Washington State
Department of Transportation

SR 167 Corridor Completion Comprehensive Tolling Study

Final Report

Prepared for the Washington State Legislature

February 2013

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Executive Summary

Project Background

Planning for the lower Puyallup Valley section of State Route (SR) 167 began over 40 years ago when freeway corridors for Interstates 5 and 405 and State Routes 167, 410 and 512 were proposed. In the late 1980s, a four-lane SR 167 from Renton to SR 161 (Meridian Ave.) in Puyallup was completed. Further construction to complete SR 167 to the Port of Tacoma was delayed due to a lack of funding. In 2006 a final Environmental Impact Statement (EIS) for the SR 167 Corridor Completion was released. The Federal Highway Administration (FHWA) signed the Record of Decision (ROD) the following year.

Project Vicinity Map

The full scope of the SR 167 Corridor Completion project as defined in the ROD includes three lanes (two general-purpose lanes and one HOV lane) in each direction from SR 161 to I-5, and two lanes in each direction west of I-5. This six-mile-long segment of highway will include five interchanges. The interchanges are to be located at SR 161, Valley Ave. E., I-5, 54th Ave. E. and SR 509.

Benefits to completing SR 167 include:

- relieve congestion on local roads and other highways by providing a new travel corridor
- move freight faster, more safely and economically
- improve regional mobility
- enhance surface water quality
- improve stream habitat feeding into Commencement Bay

To date, over $160 million has been invested in the project. This investment has enabled the Washington State Department of Transportation (WSDOT) to complete the EIS, advance design to 20% and acquire approximately 70% of the needed right of way. WSDOT estimates that approximately $1.5 billion is needed to purchase the remaining right of way, complete the design, acquire permits and construct the project.

The 2009 Legislature directed WSDOT to conduct a toll feasibility study to assess potential toll revenue that could be generated to help pay for completion of SR 167. The study concluded that tolling could fund approximately 20% to 40% of the remaining project construction cost, however since that time a number of assumptions have changed including:

- no tolls will be collected on existing facilities
- lower value of time
- lower population and employment forecasts
- the toll rate would not escalate over time in accordance with the directive by the Washington State Treasurer

The study noted that the amount of revenue generated would depend on a number of factors, including but not limited to, financial market conditions, how broadly tolls would be collected, traffic growth, additional new parallel toll-free facilities and construction methods.

In 2011, the Legislature directed WSDOT "...to continue work on a comprehensive tolling study of state route number 167 corridor..." This report is the result of that directive, in which WSDOT conducted a comprehensive technical study that involved extensive traffic, toll, and revenue modeling analyses combined with public and stakeholder engagement to identify potential impacts and equity issues associated with tolling.

This study analyzed six different project phasing options to determine the level of capital construction costs that could be supported from toll revenues. The analysis shows that tolls could generate as much as $65 million or as low as zero, depending on the option selected.

Study Methodology and Key Assumptions

The Puget Sound Regional Council's (PSRC) regional travel demand forecast model was used to estimate traffic volumes and to help assess toll rates in this study. A sub-area traffic model was developed to supplement the regional model when assessing potential traffic diversion by accounting for travel delays on adjacent arterials.

The traffic and toll modeling work included the following assumptions:

- corridor construction will commence in 2016 and be completed in 2020
- toll collection will start at project opening (2020) and continue at least to 2050
- all vehicles using the corridor will pay tolls with the exception of transit
- tolls will vary by time of day based upon the level of congestion
- trucks will pay higher tolls based on the number of axles, similar to the Tacoma Narrows Bridge
- tolls will be charged on all segments of the new roadway (segmental tolling = the longer the distance one drives along the corridor, the more one pays in tolls)
- no tolls will be charged on existing facilities

The following assumptions were used in the financial capacity analysis:

- issuance timing of bonds: 2nd year of construction (2018)
- coverage ratio: 1.5 times debt-service requirements
- current interest rate bond: 6.25%
- capital appreciation bond interest rate: 7.75%
- no toll rate escalation over time in accordance with directive by Washington State Treasurer

Phasing Options

A stakeholder committee, formed by WSDOT, developed 19 possible construction options. After review and evaluation, 13 of the 19 options were discarded and six options were carried forward for more detailed traffic and revenue analysis. These options ranged from building one lane in each direction for only a portion of the corridor to building the full facility. The six options are shown on the following page.

