intersection of SR 509 in Des Moines and ends at SR 169 in Maple Valley, a total of 14.66 miles. The immediate area served by the study corridor (as defined by the legislation –ESSB 6381- that approved funding for the study) is bounded to the west by SR 167 in Kent (immediately to the east of SR 181) and to the east by SR 169 in the city of Maple Valley. The study corridor is used by commuter, local, commercial, recreational, freight, and non-motorized traffic.

There are a number of state highway connections with the study corridor. The westernmost portion of the study corridor (SRMP 4.52) has connections to SR 181 and SR 167. These two connections provide access to I-405 to Renton to the north. The connection to SR 167 provides access to Pierce County to the south, or to SR 18 and I-5. At MP 7.35, SR 516 connects with SR 515 (104th Avenue SE) providing access north to Renton. At the eastern end of the study corridor SR 516 (SRMP 16.22) connects to SR 169, providing access north to Renton and I-405 and south to Enumclaw and Pierce County. SR 516 also passes below SR 18 in Covington at SRMP 11.46 with ramp connections. SR 18 provides southwesterly connections to SR 167 and I-5 in Auburn and northeasterly connections up to and including I-90 in North Bend.

The only parallel local arterial serving east west travel needs for a portion of the length of the study corridor is SE 240th, located about two miles to the north of SR 516. Multiple local arterials feed into and out of the SR 516 study corridor. They include Central Avenue, S 277th St, 132nd Ave SE in Kent, Covington Way, SE Wax Rd in Covington, and 216th Ave SE and Witte Rd SE in Maple Valley.

The Puget Sound Regional Council's (PSRC) Land Use model and census data from 2010 were utilized to provide a snapshot of the corridor's principal uses as well as who is using the corridor. At the western portion, in the Kent area, the corridor serves commercial traffic as well as providing a commuting link to transit and non-transit users located to the east. As one travels east, the corridor is more commuter and local use oriented. The majority of travelers use only a portion of the study corridor to make another connection at an intersecting street or highway so it does not typically serve as a regional throughway, but rather a local use connector.

Census data indicates the area is populated with 28% under 18 years of age, and 9% 65 or older. The population within the study area census tracts is approximately 69% white, 7% African American, 11% Asian, and 10% Hispanic or other. Approximately 9% of the study area population falls below the poverty level. The majority of ethnic minorities, lower

income, and non-English speaking peoples reside in the Kent portion of the study area. PSRC's Coordinated Transit-Human Services Transportation Plan outlines how transit agencies, social service agencies, school districts, and other transportation providers can most efficiently and effectively work together to improve regional mobility for individuals with special transportation needs throughout King, Kitsap, Pierce, and Snohomish counties. The 2011-2014 Coordinated Transit Human Services Plan was adopted by PSRC's General Assembly on May 20, 2010. The plan can be accessed at: www.psrc.org/transportation/special-needs.

Freight

The western terminus of the study area is utilized by a large volume of freight traffic. The rail lines operated by Union Pacific and BNSF carry large quantities of commercial goods, much of which is transferred to trucks for distribution throughout the valley area and other destinations. SR 167 is a primary freight route for the state. The eastern end of the study corridor, while carrying less total tonnage than the western end, does support resource based truck traffic. The 2011 WSDOT Freight and Goods Transportation System lists the entire 14.66 mile long SR 516 study corridor as T-2, with an annual tonnage amount of 4,650,000, and an average daily truck volume of 1,600 vehicles. The study corridor has at grade crossings with two rail lines, Union Pacific and BNSF. Both crossings are located at the western end of the study corridor.

Bike Facilities

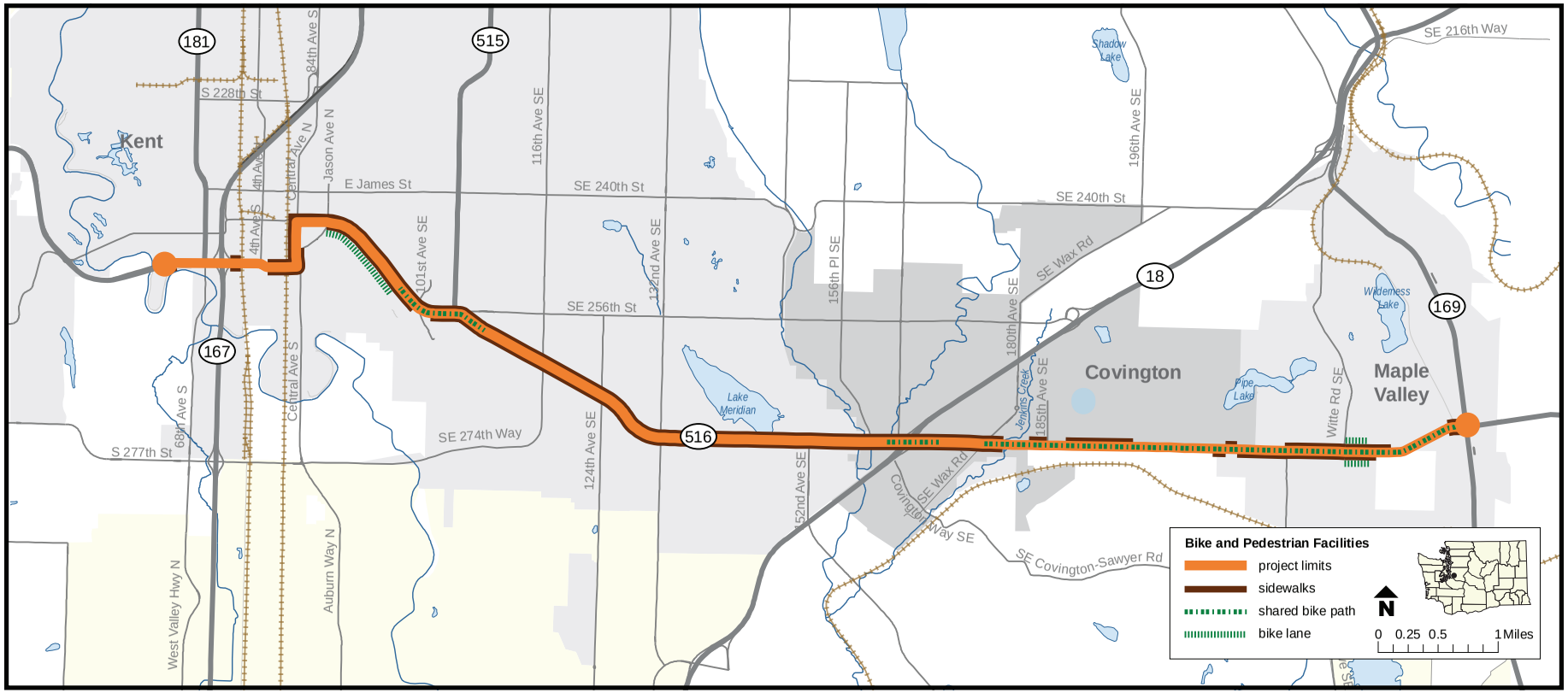
There are few designated bike lanes located along the study corridor. The city of Covington's Parks, Recreation & Open Space Plan shows the segment of SR 516 as a shared roadway from SE Wax Rd to SR 169. In Kent, between Jason Avenue and 252nd street (SRMP 5.95 to 6.72), there is a designated five foot bike lane on the south side of the highway intended for easterly (uphill) bike traffic. Between Witte Road and 228th Ave SE in Maple Valley (SRMP 15.10 to 15.38), there is a designated five foot bike lane on both sides of the roadway. The King County bicycle guide map shows a shared roadway designation between SE 256th and 108th SE, Covington Way SE to 164th Ave SE, and SE Wax Rd to SR 169.

Pedestrian Facilities-Sidewalks

South side

Starting at SR 167 in Kent and traveling east, sidewalks are present on the south side of the roadway from the NBND SR 167 off-ramp to the RR crossing (SRMP 4.72 to 4.78), S 4th Avenue to Jason Ave/Titus St (SRMP 4.93 to 5.95), about 150 feet east of Jason Ave/ Titus St to 97th Pl S (SRMP 5.98 to 6.91), 101st Avenue SE to Jenkins Creek in Covington

Figure 3-2: Sidewalk and Bicycle Facility Locations



(SRMP 7.13 to 12.24), 207th Ave SE to 208th Ave SE (SRMP 14.10 to 14.11), 211th Ave SE to 216th Ave SE (SRMP 14.34 to 14.63), about 450 feet to the west of 228th SE to about 10 feet east of 228th SE (SRMP 15.30 to 15.39), and the last 850 feet of the highway to SR 169 (SRMP 16.05 to 16.22).

North side
Sidewalk locations are from the NBND SR 167 on ramp to the UPRR crossing (SRMP 4.72 to 4.80), S 4th Ave to the west bank of Jenkins Creek (SRMP 4.97 to 12.29), about 370 feet west of the shopping center entrance to 185th Ave SE (SRMP 12.45 to 12.67), 186th Ave SE to Cedar Heights JHS (SRMP 12.75 to 13.37) about 130 feet at a bus pullout (SRMP 14.16 to 14.18), Witte Rd to about 700 feet east of 228th Ave SE, (SRMP 15.09 to 15.52) and the last 850 feet of the highway to SR 169 in Maple Valley (SRMP 16.05 to 16.22). See figure 3-2 for actual locations of bicycle and sidewalk facilities.

3.2 Functional Characteristics of the Highway

Highway functions and operations are categorized by classifications. The information under the subheadings below provides an overview of the functional characteristics of the Study Corridor. Appendix A, Highway Classifications, contains general information about these classification systems and their relationship to funding and operations.

3.2.1 SR 516 Classifications

Highway classifications determine the design standards required for route improvements, and affect the funding mechanisms controlling the improvements that can take place on the highway. Table 3-1 summarizes the classification status of the highway.

Table 3-1: SR 516 Classifications

Classification System	Current Classification of SR 516 SRMP 4.52 to SRMP 16.22
Federal Functional Class	U12 - Urban other freeway/expressway MP 4.52 to MP 4.99 U14 - Urban principal arterial MP 4.99 to MP 11.45 U16 - Urban minor arterial MP 11.45 to MP 16.22
State Functional Class	U1 Urban principal arterial MP 4.55 to MP 11.45 U2 Urban minor arterial MP 11.45 to MP 16.22
Highways of Statewide Significance (HSS)	Not HSS
National Highway System (NHS)	Not HSS
*Freight and Goods Trans. System (FGTS) Status	T2 – 4,000 to 10,000 tons annually MP 4.52 to MP 16.22
Scenic/Recreational	Not a Scenic Byway
Terrain	Level MP 4.52 to MP 5.68 Rolling MP 5.68 to MP 16.22

* *2011 WSDOT Freight & Goods Transportation System (FGTS) Update*

3.2.2 Access Classification

Access management is used to maintain the capacity and safety of a state highway. The objective is to control the disruptions to through traffic caused by vehicles entering and exiting the highway. National studies have shown that roadways with fewer driveways or access points are safer and capable of moving more cars per hour than roadways with numerous driveways and connecting streets. Managing the access along a highway can help maximize efficiency, reduce "strip" type development, increase safety, and reduce congestion.

There are two types of state highway access control, Limited Access and Managed Access. Limited Access Highways are highways in which the abutting property owner's right of access to the state highway has been purchased by the state, with the result being that the

abutting property owner may or may not have access to the state highway. Limited Access Highways are further defined as Full, Partial, or Modified limited access control.

Managed Access Highways are all of the remaining state highways that are not already limited access highways. Managed Access Highways are highways in which access is regulated by the governmental entity having jurisdiction over the facility. Managed Access Highways are further classified from Class 1, the most restrictive, to Class 5, the least restrictive.

Access is governed by state law, specifically Chapter 47.50 of the Revised Code of Washington (RCW). The Washington State Department of Transportation (WSDOT) has developed Washington Administrative Code (WAC) 468-51 and 468-52 to implement this law. WAC 468-52 establishes five classification categories for non-limited-access highways. The five categories are based on surrounding land uses and highway function. Access spacing objectives are also specified in each highway classification, although these are subject to internal review and adjustment on a case-by-case basis. Driveways that were in place prior to 1991 were grandfathered when the Access Management Law (RCW 47.50) was enacted. Driveways constructed after 1991 or driveway connections to parcels being redeveloped would be subject to regulation. Those parcels where the new construction increases the volume of traffic or changes the type of traffic are required to comply with the access spacing, size and location standards through a permitting process. WSDOT works with the county and the city to ensure that developers comply with the access requirements during the project's SEPA review. WSDOT does not control access within city limits on managed access facilities. Cities are the permitting authority and have the sole responsibility for access approval. WSDOT is the permitting authority in the unincorporated areas. WSDOT access management classification categories are described below in Table 3-2.

Table 3-2: WSDOT Access Classifications

Class	Speed	Volume	Spacing for Approach	Spacing for Intersection	Multilane Median	Notes
1	High	High	1320 ft	1 mile	Median is required	Longer trips - serves regional function.
2	Medium to High	Medium to High	660 ft	0.5 mile	TWLTL* may be substituted if ADT < 20,000	Longer trips. Direct access allowed only if no other alternative.
3	Medium	Medium	330 ft	0.5 mile	TWLTL* may be substituted if ADT < 25,000	Shorter trips. Two-way left turn lane allowed if warranted.
4	Medium	Medium	250 ft	0.5 mile	Median not required	Short trips. Two-way left turn lane is typical here.
5	Low to Medium	Medium to High	125 ft	0.25 mile	Median not required	Short trips. Property access is emphasized.
Partial Control	At-grade intersections are allowed for selected public roads, and approaches for existing private driveways. No commercial approaches allowed. No direct access if alternate public road access is available					
Full Control	Access only through interchanges at selected public roads, rest areas, viewpoints, or weigh stations. All at-grade crossings and private approaches prohibited					
Modified Control	At-grade intersections are allowed for selected public roads, and approaches for existing private driveways. Commercial approaches may be allowed. No direct access if alternate public road access is available					

* *Two-way left turn lane*

SR 516 is designated as both a limited access and managed access highway. WAC 468-52-070 provides for review and modification of access classifications. This study is not recommending any changes to the access classification.

Table 3-3 depicts access classifications for the SR 516 study area by segments.

Table 3-3: SR 516 Access Classifications

Segment mileposts	Description of Study Segment	Existing Access Classification *
4.55-4.98	SR 167 vicinity to S 4th Ave (Kent)	Full
4.98-11.35	S 4th Ave (Kent) to 164th Ave SE (Covington)	M3 (Modified planned**)
11.35-11.56	164th Ave SE to 167th Pl SE (Covington)	Full
11.56-16.22	167th Pl SE (Covington) to SR 169 (Maple Valley)	M3

* *Except for full access control, the city is the permitting authority within incorporated limits.*
** *Modified access is planned for sometime in the future. No access hearing for this section has been held.*

3.2.3 Terrain and Roadside Classifications

The WSDOT's State Highway Log Planning Report (2010) was reviewed to determine the terrain classification for the Study Route. The terrain designation in this report is used in the design process.

The terrain surrounding the study corridor routes are classified as level from SR 167 interchange area to Meeker/Central (SRMP 4.55 to SRMP 5.68) and rolling from Meeker/Central to SR 169 (SRMP 5.68 to SRMP 16.22).

Rolling terrain is usually found in areas where hills and foothills are present and where the slopes rise and fall gently. Occasional steep slopes might cause restriction to horizontal and vertical alignments. This designation refers to the contour of the roadway as it relates to the frequency and steepness of hills and the effect these elements have on truck speed. A rolling designation indicates that trucks slow down frequently.

WSDOT's Unstable Slope Management System collects information about unstable slopes that present potential hazards to the state highway system. There are no listed unstable slopes along the study corridor.

Roadside character, defined in the WSDOT Roadside Classification Log, 2011, is a description of the landscape from the roadway user's perspective; and encompasses the area between the pavement edge and the right of way boundaries. The designations are dynamic, as it changes with permitted development over time. The current roadside designations for the study corridor are as follows:

Table 3-4: Roadside Designations

Segments	SRMP	Classification
SR167 to 74th Ave S	4.53 to 5.03	SEMIURBAN-Kent
74th Ave S to Titus/Jason	5.03 to 5.93	URBAN-Kent
Titus/Jason to 101st Ave SE	5.93 to 7.13	SEMIURBAN-Kent
101st Ave SE to 108th Ave SE	7.13 to 7.63	URBAN-Kent
108th Ave SE to Wax Rd vic.	7.63 to 12.23	SEMIURBAN-Kent, Covington
Wax Rd vic to SR 169	12.23 to 16.23	RURAL

It is WSDOT's policy to protect and restore the roadside character as designated in the Roadside Classification Plan, and to incorporate the plan into regional and route specific planning. All improvement and safety projects that result in disturbance to the roadside require complete restoration to the requirements specified by the roadside classification within the project limits. The roadside restoration of proposed safety and improvement projects fall under Treatment Level 2, which is the basic level of treatment to restore the operational, environmental and visual functions of the roadside. The plan promotes aesthetic harmony and continuity, and advocates the use of native species.

Areas of work falling within wetlands or wetland buffer areas may require additional re-vegetation or habitat management plans as required by the critical areas ordinance of the local jurisdiction in which the work occurs. As specific impacts are calculated during the design phase of individual projects recommended by this study, the local agencies will be consulted regarding the degree and character of re-vegetation required in these areas.

3.3 Land Use Characteristics

The SR 516 study corridor is located within the Urban Growth Areas of Kent, Covington, and Maple Valley. Land uses range from highly commercialized areas in all three city core areas to more suburban residential/rural residential outside the core areas. As stated earlier, the land uses are dynamic and the future development of the surrounding lands can have a major effect on the performance of the transportation system.

The Washington State Growth Management Act (RCW 36.60A) is in effect in King County. It stipulates 14 goals that serve as the guiding principles for land use planning. The comprehensive plan is a tool used to help communities resolve how to balance the

competing interests represented by these goals. King County is part of the Puget Sound Regional Council, and is guided by both its comprehensive plan and the regional growth plan, Vision 2040.

As you travel to the east along the corridor, some of the current land use and development conditions that exist include:

- Largely low-density residential uses
- Small-scale, disbursed commercial areas
- A lack of continuous trails and other bicycle/pedestrian amenities
- Large, low-density residential developments on and near the corridor planned for the future

3.4 Physical Characteristics

The physical characteristics of a corridor provide insights into the types of transportation problems experienced on the route and can be useful for developing the best solutions to those problems. These characteristics relate not only to the roadway itself – geometry, roadway section, horizontal and vertical alignments – but also to the surrounding area considering such elements as right of way and environmental resources.

3.4.1 Geometric Elements

Roadway corridor's alignment, profile and section need to be considered when determining how a route functions and how it might be improved. For this purpose, the latest information from the WSDOT Transportation Data Office (TDO) has been reviewed as part of this study. The most current information about roadway geometry can be obtained from the WSDOT's State Highway Log Planning Report (2010), as well as other TDO data sources. The highway log pertaining to the study section can be found in Appendix B. Other WSDOT records and resources, such as as-built highway plans, are also reviewed for use within this analysis.

Existing Roadway Section

The roadway section refers to the widths of the lanes and shoulders that make up the roadway. In general, the lanes and shoulders that make up the Study Corridor routes meet current WSDOT standards for these elements based on roadway classification and current traffic volumes. Details about SR 516 roadway sections, including types of materials used in the construction of the roadways and shoulders, and existing channelization can be found in Appendix B.

Existing Vertical/Horizontal Alignment
Roadway grades on the Study Corridor routes range between 0% and 7.8% (in Kent). Additional information can be found in Appendix B.

3.4.2 Pavement

WSDOT recently completed the 2011 Pavement Tour which did not identify repaving needs on the study corridor. The SR 516 pavement will be re-evaluated during the 2013 North West Region (NWR) Pavement Tour, (and subsequent pavement tours) and a determination will be made whether the SR 516 pavement conditions warrant being scoped for a future project. It should be noted that NWR has a fairly long list of "past due" pavement projects and that if SR 516 warrants a paving project, it will need to compete and prioritize against the other paving needs for available funding.

The city of Maple Valley has concerns about the condition of the existing pavement between 228th Ave SE and SR 169 (MP 15.4 to MP 16.3). Additional field investigation by WSDOT was requested to better determine the condition of this segment and possible remediation. Subsequently, NWR Maintenance has included SR 516 MP 7.30 to MP 16.20 in the 2011-2013 region crack seal program (excluding MP 11.09 to MP 12.31 which was paved in 2010) and will receive crack seal treatment. Additionally, in coordination with the city, some sections in the westbound lane have been ground out and replaced in 2012. The area will continue to be monitored.

3.4.3 Bridges and Structures

There are two bridges on the SR 516 portion of the study corridor. One bridge is immediately south of Lake Meridian's southern shore. It is actually a half bridge, on the southern side of the road, spanning a storm water detention pond/wetland (SRMP 10.20 to 10.30, bridge #516/014). The second is a full width bridge, spanning Soos Creek (SRMP 11.07 to 11.09, bridge #516/016). An additional four structures span over SR 516 in the study area. They are northbound and southbound SR 167 at SRMP 4.64 and SRMP 4.66 and eastbound and westbound SR 18 at SRMP 11.45).

See Table 3-5 and Figure 3.3 for bridge locations. Both structures on SR 516 mainline have sidewalks on both sides. The bridge inspection schedule is every two years. The following bridge information is based on WSDOT's Highway Road Log and the WSDOT Bridge Office.

None of the bridges within the study corridor is listed as needing repair or replacement.

Table 3-5: Intersection Inventory and Traffic Channelization

State Route	SR 516 Milepost	Stream/Feature Name	Nearest Cross Street	Sufficiency Rating*
516	10.20 to 10.30	Storm water detention pond / wetland (half bridge - Eastbound lane)	Between SE 270th Pl and 148th Ave SE	76.52
516	11.07 to 11.09	Soos Creek (Bridge)	160th Ave SE	92.11
167	4.64	Southbound lanes Overcrossing	SR 167- SR516	91.24
167	4.66	Northbound lanes Overcrossing	SR 167- SR516	89.12
18	11.45	Westbound lanes Overcrossing	SR 18- SR516	94.80
18	11.45	Eastbound lanes Overcrossing	SR 18- SR516	96.83

* *If the value in this column is < 50, the structure needs repair or replacement.*

3.4.4 Intersection Inventory and Traffic Channelization

There are currently 34 traffic signal controlled roadway intersections along the study corridor route. Locations of traffic signals and channelization/refuge areas are in Appendix B, Physical Characteristics.

There are also two rail lines crossing the study corridor. The BNSF Railway crossing is approximately ½ mile east of SR 167 interchange (I/C) area. The Union Pacific crossing is east and adjacent to the SR 167/SR 516 I/C. Both railroad crossings are signalized with automatic gates.

Rail freight schedules can vary by time of day, day of the week, or time of year. Shippers' demands, overall freight traffic levels, ship traffic at the ports, and maintenance work are all factors in scheduling. Typically, the UP will see up to 15 freight trains per day operating on their mainline between Tukwila (Black River Jct.) and Tacoma. The BNSF line is a busier rail line with up to 40 daily freight trains and an additional 28 daily Amtrak & Sounder passenger trains between Seattle and Tacoma operating through Kent.

3.4.5 Right of Way

Existing right of way widths vary from 60 feet to 100 feet along the study corridor route. The right of way width is an important consideration when contemplating improvements that require additional space. Right of way purchase can be a significant cost item, especially in a highly developed area. More details about right of way widths and specific locations are given in Appendix B, Physical Characteristics.

3.4.6 Utilities

Over 200 unique franchise agreements have been identified along the Study Corridor, involving 83 separate companies, 20 individuals and 23 municipalities/departments. A table of franchises is found in Appendix C, Utility Locations. Current listings are maintained at the WSDOT Northwest Region Utilities Office.

3.5 Environmental Overview

Environmental elements described in this corridor plan consist of information collected to identify and document potential environmental issues as part of the transportation study process. The study research identifies known areas of concern, both in the existing right of way (ROW), and adjacent to the ROW. Areas of concern will influence decisions about whether improvements should be considered, what type of improvement would be the most sustainable, and help to give designers of any improvements insight into the conditions they may be working in. Areas of concern outside of the ROW are important to identify and consider when contemplating improvements that require additional space. The environmental information collection helps WSDOT to make informed decisions that are reliable, sustainable, responsible, and sensitive to the areas potentially affected. Specific impacts to environmental elements would be determined, and associated permits obtained, when a project has been funded for design and construction.

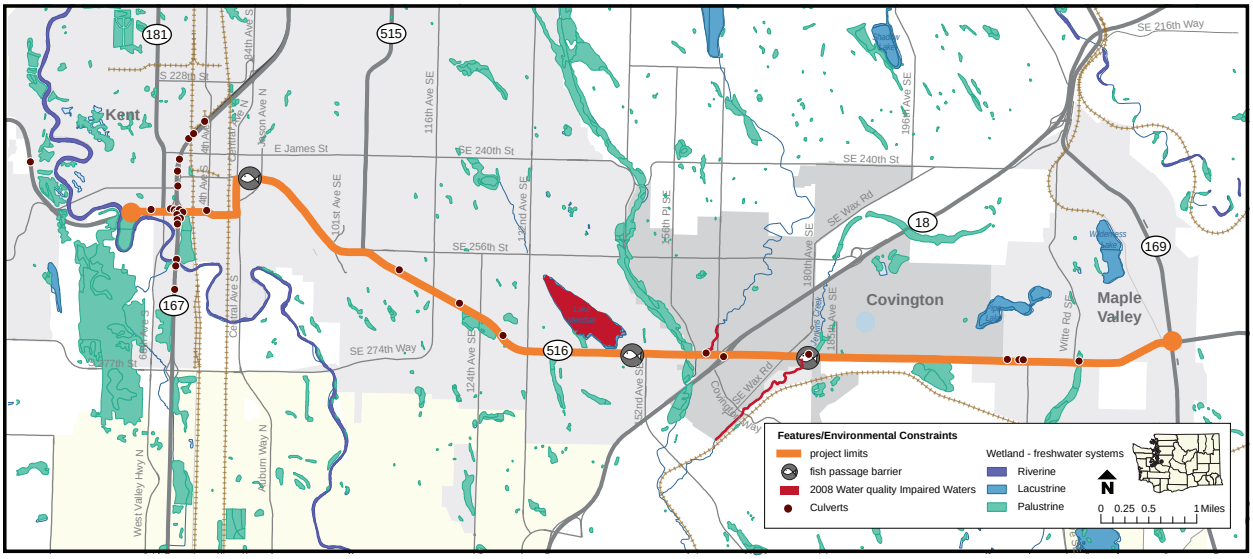
Wetlands

The Department of Natural Resources (DNR) and National Wetlands Inventory (NWI) were used to determine if and where wetlands exist along the study corridor. (Figure 3-3) This determination was used as a preliminary check for selecting possible recommendations and the potential consequences to the wetlands in the area.

If individual projects are chosen and developed from the study recommendations, an in-depth wetland delineation should be completed to determine the full extent of recorded wetlands and potential impacts and mitigations. The area should also be examined to identify other wetlands that may not have been included on the maps. Wetlands should

be avoided if possible when designing roadway improvements. If construction impacts are unavoidable, they should be minimized to the degree practicable, and any unavoidable impacts mitigated according to WSDOT's "no net loss" policy regarding wetland functions and values. Wetland filling along the study segment is regulated by King County, the US Army Corps of Engineers, and the Washington State Department of Ecology through Section 401 of the Clean Water Act.

Figure 3-3: Wetland, Water Quality, and Fish Barrier Locations



Fish Passage Barriers

WSDOT is required to install and maintain all culverts, fishways, and bridges to provide unrestricted fish passage as per Washington law, RCW 77.57.030. Design of fish barrier correction will be based on the latest version of the Washington Department of Fish and Wildlife's (WDFW) Fish Passage Design at Road Culverts manual or its successor. Through use of this design guidance and in coordination with WDFW, it is expected that new highway construction at stream crossings will not result in additional barriers to fish passage.

In 1991, the Washington State Legislature, working with WSDOT and WDFW, organized and implemented a fish passage inventory on Washington State Highways. The purpose of the inventory is to document fish passage problems located at state highway stream crossings to prioritize the correction of these fish passage barriers. The need for repair is based on the potential to gain fish habitat. In general, a barrier requires repair if there is a minimum of 200 meters of functional fish habitat both upstream and downstream.

WSDOT has a goal of evaluating and correcting state highway fish barriers based on a twenty-year system plan. It designates dedicated funding to correct the highest priority fish passage barriers within the Environmental Retrofit Program's Six-Year Plan. Also, as road projects are constructed, additional fish passage barriers are removed whenever Hydraulic Project Approval (HPA) from WDFW is required.

Locations are identified as fish passage barriers by the Salmonid Screening, Habitat Enhancement and Restoration Division of Washington Department of Fish and Wildlife (WDFW). Refer to Table 3-6 for the three fish barrier locations within the study area. Jenkins Creek is the highest ranking fish barrier retrofit of the three locations in the study area, but none of the three have been programmed in the six year state plan for environmental retrofitting.

Table 3-6: Fish Barrier Locations

Existing Fish Passage Barriers	
MP 5.82 Mill Creek	Site ID is 997651 – Partially blocks access to 4,561 square meters (1.13 acres) of upstream habitat
MP 10.58 Big Soos Creek	Site ID is 997670 – Partially blocks access to 3,514 square meters (0.87 acre) of upstream habitat
MP 12.33 Jenkins Creek	Site ID is 990210 – Box culvert that partially blocks access to 18,561 square meters (4.59 acres) of upstream habitat

WSDOT is looking into the concept of coordinating fish barrier replacement on a more watershed-wide basis. That is, coordinating efforts among multiple jurisdictions to remove multiple barriers on a potentially high value fish rearing area. To date, the concept is in its infancy, with a possible pilot program being considered in the Olympic Region of WSDOT.

Wellhead / Aquifer / Watercourse protection

The corridor study segment is located on several wellhead protection zones. The roadway lies within a ten year wellhead protection zone from Alford in Kent to SR 169 in Maple Valley. One year wellhead protection zone areas are located on the corridor between 116th and 119th, 122nd to 133rd, 148th to 158th, 175th to 196th, and from Witte Rd to SR 169. The distinction of the different time periods is an indication of the time it takes for surface water to migrate to the well supply.

The corridor study area is not located over a Sole Source Aquifer or an area identified as an Aquifer Recharge Area of Concern. Between approximately 181st Ave SE and 207th Ave SE in Covington, to the south of the roadway, is a category one Critical Aquifer Recharge Area

(CARA). The GMA defines CARAs as "areas with a critical recharging effect on aquifers used for potable water."

There are three impaired and threatened watercourses near SR 516 which are on the 2008 Water Quality Impaired Waters (303d) list. The first is Little Soos Creek located approximately at 160th Ave SE, another is Lake Meridian, near SE 270th Place, and the third is Jenkins Creek, located near SE Wax Road. See Figure 3-3 above.

Current WSDOT water quality/water quantity treatment practices, as described within WSDOT's Highway Runoff Manual, should be adequate to protect the groundwater supply. Figures 3-4 and 3-5 shows the approximate locations of aquifer recharge areas and wellhead protection zones relative to the study area corridor. Any proposed improvements will need to address the current classifications and requirements during the design phase to improve current conditions or avoid impacting any additional areas.