Phase 1A ($272 million)

Phase 1B ($463 million)

Phase 1C ($711 million)

Phase 1 ($963 million)

Phase 2 ($1.25 billion)

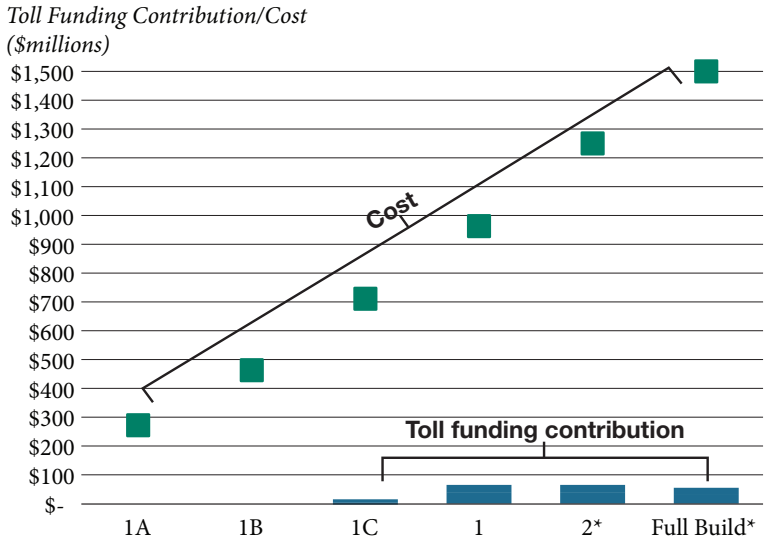
Phase 3 ($1.5 billion)

Key Findings

Through the use of a public opinion survey, focus group discussions and traffic/toll modeling and analysis, the study identified the following key points:

- There is strong support among the public and stakeholders to complete SR 167. Over 90% of those surveyed stated that SR 167 completion is a high priority.
- Public support for the project is diminished if the new facility is tolled.
- About two-thirds of those surveyed stated they would be more supportive of tolling if the toll revenue was exclusively used to fund construction of the SR 167 completion.
- There is a strong stakeholder resistance to tolling existing facilities, including SR 167 or parallel routes.
- Without future improvements on I-5 to accommodate traffic growth, congestion on I-5 is expected to grow. That growth could, in turn, limit usage of the SR 167 corridor and negatively affect toll revenue.
- Assuming the establishment of carefully-structured toll rates and economies of scale in tolling, the six options could generate revenue to pay for ongoing facility maintenance, operations, and toll collection costs. Tolls would, however, only generate limited funding for construction (see chart, next page.)
- Tolling would help manage traffic demand and make a phased approach more viable from both a traffic operation and financial standpoint.
- Without tolling, Phase 1 would require two lanes in each direction between I-5 and Meridian Road. That option would make the initial construction more costly and would increase traffic on I-5. Without additional improvements on I-5, that extra traffic would impede I-5 operations.

Potential toll contributions and construction cost comparison for the six options



*Toll funding contructuion for Phase 2 and Phase 3 were not fully analyzed. The data were extrapolated from Phase 1 for illustration.

The above chart compares the total cost of each option and the net toll revenue expected to be available for upfront construction (after deducting for ongoing facility operations and maintenance). When compared to the 2010 study findings, the potential financial capacity of tolling is significantly lower. A number of factors contribute to this outcome.

- **No tolling of existing facilities:** The 2010 study assumed that existing SR 167 east of Meridian Ave. would be tolled, negating travelers' ability to divert onto a non-tolled facility. Some of the 2010 study tolling scenarios also assumed that existing SR 509 would be tolled and that some I-5 HOV lanes would be converted to high-occupancy-toll (HOT) lanes.
- **Lower Time Value:** Drawing from the experience of SR 520 tolling, a lower value of time was assumed in this study compared to the 2010 study. A lower value of time means that travelers are less willing to pay a toll, leading to lower toll rates and higher traffic diversion to non-tolled facilities.
- **Lower population and employment forecasts:** These forecast are lower as a result of the recent recession.
- **No toll rate escalation:** Per direction from the State Treasurer's office, there was no toll rate escalation in this analysis.