Figure 3-4: Aquifer Recharge Areas

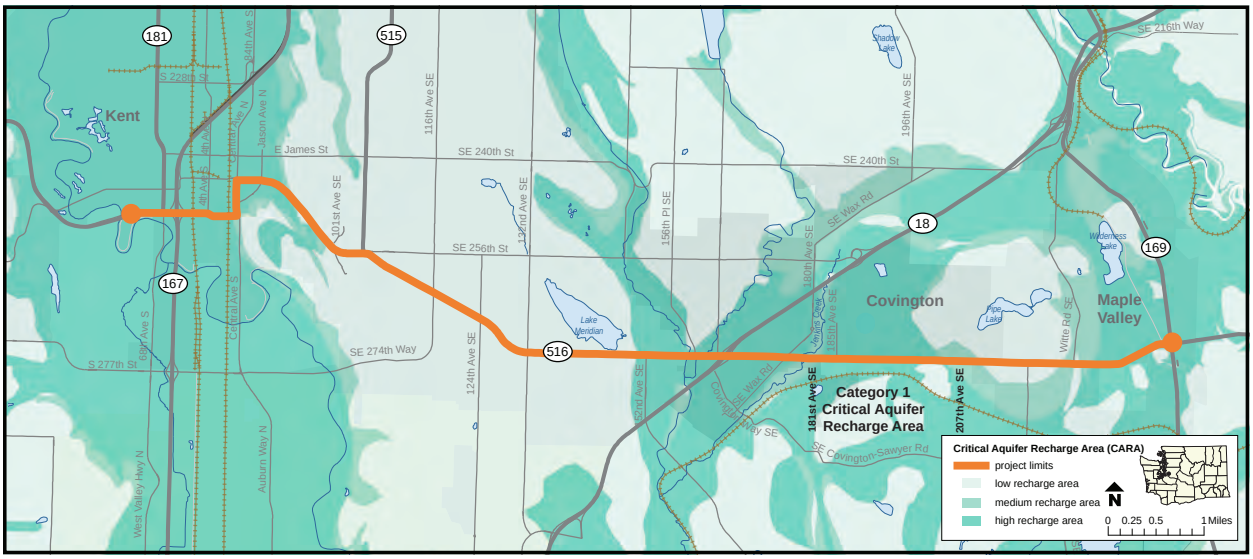
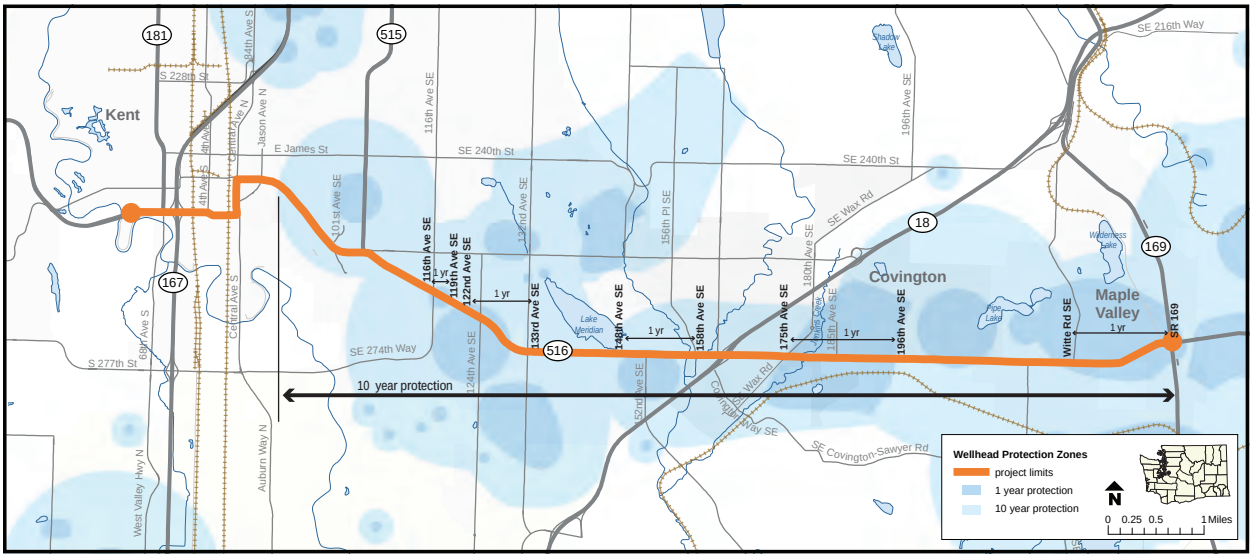


Figure 3-5: Wellhead Protection Areas



Environmental Mitigation

Locating suitable mitigation sites is a high priority for projects that will displace existing wetlands or increase the impervious area represented by the highway. It is generally undesirable to construct mitigation for wetland impacts within highway right of way. Many highway activities, such as guardrail installation, slope flattening, excavation or fill that alters the water table or flow to a wetland, and noise and air impacts on wetland wildlife, could adversely affect an adjacent mitigation site. There is an existing mitigation site located at MP 10.25 which is listed as a storm water detention pond and wetland.

If no other reasonable alternative is available in a particular area, during the design phase of a project, engineering staff should work closely with the staff of the Northwest Region Environmental Services office to determine the extent of unavoidable wetland impacts and to locate an appropriate mitigation site.

Mitigation for increased storm water runoff resulting from the addition of impervious surfacing, such as swales and ponds, can often take place within highway right of way if sufficient area exists. The appropriate level of storm water treatment can be determined using the WSDOT Highway Runoff Manual.

The cost of the construction of wetland mitigation sites and storm water treatment facilities can be considerable, and should be considered when estimating overall project construction costs.

Historical and Cultural Resources

The Washington Heritage Register and the National Register of Historic Places were researched to identify historical properties along the Study Corridor.

During the design phase of any projects recommended by this plan, a cultural resources survey should be conducted in the area of potential effect.

A cultural resources survey may include a literature search to determine if previously documented sites or resources exist in the vicinity, as well as a ground survey to determine the potential for encountering artifacts of an historic or archaeological nature during construction. Results of the survey, and the determination of effects of the construction projects, should be presented for the State Historic Preservation Officer's concurrence.

Two archeological sites have been recorded near the study area. One is in the vicinity of N 1st & 2nd Avenues and W Smith & Temperance Streets. The second is in the vicinity of the southwest quadrant of the SR 516 and SR 169 intersection. The Carnation Milk Factory/Kent Hardware Co at 203 Meeker Street is a property that has been recognized as historically significant. The Department of Archaeology and Historic Preservation staff suggested that they would not expect to find any significant issues or major archeological sites that would impact any proposed solutions on the route. Historic-era resources may be affected throughout the corridor, but the likelihood of delays due to unforeseen cultural resources compliance is not great. Staff further stated that if projects do develop from the plan and federal money is used, a Section 106 review would be required. Also, if state funds are used, a 0505 Executive Order level review would be required.

The Muckleshoot and Yakama Tribes were sent letters in June of 2011, describing the study, outlining the limits of the study area, and asking if they would like to be involved in the corridor study and if they had concerns about any cultural or natural resources being potentially affected by this study. While the tribes had not indicated having a concern at that time, or after a subsequent phone call follow up in April 2012, should any project move forward toward development, further outreach to the tribes should be implemented at the very earliest stages.

Environmental Justice

Environmental justice refers to the inequitable adverse effect of transportation projects on social, economic and health status of minority and low-income populations in a community. One of the goals of WSDOT is to avoid, minimize or mitigate any disproportionate impact to these populations resulting from WSDOT activities in the area. To accomplish this,

information about potential environmental justice communities was gathered using 2010 Census data through the PSRC and the Office of Superintendent of Public Instruction's Washington State Report Card. All census tracts abutting the SR 516 roadway study vicinity were used to compile the following information.

The census data indicated that the study area census tract population is 83,300 with 28% under 18 years of age and 9% are 65 years old or older. Approximately 69% of the proximity population is White, 7% African American, 1% Native American, 11% Asian, 1% Native Hawaiian or Other Pacific Islander, and 11% Hispanic or Latino. Within the city of Kent, several areas of non-English speaking populations exist. The first area along the study corridor, between SR 167 and 94th Ave S, census data indicates there are 5% or more of the population whose primary language is Spanish or Spanish Creole. Between 94th Ave S and 132nd Ave SE there are populations of 5% or more whose primary language is Spanish, Spanish Creole, Slavic, or Russian Slavic.

The Kent and Tahoma school districts reported that 47% and 15% (respectively) of their student body qualified for the federal free or reduced price meals program. As mentioned earlier in this report, PSRC's Coordinated Transit-Human Services Transportation Plan outlines how transit agencies, social service agencies, school districts, and other transportation providers can most efficiently and effectively work together to improve regional mobility for individuals with special transportation needs. The plan can be accessed at: www.psrc.org/transportation/special-needs.

Noise

Transportation projects that construct a highway at a new location, or significantly change the horizontal or vertical alignment of an existing highway or increase the number of through traffic lanes, require evaluation as to whether it is reasonable and feasible to provide mitigation for noise impacts.

During the design phase, any project should be evaluated for potential noise impacts and modeled to predict traffic noise levels if necessary. Although the federal government participates in the majority of costs associated with noise barriers along interstate highways, those that are constructed along smaller state routes like SR 516 are typically funded solely by the state. WSDOT has a cost-benefit criterion, which is applied to determine if a noise barrier is reasonable and feasible.

Air Quality

WSDOT's GIS layer for air quality, information provided by Washington Department of Ecology, was consulted to determine if there are air quality issues in the vicinity of the study corridor. The study corridor is within a former carbon monoxide and one-hour ozone maintenance area, but currently is in attainment for all criteria pollutants. Currently the air quality meets state and federal standards.

Climate Change & Transportation Emissions

Executive Order 07-02, Governor Christine Gregoire's Washington Climate Change Challenge, established the state's commitment to address climate change by reducing greenhouse gas emissions through strategies that reduce the amount of driving and vehicle miles traveled. The recommendations in this corridor planning study address climate change by reinforcing CTR Programs, analysis of bicyclist and pedestrian needs to encourage nonmotorized travel, and inter-agency coordination with transit to encourage access to and use of transit. In 2009, Governor Gregoire issued Executive Order 09- 05, Washington's Leadership on Climate Change, which directs WSDOT to consult and collaborate with the Departments of Ecology and Commerce, local governments and other stakeholders in estimating current and future statewide levels of vehicle miles traveled (VMT); in evaluating potential changes to the VMT benchmarks established in RCW 47.01.440; and in developing additional strategies to reduce greenhouse gas (GHG) emissions from the transportation sector. The Governor's Executive Order (EO) also directs the department to work cooperatively with the four largest metropolitan planning organizations to develop and adopt regional transportation plans that will provide people with additional transportation alternatives, reduce GHGs, and achieve the annual per capita VMT statutory benchmarks. climate change is addressed at the following WSDOT website: www.wsdot.wa.gov/SustainableTransportation/

Climate Change and Greenhouse Gas Emissions (GHG)
Global climate change refers to changes in average temperatures, wind patterns, precipitation, and storms. Gases that trap heat in the atmosphere are often called Greenhouse Gases (GHGs). GHGs are emitted by both natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the Earth's temperature. Emissions from human activities, such as electricity production and vehicle use, have elevated the concentration of GHGs in the atmosphere, leading to higher ambient temperatures and global climate change. Carbon dioxide makes up the larger share of greenhouse gases. In Washington State, the largest single source of carbon emissions is motorized transportation, accounting for an estimated 47 percent of carbon dioxide equivalent emissions statewide. The average passenger vehicle emits about 423 grams of CO2 per mile, or 423 grams per Vehicle Miles Travelled (VMT).

GHG and VMT

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

Executive Order 07-02, Governor Christine Gregoire's Washington Climate Change Challenge, established the state's commitment to address climate change by reducing greenhouse gas emissions through strategies that reduce the amount of driving and vehicle miles traveled. The recommendations in this corridor planning study address climate change by reinforcing CTR Programs, analysis of bicyclist and pedestrian needs to encourage non-motorized travel, and inter-agency coordination with transit to encourage access to and use of transit. In 2009, Governor Gregoire issued Executive Order 09- 05, Washington's Leadership on Climate Change, which directs WSDOT to consult and collaborate with the Departments of Ecology and Commerce, local governments and other stakeholders in estimating current and future statewide levels of vehicle miles traveled (VMT); in evaluating potential changes to the VMT benchmarks established in RCW 47.01.440; and in developing additional strategies to reduce greenhouse gas (GHG) emissions from the transportation sector. The Governor's Executive Order (EO) also directs the department to work cooperatively with the four largest metropolitan planning organizations to develop and adopt regional transportation plans that will provide people with additional transportation alternatives, reduce GHGs, and achieve the annual per capita VMT statutory benchmarks. climate change is addressed at the following WSDOT website: www.wsdot.wa.gov/SustainableTransportation/

Climate Change

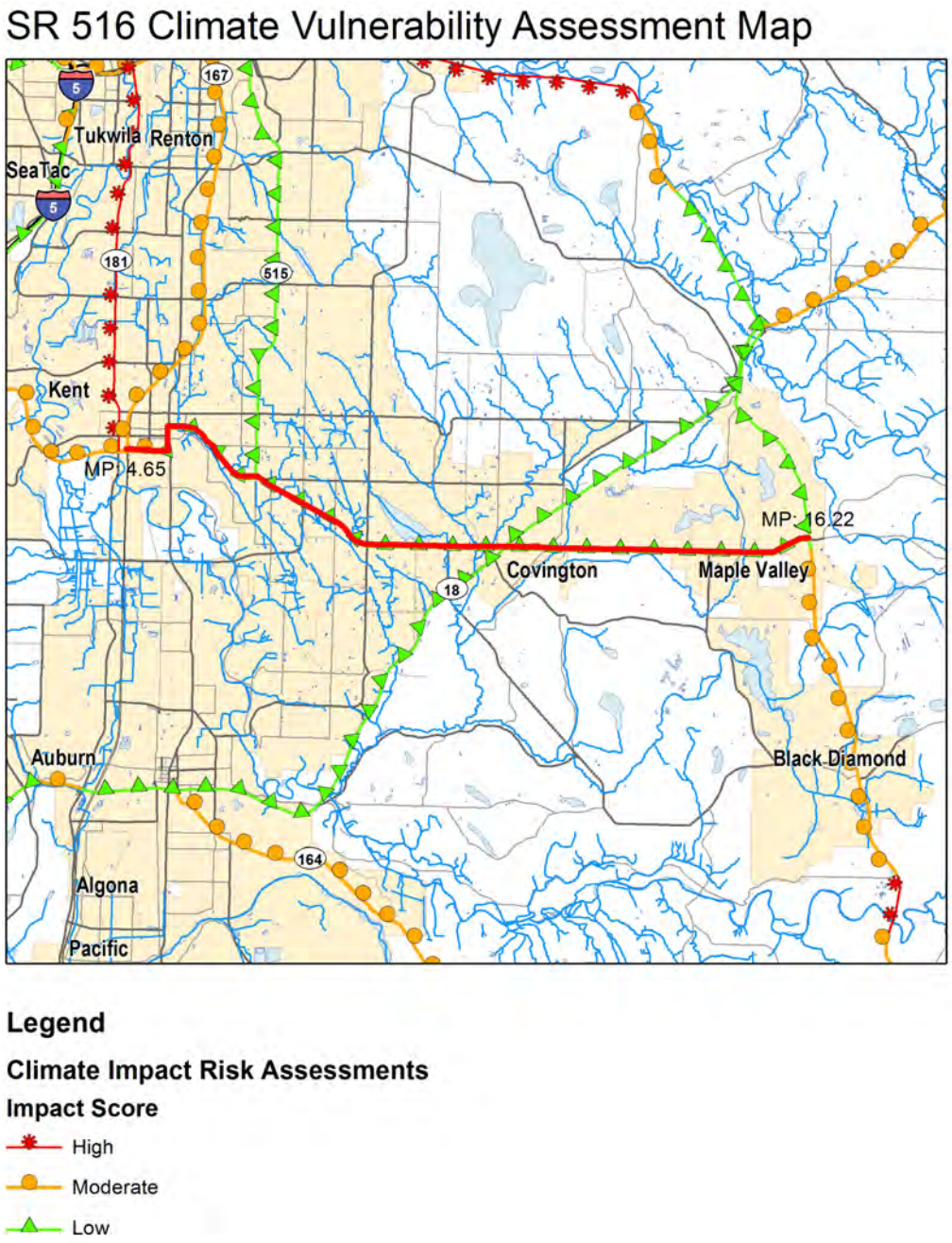
Pacific NW climate projections available from the Climate Impacts Group at the University of Washington show that over the next 50 years Washington State is likely to experience:

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

Climate Change Vulnerability Assessment

In 2011, WSDOT examined climate risks to state transportation assets using data from the University of Washington Climate Impacts Group. WSDOT convened 14 workshops across the state to inventory and assess the possible impact of extreme weather on WSDOT owned and operated facilities. The result was the Climate Impacts Vulnerability Assessment Report, published November, 2011. The planning team incorporated information from the 2011 Climate Change Vulnerability Assessment Report into this corridor planning study. Any improvements should be designed to last far into the future. As a result of our understanding of current weather extremes and future climate conditions, and their possible impact on the transportation system, any plan should incorporate features that will provide greater resilience and function in the event of a projected impact from severe weather conditions brought on by climate change. The segment within the SR 167/SR 516 interchange area and RR crossings has been assessed as having a moderate probability of experiencing climatic weather impacts. The remaining segment of the SR 516 study has been assessed as having a low probability of experiencing climatic weather impacts. No additional features are recommended in this report. If improvements to this corridor move forward, additional study during the design phase should be considered. A graphic showing the potential vulnerabilities is shown on Figure 3-6 below.

Figure 3-6: Climate Vulnerability



Hazardous Materials

The Hazardous Sites List, toxics cleanup program, and the Leaking Underground Storage Tank databases maintained by Washington Department of Ecology were used to determine if there is known potential for encountering hazardous materials during the construction of any proposed improvements to the Study Route. The website can be reviewed at: http://apps.ecy.wa.gov/website/facsite/viewer.htm.

The Leaking Underground Storage Tank database lists several properties on the Study Corridor route. They are; 7-11 by Bridges, Mr. Sudsy Car Wash by Titus St., Chevron Station by 100th Pl SE, East Kent Chevron by 141st Ave SE, Circle K Store by 164th Ave SE, Harris Enterprises by 172nd Ave SE, Junior High 6 by 196th Ave SE, and Maple Valley BP station by SR 169. Before any maintenance work or corridor improvements in these areas, these databases should be reviewed for updated information, and site assessments performed, if warranted.

3.6 Transit

The study corridor area is served by King County Metro transit. The principal route that serves the study corridor is the 168, operating between Kent Station and SR 169. Other routes, such as the 150, 157, and 161 operate along shorter segments, with typical service frequency of about 30 minutes. Routes 157, 158, and 159 are primarily commuter runs travelling from the Lake Meridian P&R to Kent and Seattle in the AM peak and in the reverse direction during the PM peak. Routes 914 and 916 provide Dial-A-Ride Transit (DART) service within the study corridor area. Transit routes provide travel options to employment centers, provide feeder service to Kent Sounder Station and other transit centers, and lifeline service to shopping and service providers.

In the fall of 2009, Route 168 operated hourly on weekdays, along the current routing between Kent and Maple Valley/4 Corners, with weekend service operating hourly as far east as SE 272nd/192nd Ave SE in Covington. Since then, with support from a WSDOT Regional Mobility Grant, route 168 has been significantly upgraded to supply 30 minute service on weekdays, until about 7PM, then hourly until the end of service around midnight and also extend the weekend hourly trips out to 4 Corners for a consistent service pattern. These improvements were implemented in September 2010. Since that time, service on route 168 has been increased approximately forty per cent. Ridership on the route has also increased although by a smaller percentage (14%), going from 434,100 annual rides prior to the change to around 495,100 annual rides at the time of this report. With the size of the service increase, the growth in ridership was better than anticipated. Going forward, ridership on the route is likely to continue to grow. The current grant funding expires in

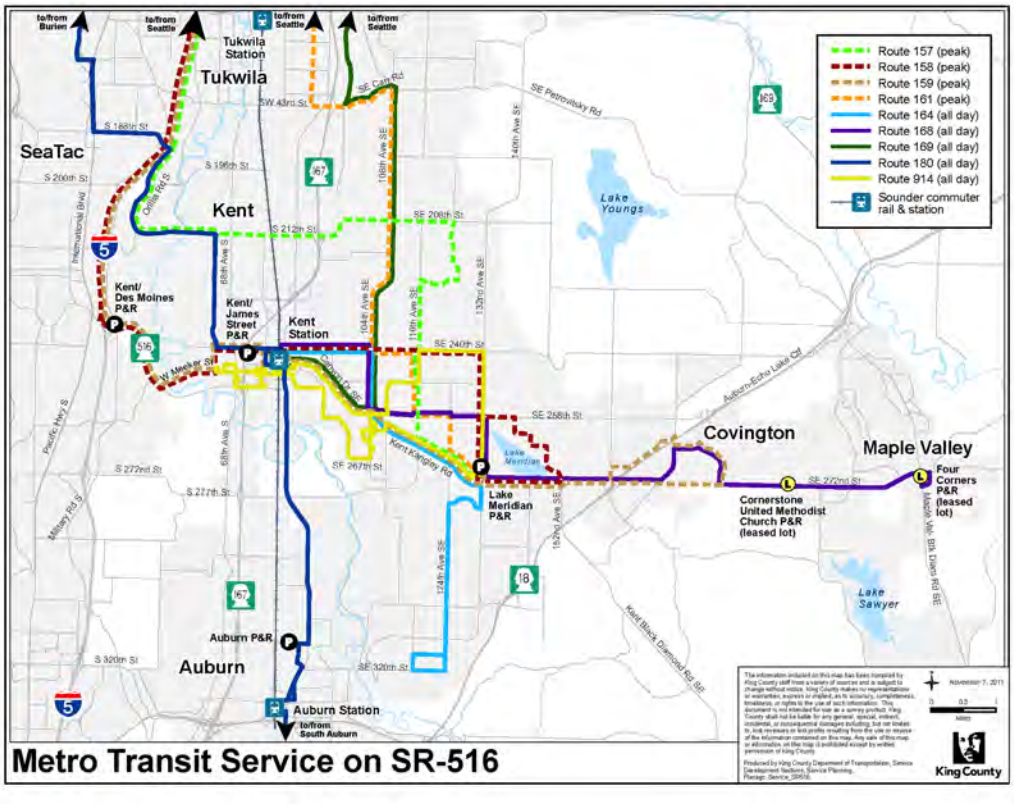
June 2013, but Metro has expressed a desire to continue the current service levels if funding can be secured.

Park and Ride lots can serve the travelling public by making transit travel more convenient, with side benefits of less vehicle miles travelled, less congestion, and less pollution. Below is a list of the four Park & Ride lots in the vicinity of the study corridor with occupancy rates from Spring of 2011:

- Four Corners Shopping Center (leased lot) - 26920 Maple Valley Hwy
  Capacity-24 / Average Daily Utilization-22 MT Routes: 143, 907, 168
- Cornerstone United Methodist Church (leased lot) - 20730 SE 272nd St.
  Capacity-20 / Average Daily Utilization-15 MT Route: 168
- Lake Meridian P&R (Metro) - 26805 132nd Ave SE
  Capacity-172 / Average Daily Utilization-45 MT Routes: 157, 158, 159, 161, 168, 914
- Kent Station/garage & surface lots (Sound Transit) - 301 Railroad Ave N
  Capacity-996 / Average Daily Utilization-954 MT Routes: 150, 153, 158, 159, 164, 166, 168, 169, 180, 183, 566, 913, 914, 916, 952, ST Routes 566 & Sounder

Figure 3-7 shows the existing transit service routes and P&R locations within the study corridor.

Figure 3-7: Transit Service Map



Southeast King County DMU Commuter Rail Feasibility Study

In 2010, WSDOT completed the Southeast King County Diesel Multiple Unit (DMU) Commuter Rail Feasibility Study. As part of this study, a transit based Enhanced Bus Scenario was developed to compare the DMU rail option to transit. (It should be emphasized that the service improvements assumed in this analysis are not in the King County Metro budget and have not been proposed or presented for public or County Council review.) In this analysis, enhanced transit service is implemented with improvements to two existing Metro routes, #149 (SR 169 corridor) and route #168 (SR 516 corridor), along with a new peak-period express route operating from Maple Valley and Covington to the Auburn Sounder Station via SR 18. These routes would roughly parallel the DMU Commuter Rail service on the BNSF Railway's Stampede Pass line.

The complete study can be reviewed at:
www.wsdot.wa.gov/planning/Studies/SEKingCommuterRailStudy/.

It should be noted the WSDOT Regional Mobility Grant mentioned earlier and the resulting recent increase in service for route # 168 actually slightly exceeds the enhanced service scenario for route #168 looked at for the DMU study.

3.7 Highway Segments and Intersections

The study area for the traffic analysis includes SR 516 from SR 181 / SR 167 (SRMP 4.52) on the west end to just east of the SR 169 intersection in Maple Valley (SRMP 16.22. Appendix D shows all traffic analyses and the results in detail. A total of 26 signalized intersections on this corridor were identified by the stakeholder group and analyzed. Figure 2.2 shows the locations of intersections on the corridor and Table 2.2 provides the names of the intersections along with mile-post. The corridor in the study area goes through the cities of Kent, Covington and Maple Valley, but the travel demand forecasts were done for a larger area covering the cities of Kent, Covington, Maple Valley and Black Diamond as well as parts of King County associated with the study area. The study corridor was broken into six segments to analyze both volumes and average speeds of vehicular traffic. The segments are listed below and can be seen on Figure 2-3.

1. SR 181 to Jason/Titus Avenues
2. Jason/Titus Avenues to 101st Ave SE
3. 101st Ave SE to Kent/Covington city limit
4. Kent/Covington city limit to 185th Ave SE
5. 185th Ave SE to 216th Ave SE
6. 216th Ave SE to SR 169

Existing - Intersection LOS
All the intersections operate at an acceptable level of service during the AM peak hour of operation. Other than the Union Pacific Rail Road (UPRR) crossing impacts on the intersections near the SR 167 interchange, all the intersections on SR 516 between SR 181 and Central Avenue N operate at LOS D or better in existing conditions. All but four of the intersections operate at or above LOS D during the PM peak hour in existing conditions. The four intersections operating below LOS D are:

- SR 516 and 104th Avenue SE (LOS E)
- SR 516 and 172nd Avenue SE (LOS E)
- SR 516 and SR 169 (LOS E)
- SR 516 and SE Wax Rd (LOS F)

The intersection level of service for AM and PM peak hour are shown in Table 3-7.

Table 3-7: Existing LOS

Int. #	LOCATION	Existing – LOS	
		AM	PM
1	SR 516 & SR 181	C	D
2	SR 516 & SR 167 SB RAMPS	B	D
3	SR 516 & SR 167 NB RAMPS	C	C
4	SR 516 & S 4th Ave	C	C
5	SR 516 & Central Ave N	C	C
6	SR 516 (E Smith) & Central Ave	C	D
7	SR 516 & 104th Ave	C	E
8	SR 516 & SE 256th St.	B	C
9	SR 516 & 108th Ave	A	D
10	SR 516 & 116th Ave SE	B	C
11	SR 516 & 124th Ave SE	C	C
12	SR 516 & 132nd Ave SE	C	D
13	SR 516 & 152nd Ave SE	D	D
14	SR 516 & SE Covington - Sawyer Road	B	C
15	SR 516 & 164th Ave SE	C	C
16	SR 516 & SR 18 WB RAMPS	B	C
17	SR 516 & SR 18 EB RAMPS	B	B
18	SR 516 & 168th Place SE	B	D
19	SR 516 & 172nd Ave SE	B	E
20	SR 516 & Wax Road	D	F
21	SR 516 & 185th Ave SE	A	B
22	SR 516 & 192nd Ave SE	A	A
23	SR 516 & 216th Ave SE	B	B
24	SR 516 & Witte Road	C	C
25	SR 516 & 228th Ave SE	B	C
26	SR 516 & SR 169	C	D

Existing - Segment Travel Speed
A threshold target of 70% for the ratio of operating speed to the posted speed was used in order to identify roadway segments that may need more analysis and/or improvements. The inputs for this analysis include roadway classification; geometric information of segments including number of lanes, segment length and left turn channelization; free flow speed; annual average daily traffic (AADT); directional distribution; saturation flow rate; peak hour factor; and other information.

During the AM peak hour operation in the existing condition, three segments fall below the 70% speed threshold. These segments are SR 181 to Jason Avenue N, 101st Avenue SE to Kent/Covington City Limit, and Kent/Covington City Limit to Jenkins Creek. During PM peak hour operation in the existing condition, the same three segments fall below the 70% speed threshold.

The ratio of operating speed to posted speed for AM and PM peak hours for all the segments are shown in Figure 4.3.

Existing - Railroad Crossing Analysis
Because of its close proximity to the interchange area at SR 516 and SR 167, the Union Pacific (UP) railroad track was the principle focus of this analysis. Field observation is one of the best methods of assessing railroad crossing roadway impacts since it also includes any additional influence of BNSF rail traffic to the east of the UP line. In addition to nine days of observation, the study included information from camera operations in the Northwest Region traffic division as well as data and input from the city of Kent.

The number of trains crossing SR 516 was based on data received from the city of Kent for May 2010. The data reveals that on average, one UP train crosses SR 516 during the AM peak hour. Trains are of various lengths and run at different speeds. To capture impacts of trains with various lengths and speeds, the project team assumed a railroad gate closure for 2, 3, 4, and 5 minutes. For each of these closure durations, the project team developed a model to estimate traffic queue length and average vehicle delay. During existing AM peak hour, the average eastbound travel time from SR 181 to Central Avenue S was 1.3 minutes per vehicle for the worst case scenario with five minutes closure time. Westbound traffic experiences little more than one minute of delay per vehicle average for the five minutes closure. The same data reveals crossing of one UP train during a two-hour PM peak period on an average. A gate closure of 2, 3, 4, and 5 minutes was again used for analysis. During existing PM peak hour, the average eastbound travel time from SR 181 to Central Avenue S is 0.7 minutes per vehicle during the worst case scenario with five minutes closure duration. For the same closure duration, westbound traffic experiences a delay of about 0.2 minutes per vehicle average. Sounder train trips on the BNSF line, running approximately every half hour, have a short gate closure time due to their short length.

3.8 Safety and Collision History

The Washington State Department of Transportation has adopted a Target Zero© goal of reducing the fatal and serious injury collisions statewide to zero by 2030. More detailed information connected to the development and application of TargetZero can be found at [targetzero.com]. This corridor safety analysis was developed with the intent to identify locations where improvements may be considered for eliminating or reducing the severity of fatal and serious injury collisions.

The safety analysis was performed for the SR 516 corridor from Mile Post (MP) 4.85 to MP 16.22 and for the five year period 2005-2009. The safety analysis focused on strategies to eliminate or decrease the severity of fatal and serious injury collisions. WSDOT's official Collision Analysis Location (CAL), Collision Analysis Corridor (CAC), and Intersection Analysis Location (IAL) lists were reviewed and countermeasures considered when needed following the process outlined in the WSDOT Highway Safety website to make sure any identified locations had been addressed. Cities with a population equal to or greater than 25,000 are responsible for safety conditions and remedies within their boundaries. There were no CAC or CAL sites identified within the study corridor. CACs are five mile corridors with a five year history of at least 11 fatal or serious collisions outside of cities of greater than 25,000 in population. CALs are less than one mile sections with a five year history of four fatal or serious collisions or more than six evident injury collisions outside of cities with a population of 25,000 or greater. The city of Kent has a population above 25,000 and is responsible for safety remedies within their boundaries. The cities of Covington and Maple Valley are currently below the 25,000 population threshold, but may reach the 25,000 population during the 20 year study time span.