It should be noted that there is a high degree of uncertainty in toll revenue projections, especially for new highways. Toll contributions can vary as a function of the type of debt instruments used, market conditions and interest rates at the time the debt is issued, and policy decisions on debt structure. As such, the findings in this study could be significantly different if market conditions and public willingness to pay tolls are different than the assumptions used in this study.

Chapter 1:

Legislative Directive, Purpose, and Background

The 2011 Legislature directed WSDOT to conduct a comprehensive tolling study of the SR 167 Corridor Completion that would build on the 2010 Toll Feasibility Study. The budget proviso provided $1 million for the study and specifically directed WSDOT:

> *".....to continue work on a comprehensive tolling study of state route number 167 corridor (project 316718S). As funding allows, the department shall also continue work on a comprehensive tolling study of the state route number 509 corridor."*

Study Purpose

The purpose of this study was to conduct a detailed analysis of how much revenue can be generated from tolling the SR 167 corridor, and how much revenue will be needed from other sources to complete the corridor construction in either an incremental approach or full completion of the project. Also incorporated into this study are updated operational and financial assumptions and examines the following topics in detail:

- public support of tolling to help finance the project
- verification of preliminary assumptions associated with a tolling concept of operations
- toll rates
- population and employment growth projections
- value of time ("willingness to pay")
- implications of potential construction phasing of project segments
- verification of preliminary design and cost estimates
- toll revenue estimates and potential financial capacity based on current market conditions
- environmental justice analysis

Background and the 2010 Toll Feasibility Study

Figure 1.1: Project Vicinity Map

Planning for the lower Puyallup Valley section of SR 167 began more than 40 years ago when freeway corridors for I-5, SR 167, SR 410 and SR 512 were proposed. By the late 1980s, a four-lane highway from I-405 in Renton to SR 161 in Puyallup was complete.

In 2006, the final EIS for the lower Puyallup Valley section of SR 167 from Puyallup to SR 509 was completed. The Federal Highways Administration signed the ROD in the following year.

The full scope of the project as defined in the ROD includes three lanes (two general-purpose lanes and one HOV lane) in each direction from SR 161 to I-5, and one lane in each direction west of I-5. This six-mile-long segment of highway also includes five new interchanges and additional improvements to facilitate local traffic circulation. The project completes an important link missing in the state highway network, which is essential to accommodate further growth of the Port of Tacoma and the region.

To date, more than $160 million in funding has been secured for project completion. These funds allowed WSDOT to complete the EIS, advance project design to the 20% level, and acquire 70% of the needed right of way. Approximately $1.5 billion is needed to acquire the remaining right of way, secure permits and complete construction of the full corridor project.

This report is the second, and more comprehensive, SR 167 tolling study directed by the Legislature. In 2009, the Legislature directed WSDOT to complete a toll feasibility study. As part of the study WSDOT was asked to:

- assess the potential for variable tolling to generate revenue for transportation facilities within the corridor
- develop scenarios that optimize traffic flow in the SR 167 corridor
- identify economic considerations for future system investments

In carrying out the 2009 study mandate, WSDOT worked with stakeholders from affected cities and jurisdictions, as well as the Puyallup Tribe of Indians, the Puget Sound Regional Council, and FHWA to evaluate six combinations of construction phasing and tolling options. The construction phasing options ranged from constructing one lane in each direction along the entire new corridor, to constructing one lane in each direction on only portions of the corridor. The tolling concepts also varied from tolling only the new roadway to tolling the new corridor and existing SR 167 just east of SR 161, tolling SR 509 and converting existing I-5 HOV lanes to HOT lanes.

WSDOT completed the Toll Feasibility Study in 2010 and concluded that tolling was feasible. The study found that tolling could generate a significant amount of revenue, but that a majority of construction funding would need to come from other sources. The 2010 study also concluded that travel demand would be reduced under tolled conditions, creating opportunities to phase project construction. Based on these results, the project stakeholders showed considerable interest in conducting a comprehensive tolling study and implementation of the full project.

This study builds upon the analysis and findings of the 2010 Toll Feasibility Study and analyzes construction phasing and tolling scenarios in greater detail. It uses updated economic, demographic, traffic and financial assumptions to compare the benefits and costs of the options.