IALs are intersections that exhibit a collision rate exceeding certain criteria. This list rates intersections statewide using average societal cost of collisions per each target intersection, depending on the type of collision, speed, and severity for the last five years. Each year, as the latest collision data becomes available, the list should be updated to reflect the most recent five years of data. According the currently adopted list there are no IALs along the study corridor.

To conduct the safety analysis a computer program called SafetyAnalyst was utilized to assess the number of collisions at a defined location and develop recommendations for reducing the severity or frequency of collisions at that location.

The safety analysis showed there were 24 serious safety incidents over a five year span between 2005 and 2009, of which 20 of the incidents resulted in serious injury, and four resulted in a fatality. Seven of the 24 collisions, with three of the fatalities, involved alcohol.

Other causal factors included speeding and not granting the right of way to oncoming traffic. The general trend is a decrease in serious collisions with each passing year. Collisions were spread out between the three cities along the study corridor, occurred at all times of day and night and did not reflect any seasonal trend. By times of day fatalities occurred in early to mid-morning and mid to late afternoon.

What this data shows is that the collisions and fatalities appear to be random in nature and are mainly the result of driver behavior. Given the collision history and the contributing circumstances behind the collisions, SafetyAnalyst was not able to generate specific counter-measures for mitigating these types of collisions.

In review of the collisions that occurred within the limits of this corridor it was noted that there were four collisions involving pedestrians between MP 7.06 and MP 9.5. In looking at what the potential generators are for the collisions, there is a high school on the north side of the highway (Kent Meridian) with housing and a METRO bus stop on the south side of the corridor. These features create an attraction for both bicycle and pedestrian traffic. There is a continuous sidewalk on the north side of SR 516, and a partial sidewalk to the south. These factors may contribute to pedestrian crossings at non-delineated locations. The city of Kent received a grant in October of 2010 to improve pedestrian safety in the general area (MP 7.06 to MP 8.75). June 2013 is the anticipated completion date. Opportunities for pedestrians to safely travel along and across SR 516 should be re-evaluated after the grant improvements are in place.

Although no immediate safety improvement locations were identified, based on the results generated from SafetyAnalyst and the anticipated growth surrounding the SR 516 corridor, consideration may be given for general improvements to help decrease the total number of collisions. Although the safety analysis does not show this corridor to be a high priority safety location, if a decision is made by a city to proceed with safety improvements on this corridor, at least two potential actions should be considered. They are:

- Increased emphasis on the implementation of access management for the corridor.
- Elimination of two way left turn lanes at locations exceeding 25,000 ADT.

CHAPTER 4

Future Baseline Conditions

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CHAPTER 4: FUTURE BASELINE CONDITIONS

Future baseline conditions refer to the corridor's performance at several time points in the future, using forecasted population and employment growth. This future performance is modeled based on several assumptions. These include:

- Including only currently programmed (financed) transportation improvements in the corridor area for determining the corridor's future capacity and developing a more realistic determination of what the demands on the corridor will be.
- Puget Sound Regional Council's (PSRC) regional travel demand model (EMME software) and VISUM model data from the cities of Kent and Maple Valley for forecasting travel demand.
- Modeling for AM and PM peak hours of the existing condition and three future time point conditions of 2016, 2022 and 2030.
- 26 signalized intersections were analyzed within the study corridor. The intersections were selected based on WSDOT analysis and local jurisdiction's input. Below LOS E is used as the determination of need for intersections.
- The study corridor is broken into six segments for speed analysis purposes. The segments are used to determine the average future speed and compare it to the posted speed. Segments operating below 70% of the posted speed or operating over capacity are considered as needing additional study or improvements.
- Existing signals are assumed to be optimized in the future years for the greatest efficiency. This operational efficiency is a recommendation of this report
- All maintenance and preservation work required to keep the facility in working condition is assumed for all years.

4.1 Traffic Volume Estimates

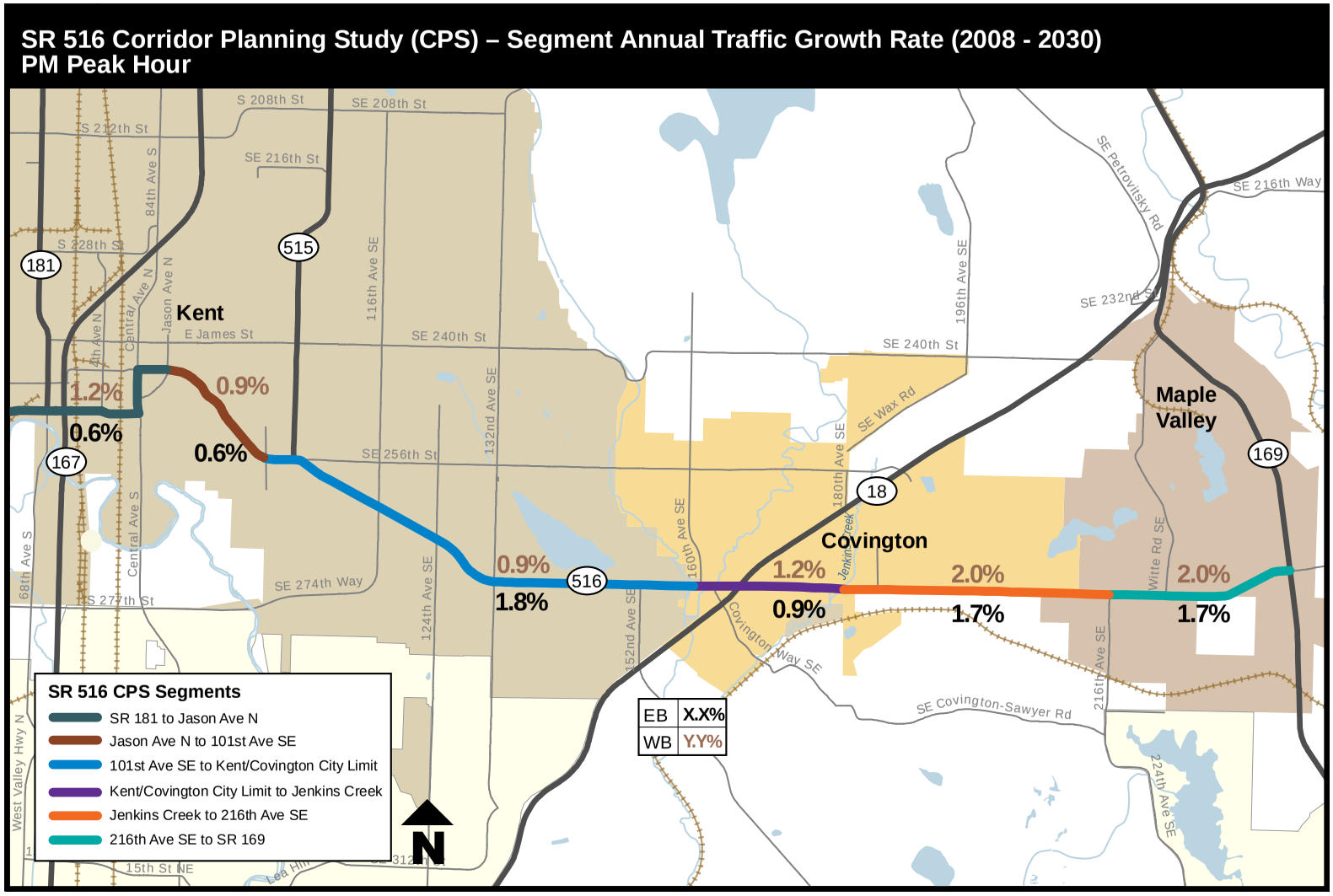
The travel demand forecasts from Puget Sound Regional Council's (PSRC) regional travel demand model (Version 1.0bb) in EMME software were used along with the cities of Kent and Maple Valley models (in VISUM software). These models were used to forecast growth factors for the intersections on this corridor. The 2020 and 2030 baseline roadway networks included only funded projects. Unfunded, planned projects were not factored into the modeling analysis. The cities of Kent and Maple Valley model's results forecast demand for PM peak hour only. The PSRC model was used as a supplement to both estimate AM growth factors as well as provide a more regional application of traffic generation and

destination projections. The roadway segments in the study corridor were analyzed using SYNCHRO and SIMTRAFFIC simulation modeling software packages and Highway Capacity Manual methodologies. All analyses focused on the AM and PM peak hours of existing condition (2009) and three future year conditions (2016, 2022 and 2030).

Between the period of 2009 and 2030, PM peak hour demand grows 1.8% annually in the eastbound direction of SR 516 in Kent. Covington and Maple Valley segments in the eastbound direction show a 1.7% annual growth rate. In the westbound direction, the growth is forecasted at 2% annually for the segment in Covington and Maple Valley.

The growth rate by direction for the six segments is shown in Figure 4-1.

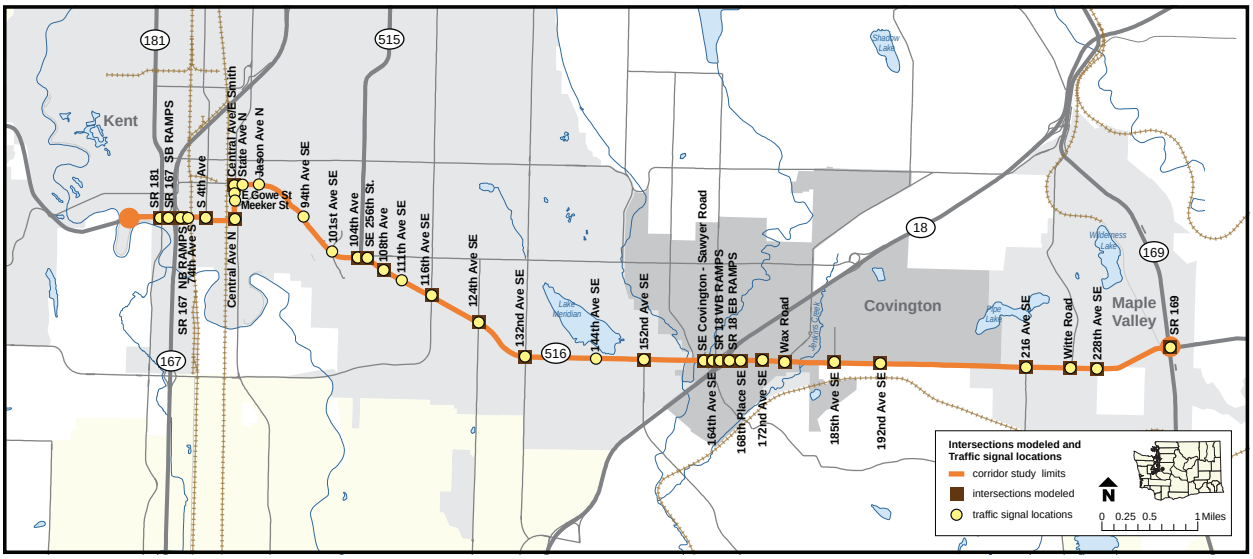
Figure 4-1: Traffic Growth Rate along the Corridor (2008-2030 PM Peak Hour)



4.2 Future Traffic Conditions

Future year analyses were conducted for three different years - 2016, 2022 and 2030. The analyses focused on AM and PM peak demand periods. Future year growth rates for each of the 26 intersections were applied by approach and by movement. Growth rates were applied to the traffic counts to develop future traffic demand for analyzing both segment and intersection performance. Like existing condition analyses, future condition analyses focused on evaluation of intersection LOS, segment travel speed and railroad crossing delays. All signalized intersections in the future years analyses were assumed to have optimized timing for peak efficiency before establishing if a need will exist. Figure 4-2 shows the locations of all signalized intersections, and identifies the 26 intersections analyzed.

Figure 4-2: Study Corridor Signalized Intersections



4.3 Highway Segments – 70% Speed Comparison

For the segment travel speed and speed ratio calculation, the same methodologies and tools were used as the existing condition analysis. The six segments were analyzed for the year 2030 to determine which segments may warrant further study and analysis. Speed comparison is used as a better measure of efficiency and allowing greater throughput. The WSDOT Highway System Plan uses 70% of the posted speed as an indicator of congestion. In other words, congestion exists if peak hour travel is less than 70% of the posted speed. This posted speed threshold is used to determine if a potential need exists along the study corridor and if an improvement recommendation is justified to address that need. Another condition for determining if a need exists is the density of signalized intersections typically

found in more urbanized areas. Higher densities of signalized intersections slow through traffic, allowing safer cross traffic movement and access to the mainline corridor. All segments, including those containing a large number of signalized intersections in close proximity, were modeled for speed comparisons. All of the segments with high density traffic signalization are slower than 70% of posted speed, but were not listed as being deficient since signal operations will have a deleterious effect on mainline traffic speeds, but have the benefit of safely allowing cross traffic movements and access to the corridor.

AM Peak Hour
During the AM peak hour operation in 2030 conditions, four segments are projected to fall below the 70% speed threshold target in both the eastbound and westbound directions. These segments are:

- SR 181 to Jason Avenue N *
- 101st Avenue SE to Kent/Covington City Limit *
- Kent/Covington City Limit to Jenkins Creek *
- Jenkins Creek to 216th Ave SE

* *These three segments have a large number of signalized intersections in close proximity to one another*

Figure 4-3 shows the AM peak hour ratios of projected speeds compared to posted speeds.

PM Peak Hour
During PM peak hour operations in 2030 conditions, the same four segments noted above fall below the 70% threshold. Figure 4-4 shows the PM peak hour ratios of projected speeds compared to posted speeds.

Two segments, Jenkins Creek to 216th Ave SE and 216th Ave SE to SR 169, were analyzed for the 2016 and 2022 mid-term conditions. Of those two segments, only Jenkins Creek to 216th Ave SE segment is projected to operate below the 70% speed threshold during the 20 year study time span. The Jenkins Creek to 216th Ave SE segment was broken down into smaller segments to determine a more precise look at the timing and locations of future needs. The three partial segments within Jenkins Creek to 216th Ave SE were:

- Jenkins Creek to 185th Ave SE
- 185th Ave SE to 192nd Ave SE
- 192nd Ave SE to 216th Ave SE

Figure 4-3: Ratio of Operating Speed to Posted Speed (AM Peak Hour)