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Chapter 2:
Toll Study Approach and Methodology

Study Approach and Methodology

Building upon the findings of the 2010 Toll Feasibility Study, various phasing options and associated tolling concepts were updated, developed and evaluated in this current study.

For example, project cost estimates were refined to reflect the most recent construction cost, and demographic and employment-growth projections were revisited to account for the recent economic recession. It also incorporated the most recent economic market conditions and financial assumptions. Opening a new facility and introducing tolls can be expected to influence travel patterns on the roadway network in the area. To augment the regional traffic forecast model and improve the accuracy of traffic and revenue forecasts, a micro-level mesoscopic model was developed and used in the analysis. The mesoscopic model does a better job of capturing traffic diversion by providing additional detail and accounting for intersection delays on local arterials.

Study Scope

The study's project manager and a technical advisory committee identified tasks and developed a project scope of work. The technical advisory committee was comprised of WSDOT and consultant staff to ensure that the study's methodologies and assumptions were consistent with other WSDOT toll studies.

The following tasks were identified as the major study elements:

- develop project phasing plan, update design and cost estimates
- develop tolling options, concept of operations and cost estimates
- develop 30-year roadway maintenance, operation and preservation cost estimates
- traffic and toll modeling
- gross revenue projections
- financial capacity analysis
- stakeholder collaboration
- public outreach
- environmental justice analysis
- study documentation

Assumptions

The key traffic and toll modeling assumptions included:

- construction beginning in 2016, corridor opening to traffic in 2020
- toll collection starting at project opening (2020) and continuing at least to 2050
- tolling all vehicles using the corridor except transit
- varying tolls by time of day based on overall levels of congestion
- tolling multi-axle vehicles at a rate based on the number of axles
- tolling by corridor segments (segmental tolling = the longer the distance one drives along the corridor, the more one pays in tolls)

Study Organization

This study was conducted by WSDOT with the assistance of consultants that specialize in the areas of financial analysis and public involvement. A stakeholder committee consisting of representatives from regional and local jurisdictions along the corridor was continued from the 2010 Toll Feasibility Study. This committee was convened at key study milestones. It served as a sounding board for project issues and reviewed draft results. The stakeholder committee included representatives from the following jurisdictions and agencies:

- City of Auburn
- City of Edgewood
- Federal Highway Administration
- City of Fife
- Freight Mobility Strategic Investment Board (FMSIB)
- City of Pacific
- Pierce County
- Puget Sound Regional Council
- City of Puyallup
- Puyallup Tribe of Indians
- South Sound Chamber of Commerce Legislative Coalition
- Port of Tacoma
- City of Tacoma
- Tacoma – Pierce County Chamber of Commerce
- Washington Trucking Association

This committee met seven times at key study milestones to provide input and review analysis results. Study updates were also provided to the WSDOT Toll Executive Committee and Washington State Transportation Commission at key milestones to seek direction and guidance. The WSDOT Toll Executive Committee is comprised of the WSDOT Secretary and WSDOT assistant secretaries and division directors.

Toll Decision-Making Framework in Washington State

The Legislature decides if and where tolls will be imposed on state highways and how toll revenue will be used. The Legislature has delegated toll-rate-setting authority to the Washington State Transportation Commission. WSDOT conducts studies and presents the findings to the Legislature and Commission for consideration.