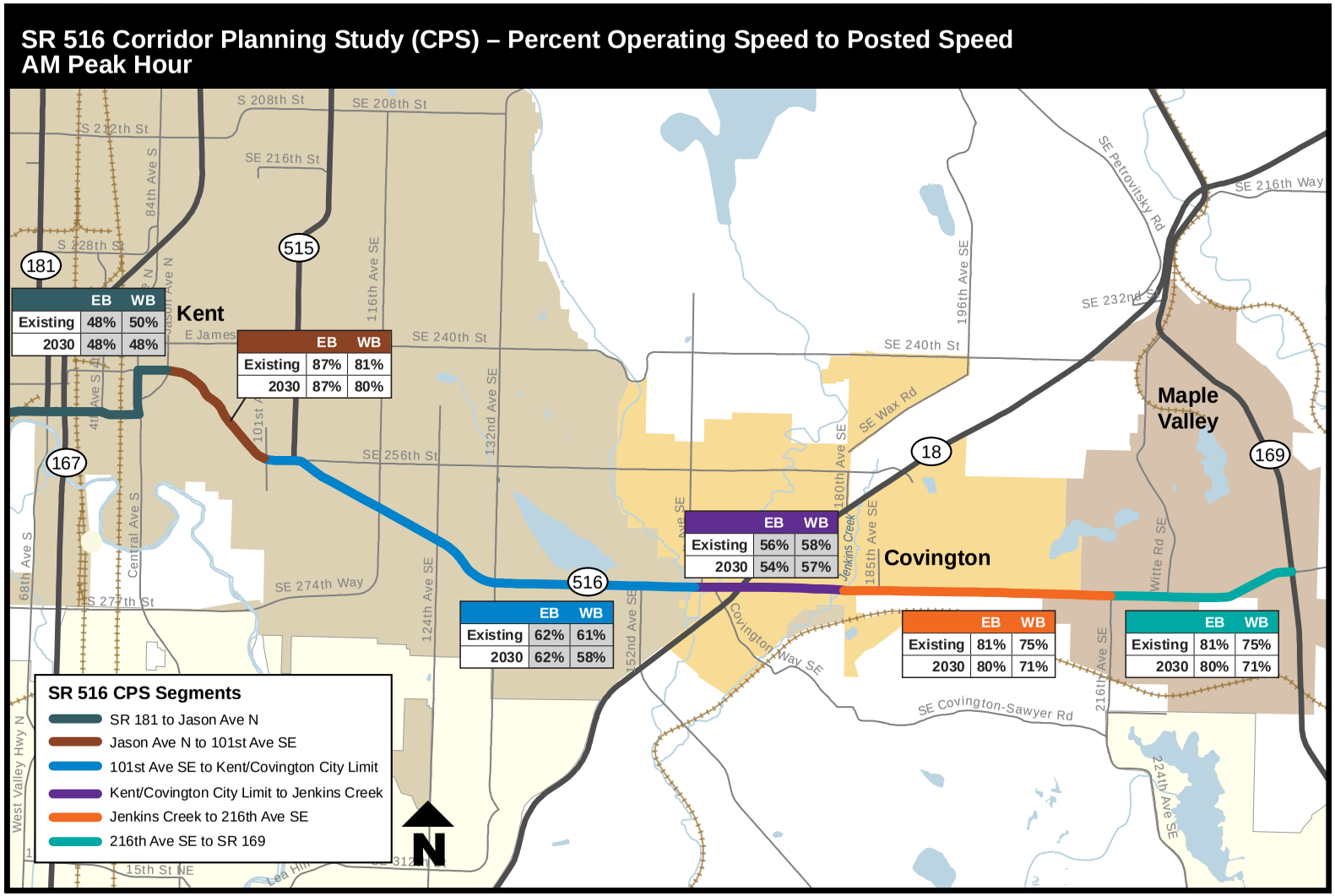
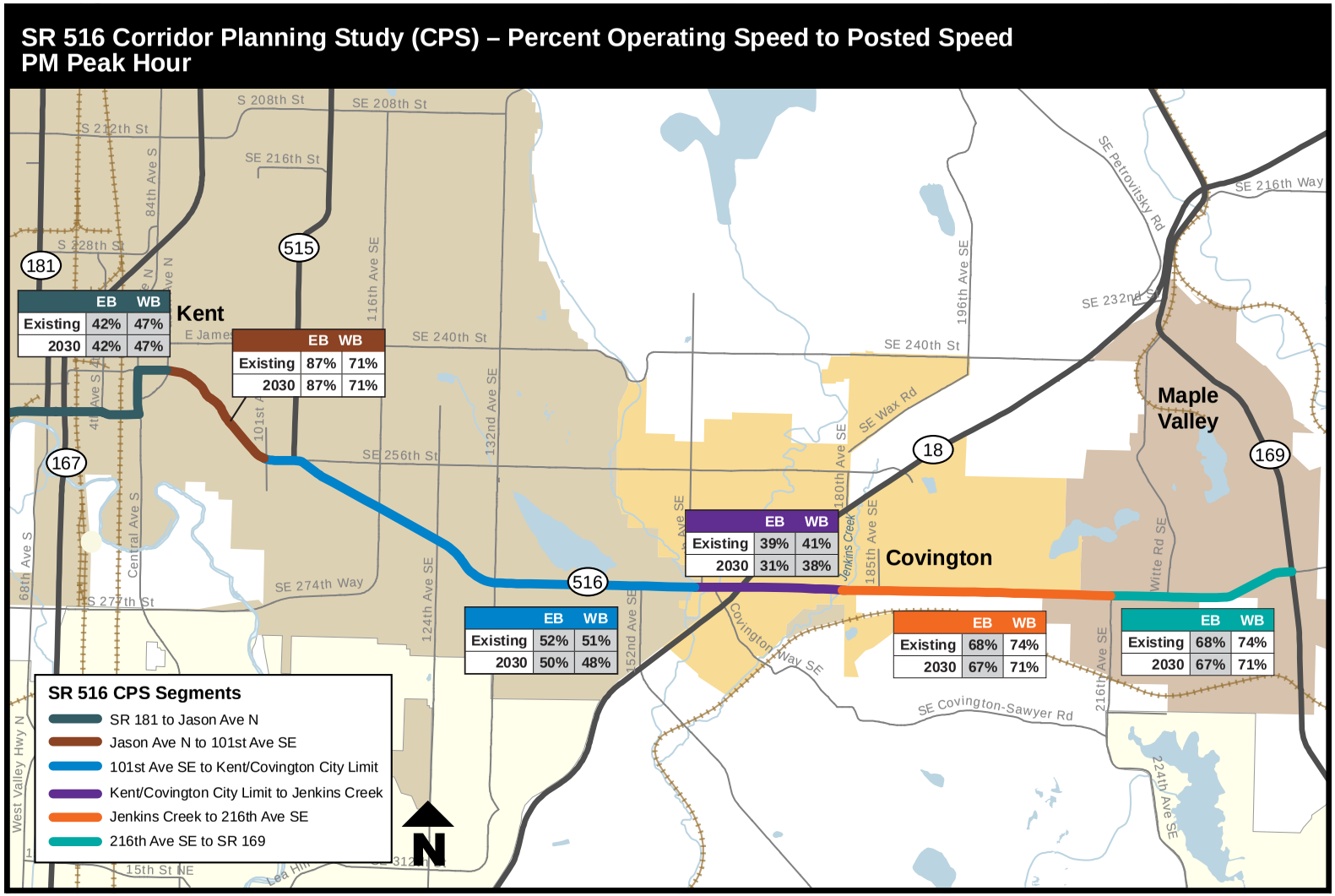


Figure 4-4: Ratio of Operating Speed to Posted Speed (PM Peak Hour)



4.4 Intersection LOS with Programmed Improvements

Intersections

Based upon analysis, with only currently funded improvements and optimized signal operations considered as being in place, of 26 signalized intersections studied, nine would operate below LOS E in 2030. AM peak periods did not indicate any intersections in the study corridor would fail. The following intersections are modeled as operating below LOS E in the study timeframe.

Far Term (2030) conditions – PM peak below LOS E (w/o ptimized signal operation)

- SR 516 and Central Avenue N/E Smith St
- SR 516 and 104th Avenue SE
- SR 516 and SE 256th St
- SR 516 and 108th Avenue SE
- SR 516 and 132nd Avenue SE
- SR 516 and 152nd Avenue SE
- SR 516 and 164th Avenue SE
- SR 516 and 172nd Avenue SE
- SR 516 and SE Wax Road

4.5 Railroad Crossing Analysis (Future)

The railroad crossing analysis for 2030 future year conditions used the same methodology as explained in the existing railroad crossing analysis in chapter three. The vehicular volumes were adjusted according to the growth rates, but no modifications were made to the Union Pacific train trip frequencies or lengths for modeling the future case scenario.

During 2030 AM peak hour, under the worst case scenario of five minutes closure time, the average travel time from SR 181 to Central Avenue S could increase from 1.3 minutes up to 2.2 minutes in the eastbound direction and from a little over one minute to 2.4 minutes in the westbound direction, respectively. During 2030 PM peak hour, under the worst case scenario of five minutes closure time, the average travel time from SR 181 to Central Avenue S could increase from 0.7 minutes up to 1.9 minutes in the eastbound direction and from 0.2 minutes to 3.2 minutes in the westbound direction, respectively.

In this worst case scenario, eastbound traffic queues could extend far enough to negatively affect four signalized intersections including the SR 167 ramp junctions. The westbound traffic queue could extend as far as Central Avenue.

At the conclusion of this study a proposal surfaced to increase coal shipments on the BNSF line from the Montana and Wyoming areas to a terminal in Bellingham. Due to the late timing of this proposal and because the SR 516 Corridor Study focused on how UP operations could affect SR 167/SR 516 operations, this corridor study would note that further analysis will be needed to determine the effects increased rail activity could have on traffic operations of the SR 516 corridor.

A safety issue associated with railroad usage and closure times is emergency access across the tracks during train travel events. This is not limited to the highway wait times but includes all local access, at-grade, roadways across the tracks. If a train is restricting access to an emergency on the other side, other units may have to be called in to respond, increasing the time it takes for emergency crews to arrive at the incident.

4.6 Non Motorized Issues

The corridor has developed over time in much the same way as other highways. The original purpose was to move vehicular traffic. As shown on earlier on Figure 3.2, there are breaks in sidewalk continuity, especially in the more rural sections. Bicycle facilities are infrequent and not interconnected at this time. Within the Comprehensive plan for Covington for example, the portion of SR 516 west of Wax Road is not recommended as a bike route, due to high volumes of through and turning vehicular traffic. (The city has made efforts to provide more bike-friendly connections to the north and south of SR 516.) The city of Maple Valley recommends sidewalks along SR 516 as part of its non-motorized plan. The cities have made efforts to include pedestrian and bicycle amenities as a requirement for permitting new development as it occurs along the corridor. These efforts are sporadic and dependant on where the new development may occur. Without dedicated funding for these amenities, apart from new development, this piecemeal approach will likely continue. Coordination between WSDOT and local jurisdictions should continue in an effort to make the corridor more pedestrian and bicycle friendly.

4.7 City Identified Transportation Improvement Needs

The following transportation improvement needs are identified by the cities of Kent, Covington, and Maple Valley. The improvement needs were derived both from the cities' Transportation Improvement Program (TIP) lists and from conversations with the CWG.

The city of Kent has identified the need for SR 516 intersection improvements at Willis St. and Central Ave., Smith St. and Central Ave., 132nd Ave SE, SE 256th St/104th Ave SE and 108th Ave SE (this is tied to an extension of 108th Ave SE to 256th Ave SE). They also indicated a need for grade separation of the two, at-grade, RR crossings in the vicinity of SR 167. The city's TIP and Comprehensive plan can both be found at: www.kentwa.gov/transportation

The city of Covington has identified a need for widening SR 516 to five lanes from Jenkins Creek to 192nd Ave SE as well as from 160th Ave SE to 164th Ave SE with intersection improvements. The city's TIP can be found at: www.covingtonwa.gov/city_departments/publicworks/engineering/engineering.html

The Comprehensive plan can be found at: www.covingtonwa.gov/city_departments/communitydevelopment/strategiclongrangeplanning/compplaninfoandforms.html#revize_document_center_rz67

The city of Maple Valley has identified the need for widening SR 516 to five lanes from the western city limits to 218th Ave SE, and then widening to three lanes from 218th Ave SE to SR 169. Sidewalks and bike facilities should be included in the widening, as well as intersection improvements at 216th Ave SE, 218th Ave SE, Witte Rd, and SR 169. The city has additionally identified a need for pavement restoration between 228th Ave SE and SR 169. The city's TIP can be found at: www.maplevalleywa.gov/index.aspx?page=356
The Comprehensive plan can be found at: www.maplevalleywa.gov/index.aspx?page=93

CHAPTER 5

Recommendations

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CHAPTER 5: RECOMMENDATIONS

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

5.1 Moving Washington Investment Principles

Moving Washington is the department's framework for making decisions for transportation investments that focus on keeping people and goods moving and supporting a healthy economy, environment, and communities.

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

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

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

Maintain and Keep Safe – The highest priority is maintaining and preserving the safe and long-lasting performance of existing infrastructure, facilities and services. This is the heart of Moving Washington and the principal target of the state's investments in its transportation system.

After maintenance and safety needs are addressed, Moving Washington combines three essential transportation strategies to achieve and align our objectives and those of our partners.

Operate Efficiently – This approach gets the most out of existing highways by using traffic-management tools to optimize the flow of traffic and maximize available capacity. Strategies include utilizing traffic technologies such as ramp meters and other control strategies to improve traffic flow and reduce collisions, deploying Incident Response to quickly clear collisions, optimizing traffic signal timing to reduce delay, and implementing low-cost/high-value enhancements to address immediate needs. Intelligent Transportation Systems (ITS) are the application of computers, communications and sensor technology to surface transportation. ITS technologies, such as electronic tolling, Traffic Management Centers (TMCs), traffic cameras and other surveillance devices, Variable Message Signs (VMS), Highway Advisory Radios, (HAR), and ramp meters can be employed as both efficiency and demand management strategies when practical.

Manage Demand – Demand management is an umbrella term for strategies that reduce vehicle trips or shift use of the roadway to off-peak periods. Demand management is one of WSDOT's strategies to ensure sustainability and fight congestion. Options include several low-cost strategies that create the least amount of environmental impacts. Whether shifting travel times away from peak periods, using public transportation, or reducing the need to travel altogether, managing demand on overburdened routes allows our entire system to function better. Overall strategies include using variable-rate tolling in ways that reduce traffic during the most congested times and balance capacity between express and regular lanes, improving the viability of alternate modes, and providing traveler information via ITS to allow users to move efficiently through the system.

Add Capacity Strategically – Only after maintenance, safety, efficient operations, and demand management options are considered, strategic capacity improvements, under a three tiered system, are considered. Tier 1 projects are typically low cost high return projects, such as turn lanes, and intersection improvements. Tier 2 are moderate to higher cost projects that further reduces congestion on both highways and local roads, examples are auxiliary lanes and parallel corridors. Tier 3 projects are the highest cost and longest range projects such as adding general purpose lanes and improving interchanges.

5.2 Evaluation Criteria and Performance Measures

Moving Washington principles were applied in the creation and application of the following criteria used to determine corridor needs.

- Safety analysis included identifying any current sites listed as Collision Analysis Corridors (CACs), Collision Analysis Locations (CALs), or being on the Intersection Analysis Location List (IALL). Following that, a program called Safety Analyst was used to determine if potential future safety issues could be identified and addressed.
- Maintenance and preservation issues were investigated to determine if there are current or anticipated unmet needs for the study corridor.
- Efficiencies were looked for in the current and future operations of the corridor.
- Demand management techniques were investigated to determine their possible employment in the study corridor.
- Strategic capacity was then considered if other techniques failed to adequately address future mobility issues.

There were other issues investigated in this study. One of the highest priorities for the city of Kent was an analysis of the interactions of two, at grade, railroad crossings in the vicinity of the interchange area at SR 181, SR 167, and SR 516. Of particular concern is the Union Pacific track, located about 500 feet to the east of the SR 167 northbound off/on ramp intersection. The interactions of rail and vehicular traffic were analyzed using a SYNCHRO model and comparing time delays at RR crossings to standard intersections as well as looking into possible safety issues with traffic queuing resulting from train traffic during vehicular peak times.

The study corridor was analyzed for needs using Level of Service measurements at 26 signalized intersections and speed and capacity analysis on six separate segments within the study corridor. The speed analysis was used in ascertaining whether speeds were already, or expected to drop, below 70% of the posted speed. Simple capacity calculations of the facility, local desire to improve, existing local financial commitments, and constructability of improvements, were also involved in reaching consensus on whether a need existed and if an improvement would be considered for inclusion into this study's recommendations.

In addition to looking at needs to be considered for this corridor, timing of addressing those needs is also considered. A 20 year span of time is used to analyze the performance of the corridor and arrive at a set of options to be considered for the entire 20 year period. The entire set of options is ranked and then assigned to the first six years, the second six years, or the final eight years. The first subset is populated with those options that would satisfy a

current need within the first six-years of the base year used for modeling. The second subset is populated with those options that would satisfy a future need arising within the second six-year period (12 years after the base year) and finally the last subset is populated with those needs that would arise within the last eight years (20 years after the base year). The 6-6-8 timing application is intended to focus on "biggest needs first", but does not actually indicate completion of a solution in this time frame. Solutions in this study and other corridor studies will be included in the HSP database and will compete with other state transportation projects based on performance outcomes.

In addition to levels of service and speed performance of the system the evaluation criteria also considered how a proposed improvement affected "Economy, Transportation, and Community" or "ETC." The intent of looking at ETC was to get a fuller picture of how a recommended improvement would benefit the community as a whole, not just the study corridor itself. For example, would a proposed recommendation enhance freight movement or improve access to Transit Oriented Development, promote energy conservation, or improve safety? Often one recommendation may meet one criterion, but not address others. ETC is a more holistic approach to potential costs and benefits.

While potential improvements and timing were looked at for the corridor, those needs arising further into the future (20 years) were not assigned a specific improvement. Rather than potentially restrict future actions based on remedies developed in the past, it is preferable to allow flexibility in addressing those needs when they arise. Newer technologies could exist to assess the needs and determine how best to address them. A better understanding of the current conditions will be available at that point in time and will help lawmakers to make better decisions as to where to invest in improvements along the corridor. For these reasons, recommendations for addressing the far-term needs will not be specific, nor will they include an estimate of costs. The needs, as identified in this report will be stated, but the potential solutions will be evaluated closer to the time of actual need.

5.3 Recommendations

As noted earlier in this chapter, recommendations in this study will need to compete for funding with other proposed improvements around the state based on performance outcome. Due to limited state funding available, local jurisdictions will need to seek funding from other sources such as developer contributions, creating a local improvement district, or federal grants to implement the recommendations.

The draft recommendations were presented to the Corridor Working Group at the November 16, 2011 meeting. The Corridor Working Group requested additional analysis to the east of Jenkins Creek with a refinement in the length of the segment being analyzed. Upon further consideration of Moving Washington priorities, stakeholder comments, and additional technical analysis, the list was refined and produced the following recommendations.

5.3.1 Preservation and Maintenance Recommendations

The Highway Activity Tracking System (HATS) is designed to support WSDOT staff to document their maintenance activities. In 2011, WSDOT spent over $32,000 in maintenance funds (M2) for this portion of SR 516. The overall pavement condition is good; crack sealing the portion between milepost 5.71 to 9.09 (Titus St. to about 127th Ave SE) is needed to extend the pavement life. WSDOT should continue with the Washington State Pavement Management System pavement monitoring and repair program. The next inspection is scheduled for 2013 and pavement needs will be reassessed at that time.

In spring 2012 the city Maple Valley identified the portion of SR 516 between 228th Ave SE and SR 169 as needing pavement repair due to rutting and cracking. WSDOT maintenance staff did a field inspection of that segment and agreed the current condition warranted repair. The repairs have been made and WSDOT will continue to address pavement issues as they arise, including crack sealing repairs on this stretch of the corridor.

Other roadside maintenance issues identified by WSDOT as ongoing needs include vegetation control (oversize tree removal), signage upgrading, and drainage improvements needed to prevent flooding as a condition for permitting any additional development. Both the state and local municipalities should continue on-going facilities maintenance and repair, including drainage, signage, illumination, guardrail, and striping. Local jurisdictions should consult with WSDOT Maintenance and Operations prior to permitting new development along the corridor.

5.3.2 Safety Recommendations

Access management should be continued by the cities within their jurisdictional boundaries. Better access management reduces both the frequency and severity of collisions on any corridor. As collision data is collected in the future, if any segment or intersection becomes a Collision Analysis Corridor (CAC), Collision Analysis Location (CAL), or Intersection Analysis Location (IAL), and prioritizes against other statewide safety needs, a remedy should be scoped and considered for implementation.

Kent has recently been awarded a pedestrian safety grant to focus on SR 516 between 104th Ave SE to 124th Ave SE. Completion is scheduled for July 2013. The resulting effect should be monitored as the pedestrian safety grant improvements are implemented by Kent.

Both the state and the cities should continue to monitor collisions on the study corridor and, if warranted, determine if a specific physical fix would be effective. Enhanced education of the public on topics such as impaired driving, excessive speed, and awareness of non-motorized modes of travel should be offered to improve safety on the corridor. Continued enforcement is also recommended. As general considerations for safety enhancement on any roadway, speed limit review, physical separation of opposing lanes, and/or removal of two way left turn lanes should also be considered whenever appropriate.

5.3.3 Efficient Operation Strategies

In addition to its safety benefits, access management will also help the flow of traffic and maximize throughput, making the system more efficient at a comparatively low cost. Maximizing flow characteristics and throughput by optimizing signal timing whenever and wherever possible is also recommended in this report. Northwest Region Traffic Operations has recommended the corridor, and the signal operations along the corridor, should continue to be reviewed at a minimum of every three years to ensure that it is operating at the best possible efficiency, minimizing vehicle delay while, to the best extent practicable, maximizing traffic flow. Kent, which is the signal operating agency within their city limits, should coordinate signal operations with WSDOT.

5.3.4 Demand Management Strategies

Demand management strategies reduce vehicle trips or shift use of the roadway to off peak periods. These strategies are implemented in partnership with local governments, transit agencies, employers, and others, so the development of strategies will depend on the capacity and interests of local partners. Other considerations will include the objectives for the corridor, existing land uses and services, analysis of travel patterns and travel behavior, and financial resources.

Based upon traffic modeling and analysis, a 5 percent reduction in peak hour trips in 2030 would remove 450 daily commute trips from the highway and could result in an approximate $8 to $10 million in roadway capacity construction savings. This target is assumed to be achieved within those twenty years as a result of the demand management measures. Some of the key characteristics of the study corridor affecting demand management are:

- Largely low-density residential uses
- Small-scale, disbursed commercial areas
- Peak hour traffic includes commuters traveling relatively long distances to employment centers (Tukwila, Bellevue, Seattle, Tacoma, etc.) and local trips that start and end within the corridor (errands, shopping, local schools)
- A lack of continuous trails and other bicycle/pedestrian amenities
- Park and ride(s) closest to the Kent Sounder Station are oversubscribed; others on the corridor are underutilized.
- Bus transit service on the corridor operates on 30 minute peak hour headways; increased frequencies are not included in local transit plans
- Large, low-density residential developments on and near the corridor planned for the future

The following table lists demand management strategies that are recommended for this corridor. Accompanied with the strategy is a suggested timeline, approximate cost, estimate of trips removed, and basis for the assumptions.

Table 5-1: Demand Management Recommendations

Recommended Strategy	Timing	Cost	Trips removed
Vanpool promotion - Market vanpools and offer subsidies and incentives for new vanpools (Based on incentives for vanpooling, I-90, 2009)	2020-2030	$14,000 per year	100 daily commute trips
Engage employers - Supplement existing commute trip reduction (CTR), growth & transportation efficiency centers (GTEC), transportation management activities (TMA), and transit efforts with targeted investments at businesses that employ corridor residents. Support for employers who will improve commute efficiency by offering telework/ compressed work week technical assistance; transit, carpool and vanpool subsidies; priority parking for carpools and vanpools; increasing SOV parking fees at worksites; etc. (Based upon: CTR, GTECs, outreach to Bellevue employers 2008)	2020-2030	$60,000 to $80,000 per year	200 daily commute trips
Relocate Vanpools - Target outreach and incentives to existing vanpools to encourage them to move from over utilized park and rides to underutilized park and rides. This frees up parking at over utilized park and rides for new transit users. Vanpools that move to underutilized park and rides stay in these locations because they are often located closer to their homes and are hassle-free (Based on: I-405 vanpool relocation project, Renton Transit Center and South Renton Park and Ride, 2007/2008)	2020, 2022, 2024, 2026, 2028	$20,000 per year, conduct biannually	100 (relocate ten vanpools to redeem 100 parking spaces at park and ride with high levels of transit service)
Multimodal commute coaching, outreach and incentives – Employ community-based outreach and marketing programs (e.g. Curb the Congestion, In Motion) that provide individualized commute coaching and incentives to move people from SOV commutes to other modes. (Based on: Curb the Congestion on 164th in Snohomish County)	2024-2030	$80,000 – $120,000 per year	100 daily commute trips

There are a number of other demand management strategies that may be considered in addition to the strategies listed above. They are:

- Ridesharing – promote vanpools and carpools, provide ride matching assistance through Rideshareonline.com, develop and maintain ride share meet-up locations
- Transit improvements – add service where appropriate to support connections to rail and transit routes
- School trip management – work with schools to support increased walking, bicycling, and school bus use, parent ride-sharing
- Bike to transit stations – promote and support safe bicycling routes to rail/transit stations to create broader access to main commuter routes
- Employer/commute trip reduction programs – work with employers to promote commute options to employees through outreach, assistance, and incentives; identify key employers on the destination end to work with to affect trips originating in the suburban community
- Residential-based trip reduction programs – use individualized and social marketing programs to educate and support households to make more efficient trip choices
- Personal travel assistance – establish a public outreach presence to assist travelers in making choices and using alternatives
- Incentives – provide incentives for travelers that use alternative modes being promoted in the corridor
- Improve non-motorized infrastructure – make investments in bicycle and pedestrian infrastructure to improve access and safety for bikers and walkers
- Human service improvements – improve/expand human services transportation
- Land use policies – work with local governments to make land use policies, plans and regulations more transportation-efficient, may include requirements for new development (such as limited parking, transit passes to residents, etc.)

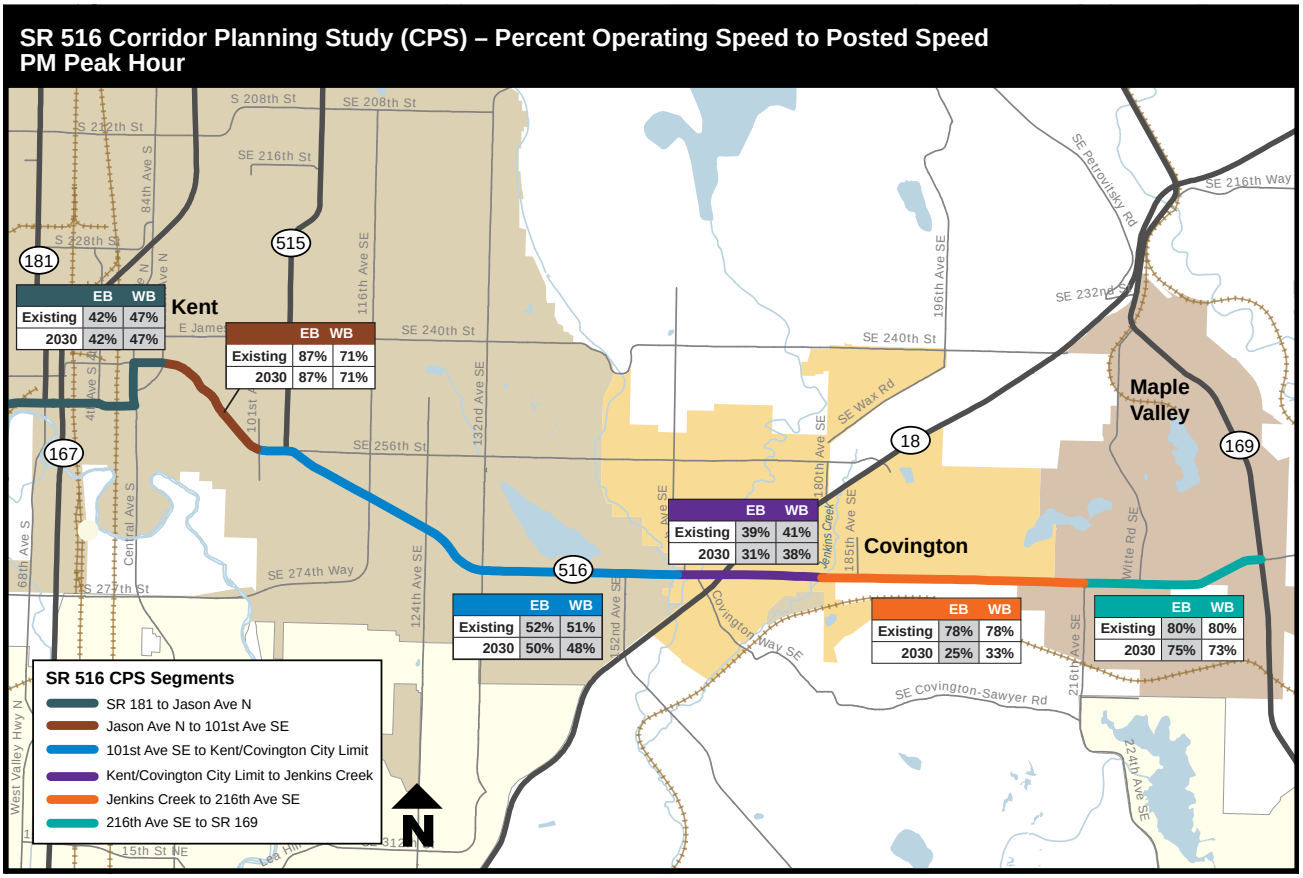
5.3.5 Strategic Capacity Addition Strategies

Capacity improvements are broken down into three subsets, Tier 1, Tier 2, and Tier 3 projects. TIER 1 recommendations focus on low-cost projects that may deliver a high return on capital investment and have short delivery schedules. These include ramp modifications, turn lanes and intersection improvements. TIER 2 recommendations focuses on moderate to higher cost improvements that reduce congestion on both highways and local roads. These include improvements to parallel corridors (including local roads), adding auxiliary lanes, and direct access ramps. TIER 3 recommendations focuses on the highest-cost projects that can deliver corridor-wide benefits. These include adding general purpose lanes.

In addition to creating a list of recommendations based on performance criteria and timing of need, additional analysis was employed to look at potential solution locations and the existing landscape to help ascertain the potential impediments that may be faced when attempting to construct the improvements. Planning level cost estimates for the potential improvements, including the impediments were developed for the study. A benefit/cost (b/c) analysis was conducted using the estimated costs of the improvements and comparing those to the benefits, based on collision reduction and annual 24-hour user travel time savings for 20 years after implementing the project. The b/c estimates are based solely on time savings for motorized traffic and apply only to the 2016 and 2022 recommendations. A more detailed look at the analyses can be found in Appendix E.

The following section summarizes the results of key traffic analyses conducted for this study and how they support the capacity strategies using WSDOT standards. Figure 5-1 presents the ratio of operating speed to posted speed for the PM peak hour.

Figure 5-1: Ratio of Operating Speed to Posted Speed (PM Peak Hour)



Based on traffic analysis, the study team worked with the stakeholders and identified short-term (2016), mid-term (2022) and long-term (2030 and beyond) capacity improvement needs of this corridor. Looking at Figure 5.1 one can see that the ratio of operating speed to posted speed on several segments is below WSDOT's threshold. However, existing and forecasted operating speeds falling below the threshold does not automatically trigger capacity improvement consideration if widening is not deemed a viable option. Examples of such segments include from SR 181 to Jason Avenue N, from 101st Avenue SE to Kent/Covington City limit.

One of the critical needs identified by the stakeholders in this corridor is at Jenkins Creek, where the roadway narrows from 4/5 lanes to 2/3 lanes. This bottleneck creates traffic delays and merge problems. The old culvert presents a barrier for fish passage and it needs to be re-constructed. There are also two schools in the near vicinity of Jenkins Creek. The first is Jenkins Creek Elementary, located at 26915 186th Ave SE and the second is Covington Elementary, located at 17070 SE Wax Rd. Both of these schools are serving a young student population and this segment of SR 516 should be considered to be in alignment with the Safe Routes to School Program (www.wsdot.wa.gov/LocalPrograms/SafeRoutes/default.htm), and consider improvements that reduce potential pedestrian and bicycle conflicts with motor vehicle traffic; and/or establish safer and fully accessible crossings, walkways, trails or bikeways.

The following are capacity recommendations for the study corridor. It should be remembered that this is not a project list and state funding for these recommendations is subject to them prioritizing above other state wide transportation needs. The recommendations are further broken down into a sequence that reflects a logical approach to considering implementation. The time frames do not imply a schedule depicting actual implementation timing. Longer term recommendations do not include specifics as to how the needs should be met. This approach allows for greater flexibility for decision making in the future.

Near Term Needs, Recommendation, and Cost Estimate

Widening from Jenkins Creek to 185th Ave SE* TIER 3

- Widen and reconstruct SR 516 between Jenkins Creek and 185th Place SE. This project will include the crossing of Jenkins Creek with a new structure for the stream, widening the street from 2-lanes to 5-lanes including curb and gutter, 8' sidewalks, access control features, landscaping and provisions for u-turns. A five foot bike lane is planned from east of the bridge to 185th Ave SE. This recommendation is consistent with the city of Covington's Transportation Improvement Plan.
- Estimated cost range (2011 dollars) $10.6M to $15.2M

- Considerations for construction include possible impacts to wetlands, residential properties, and access and egress points to and from SR 516. Additional costs have been included in the estimate for the remediation of the existing fish barrier location at Jenkins Creek.
- The benefit cost ratio was determined to be 0.9 to 0.6.

* *Only travel time savings within the segment recommended for improvement are included in the benefit to cost ratio (B/C) calculation. B/C is only one of several factors considered in making the recommendations. Other benefits exist that may be less tangible from a purely economic standpoint, but important to society as a whole.*

Mid Term Needs, Recommendations, and Cost Estimates

Intersection improvements at SR 516/104th Avenue SE (SR 515) TIER 1

- Improvements could range from local street improvements helping to relieve pressure on this intersection, and/or access removal of SE 256th St to SR 516, and/or a roundabout and/or improving the current intersection design with additional turning lanes, storage lanes and other related improvements.
- Estimated cost range (2011 dollars) $3.5M to $19.5M
- Considerations for construction include possible impacts to adjacent parking lots and businesses.
- The benefit cost ratio was determined to be 7.6 to 5.7.

Widening from 185th Ave SE to 192nd Ave SE* TIER 3

- Widen and reconstruct SR 516 between 185th Place SE and 192nd Avenue SE. This project will widen the street from 2-lanes to 5-lanes including curb and gutter, 8' sidewalks, access control features, landscaping and provisions for u-turns. A five foot bike lane is also planned. This recommendation is consistent with the city of Covington's Transportation Improvement Plan.
- Estimated cost range (2011 dollars) $10.2M to $13.6M
- Considerations for construction include possible impacts to residential properties, and access and egress points to and from SR 516.
- The benefit cost ratio was determined to be 0.7 to 0.6.

* *Only travel time savings within the segment recommended for improvement are included in the benefit to cost ratio (B/C) calculation. B/C is only one of several factors considered in making the recommendations. Other benefits exist that may be less tangible from a purely economic standpoint, but important to society as a whole.*

Long Term 2030 Needs and Recommendations

Intersection improvements at SR 516/Central Avenue N	TIER 1
Intersection improvements at SR 516/SE 256th St	TIER 1
Intersection improvements at SR 516/108th Avenue SE	TIER 1
Intersection improvements at SR 516/132nd Ave SE	TIER 1
Intersection improvements at SR 516/152nd Avenue SE	TIER 1
Intersection improvements at SR 516/172nd Avenue SE	TIER 1
Intersection improvements at SR 516/SE Wax Road	TIER 1
Capacity improvements from 192nd Ave SE to 216th Ave SE	TIER 3

5.4 Environmental Considerations

As discussed in Chapter 3, Environmental Overview, there are a number of environmental considerations to be addressed before any physical alteration of the existing corridor is undertaken. In connection with suggested improvements as part of this study, the primary area of interest is Jenkins Creek in Covington. Before any improvements are made to the corridor facilities, wetland, wellhead, and fish barrier issues must be addressed. Covington has already been working on a preliminary design for roadway widening and culvert replacement. Covington has been working on this design in cooperation with King County and the Department of Fish and Wildlife. The improvement to the roadway at Jenkins Creek will result in the removal of an existing fish passage barrier with better access to approximately 18,500 square meters of upstream habitat.

WSDOT is in the preliminary stages of looking at stream sheds and the fish barrier issue in a more holistic manner, with the thought of coordinating efforts between different participants. WSDOT Olympic Region is considering a pilot study on the Olympic Peninsula. The general idea is that many jurisdictions may have single project fish passage needs and limited funds to accomplish the work. If each jurisdiction moved ahead on its own individual timeline, just a "piece" of a stream is opened up to fish passage. But if jurisdictions got together and pooled their monies and identified the best way to prioritize projects in the area, i.e. focus on the "right" barriers, there is a likelihood of maximizing the stream's fish rearing potential. The hoped for results could include maps to show existing problems and potential combinations of fixes. All investigations into this concept will be coordinated with the Environmental Services Office. While the effort to coordinate fish barrier removals on a stream shed basis is in its infancy, when any of the three existing fish barriers along the study corridor is being considered for replacement, the project managers should investigate the progress of the coordination effort, and utilize the findings if available.

Any other work performed on the intersections or associated with development along the roadway must address the environmental issues associated with the area and ensure that these actions do not impact the environment unnecessarily or create a future environmental issue that may impact the state facility's functions.

CHAPTER 6

Next Steps

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CHAPTER 6: NEXT STEPS

This chapter presents an overview of the next steps towards integration with other plans, obtaining project funding, and initiating implementation of the SR 516 recommendations. The SR 516 Corridor Planning Study identifies corridor needs that are based on Washington State Department of Transportation (WSDOT) Moving Washington guidelines and proposes actions to address those needs. While this alone does not guarantee implementation funding, the plan allows future consideration for funding requests to be focused on areas of greatest need in this corridor. These identified areas will compete with other similar locations around the state for future funding based on performance outcome.

The SR 516 Corridor Plan has identified preservation activities, safety considerations, operational efficiencies, demand management strategies, and capacity improvements that are recommended to meet the corridor needs. With prevailing economic conditions, the available revenue needed to implement these recommendations is very limited and WSDOT cannot fund the recommendations in the near term. In the future, actual conditions and available technology may present opportunities to address corridor needs in more sustainable and less capital intensive ways. These should be taken into consideration in determining the best approach to achieve the desired outcome. Given the higher priority of maintenance, safety, efficient operations, and demand management, these strategies are to be considered and utilized prior to capacity improvements being implemented. Should state funding become available for new capacity improvements, any recommendations made here would be subject to the prioritization process against other statewide transportation needs.

Specific actions that should be taken to position the corridor plan proposed improvements for future implementation include:

- Incorporate the SR 516 Corridor Plan recommended improvements in the State's Highway System Plan (HSP) and the Puget Sound Regional Council transportation plan, as appropriate.
- Incorporate the SR 516 Corridor Plan recommended improvements, as appropriate, in city comprehensive plans.

6.1 What Funding Sources are Available?

There are a variety of funding sources that can be utilized to fund recommendations. Given the current economic climate, coupled with the limited dollars that are available for projects and the stiff competition for available funding; one or all of the sources listed below might be needed to fund the improvements.

Local Agency Funding - To be eligible for and competitive in most grant programs, local matching dollars are required – in fact, the more local participants are involved in and support a project financially, the more competitive a grant application can become. In addition to local matching dollars for grants, some communities have formed transportation benefit districts to raise funds for transportation projects. These districts, formed by the local government(s) through legislative action or a vote of the people, levy a tax for a specific transportation project within that jurisdiction(s). State law regarding benefit transportation districts (RCW 36.73) should be consulted before such a district is established by the jurisdiction(s).

Some other options include regional mobility grants, transit program funding for enhanced service, vanpool investment program, park & ride opportunities, special use needs, etc.

Development Impact Fees - The use of development impact fees to fund public facilities that are necessary to provide services for new developments and maintain acceptable level-of-service has been widely used in Washington and across the U.S. Development impact fees are one-time charges applied to new developments. Their goal is to raise revenue for the construction or expansion of capital facilities located outside the development to maintain an acceptable level-of-service for all users. Impact fees are assessed and dedicated principally for the provision of additional water and sewer systems, roads, schools, libraries, parks, and recreation facilities made necessary by the presence of new residents in the area. As new developments are approved, consideration should be given to their impact on the operation of local, county, and state highways within the proximity of the new development. New development along the corridor should be tasked with providing facilities that may be missing in the area involved. Examples can be sidewalks, bike facilities, safe vehicular access, landscaping, transit stops, etc. Other improvements may include requiring appropriate transportation demand management measures as a condition of development. These facilities benefit the business as well as the travelling public. Developers can also participate in improvements to mitigate impacts on a pro-rata share basis (rough proportion based upon new traffic added)

State Funding - The state of Washington also administers a number of funding programs that can be used for transportation projects. The most common source of state grant funds for projects along the corridor is the Transportation Improvement Board (TIB). The Washington State Legislature created the Transportation Improvement Board (TIB) to foster state investment in quality local transportation projects. The TIB distributes grant funding, which comes from the revenue generated by three cents of the statewide gas tax, to cities and counties for funding transportation projects.

For the improvements, these funds can be used by the incorporated cities to lead selected improvement projects within their jurisdictions, such as intersection improvements or parallel street improvements than can divert traffic from the state highway along the corridor.

Another means of funding and implementing corridor plan recommendations is through legislative funding. Delegates can choose to introduce as a line-item a project that provides safety, congestion, economic, or other benefits that meet community needs. Study findings and recommendations in support of projects help to demonstrate the need. Moreover, since the plan is developed through a public process, stakeholder support is behind the recommendations.

Federal Funds - On July 6, 2012, President Obama signed into law P.L. 112-141, the Moving Ahead for Progress in the 21st Century Act (MAP-21). Funding surface transportation programs at over $105 billion for fiscal years (FY) 2013 and 2014, MAP-21 is the first long-term highway authorization enacted since 2005. MAP-21 represents a milestone for the U.S. economy – it provides needed funds and, more importantly, it transforms the policy and programmatic framework for investments to guide the growth and development of the country's vital transportation infrastructure.

MAP-21 creates a streamlined, performance-based, and multimodal program to address the many challenges facing the U.S. transportation system. These challenges include improving safety, maintaining infrastructure condition, reducing traffic congestion, improving efficiency of the system and freight movement, protecting the environment, and reducing delays in project delivery.

MAP-21 builds on and refines many of the highway, transit, bike, and pedestrian programs and policies established in 1991. This summary reviews the policies and programs administered by the Federal Highway Administration. The Department will continue to make progress on transportation options, which it has focused on in the past three years, working closely with stakeholders to ensure that local communities are able to build multimodal, sustainable projects ranging from passenger rail and transit to bicycle and pedestrian paths.

Setting the course for transportation investment in highways, MAP-21:

Strengthens America's highways
MAP-21 expands the National Highway System (NHS) to incorporate principal arterials not previously included. Investment targets the enhanced NHS, with more than half of highway funding going to the new program devoted to preserving and improving the most important highways – the National Highway Performance Program.

Establishes a performance-based program
Under MAP-21, performance management will transform Federal highway programs and provide a means to more efficient investment of Federal transportation funds by focusing on national transportation goals, increasing the accountability and transparency of the Federal highway programs, and improving transportation investment decision making through performance-based planning and programming.

Creates jobs and supports economic growth
MAP-21 authorizes $82 billion in Federal funding for FYs 2013 and 2014 for road, bridge, bicycling, and walking improvements. In addition, MAP-21enhances innovative financing and encourages private sector investment through a substantial increase in funding for the TIFIA program. It also includes a number of provisions designed to improve freight movement in support of national goals.

Supports the Department of Transportation's (DOT) aggressive safety agenda
MAP-21 continues the successful Highway Safety Improvement Program, doubling funding for infrastructure safety, strengthening the linkage among modal safety programs, and creating a positive agenda to make significant progress in reducing highway fatalities. It also continues to build on other aggressive safety efforts, including the Department's fight against distracted driving and its push to improve transit and motor carrier safety.

Streamlines Federal highway transportation programs
The complex array of existing programs is simplified, substantially consolidating the program structure into a smaller number of broader core programs. Many smaller programs are eliminated, including most discretionary programs, with the eligibilities generally continuing under core programs.

Accelerates project delivery and promotes innovation
MAP-21 incorporates a host of changes aimed at ensuring the timely delivery of transportation projects. Changes will improve innovation and efficiency in the development of projects, through the planning and environmental review process, to project delivery.

MAP-21 restructures core highway formula programs. Activities carried out under some existing formula programs – the National Highway System Program, the Interstate Maintenance Program, the Highway Bridge Program, and the Appalachian Development Highway System Program – are incorporated into the following new core formula program structure:

- National Highway Performance Program (NHPP)
- Surface Transportation Program (STP)
- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Highway Safety Improvement Program (HSIP)
- Railway-Highway Crossings (set-aside from HSIP)
- Metropolitan Planning

It creates two new formula programs:

- Construction of Ferry Boats and Ferry Terminal Facilities – replaces a similarly purposed discretionary program.
- Transportation Alternatives (TA) – a new program, with funding derived from the NHPP, STP, HSIP, CMAQ and Metropolitan Planning programs, encompassing most activities funded under the Transportation Enhancements, Recreational Trails, and Safe Routes to School programs under SAFETEA-LU.

MAP-21 creates a new discretionary program – Tribal High Priority Projects (THPP) – and continues the following current discretionary programs:

- Projects of National and Regional Significance (PNRS)
- On-the-Job Training Supportive Services
- Disadvantaged Business Enterprise (DBE) Supportive Services
- Highway Use Tax Evasion (Intergovernmental enforcement projects)
- Work Zone Safety Grants

It also eliminates most current discretionary programs, but many of the eligibilities are covered in other programs:

- Delta Region Transportation Development
- Ferry Boats Discretionary
- Highways for LIFE Demonstration Program

- Innovative Bridge Research and Deployment
- Interstate Maintenance Discretionary
- National Historic Covered Bridge Preservation
- National Scenic Byways
- Public Lands Highway Discretionary
- Railway-Highway Crossing Hazard Elimination in High Speed Rail Corridors
- Transportation, Community, and System Preservation
- Truck Parking Pilot Program
- Value Pricing Pilot Program (no additional funding, but authority remains)

MAP-21 extends current law (SAFETEA-LU) for the remainder of FY 2012, with new provisions for FY 2013 and beyond taking effect on October 1, 2012. Funding levels are maintained at FY 2012 levels, plus minor adjustments for inflation – $40.4 billion from the Highway Trust Fund (HTF) for FY 2013, and $41.0 billion for FY 2014.

Additional information can be found at www.dot.gov/map21.

Appendix A – Route Classifications

Table 3.1 in this report lists various classification schemes used by the Washington State Department of Transportation (WSDOT) and others in managing the state's transportation system. Program funding, operations and maintenance are among the WSDOT functions affected by these classification programs. The following is a brief description of each classification program and its function.

Functional Class (Federal and State)
Federal Functional Classification is one of the determining factors of eligibility for Federal Transportation Funding. The classification should reflect the residential, commercial and industrial uses served by the route, municipal boundaries, and the urbanized area designations of the U.S. Bureau of the Census.

State functional classifications seek to group highways, roads and streets by the character of service they provide. The system was developed for transportation planning purposes. It recognizes the various roles that individual routes play in the transportation network. Functional classification at this level is used to identify how to direct travel through the transportation network in the most logical and efficient manner. State functional classifications in Washington are divided in two major divisions, Rural and Urban. For this division the Federal Aid Highway Urban (or Urbanized) Area Boundary is used to divide the route classifications. See "Functional Classification System Concepts, Criteria, and Procedures, FHWA 1989" for more information.

Highway of Statewide Significance (HSS)
The designation of Highways of Statewide Significance (HSS) was mandated by the 1998 Washington State Legislature. Highways of Statewide Significance include, at a minimum, interstate highways and other principal arterials that are needed to connect major communities in the state. The designation helps assist with the allocation and direction of highway funding. HSS highways are considered a higher priority for correcting identified deficiencies.

In some cases, the local Metropolitan Planning Organization or Regional Transportation Planning Organization, in coordination with WSDOT, sets the level of service standard for state highways within their jurisdiction. The 1998 legislation directed the Washington State Department of Transportation to set the level of service standards for HSS routes in consultation with local governments. However, WSDOT retains the authority to make final decisions regarding level of service standards for HSS routes.