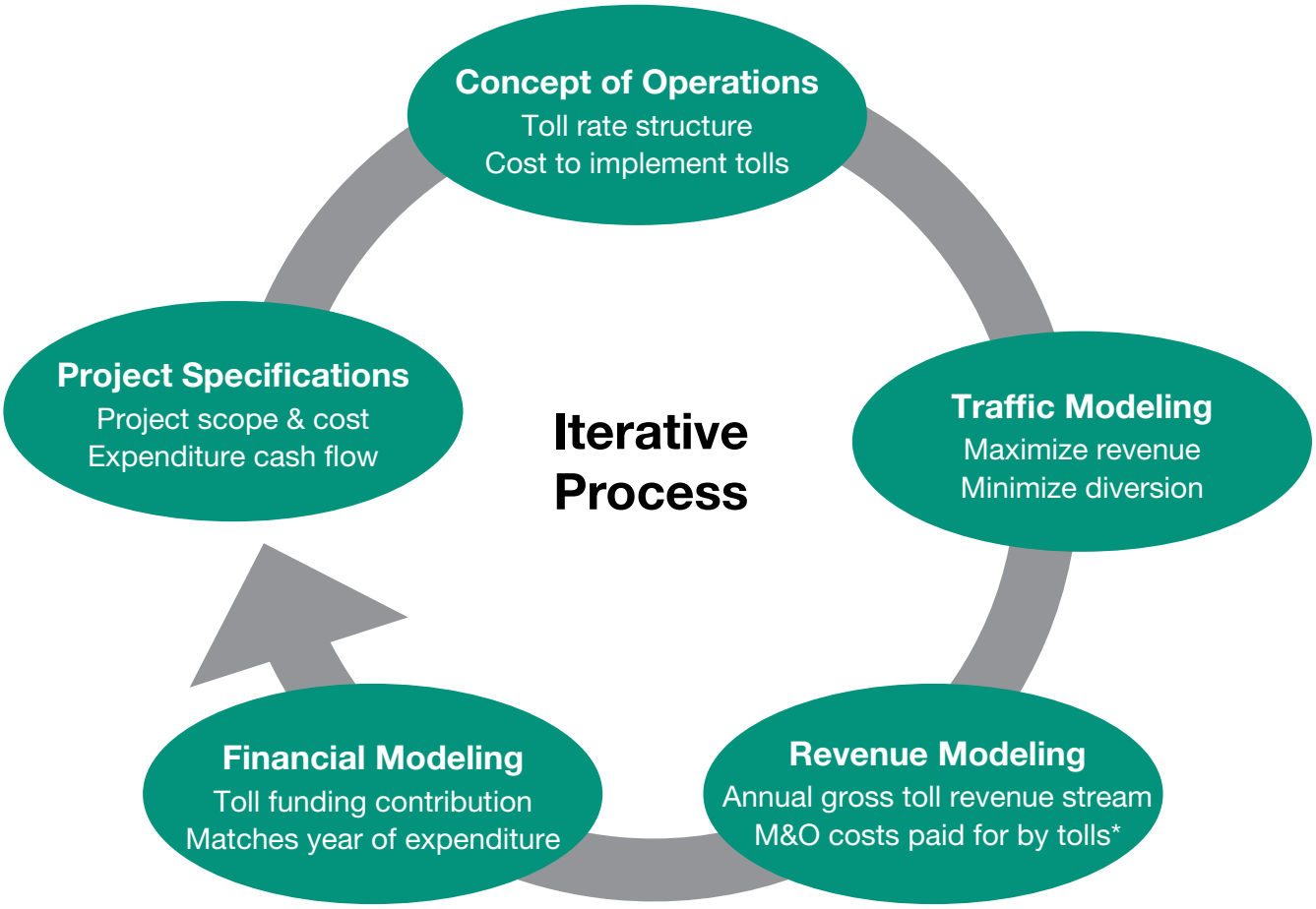
Different Types of Toll Studies

Toll studies are classified into three categories:

- **Feasibility Study:** A data-driven technical analysis that focuses on traffic and financial modeling, operations and cost estimates. Feasibility studies are typically the first step in determining whether tolling a project makes sense. Due to the preliminary nature of these studies, public involvement is usually minimal.
- **Comprehensive Toll Study:** Provides technical analysis and public and stakeholder engagement to address a wide range of tolling related issues, including public acceptability, traffic diversion and equity. Comprehensive tolling studies are intended to examine in more detail the trade-offs associated with tolling proposals, to identify the most promising toll options, and to determine public acceptability.
- **Investment-Grade Toll Study:** The final step in the toll planning process is conducted just prior to bond issuance. It involves a detailed analysis of toll traffic revenue and financial capacity forecasts based on the most current market conditions and assumptions for a specific toll proposal. If the project intends to issue debt to fund construction, an investment-grade study will be necessary to satisfy credit-rating agencies and bond underwriters.

This study is a comprehensive toll study. It is an iterative process as illustrated in Figure 2.1 (next page). The technical analysis process starts with project specifications or roadway configurations. That is followed by development of a concept of operations, traffic and revenue modeling, and financial analysis. Upon review of the draft financial results, there may be a desire to study more roadway configurations or phasing plans and/or different toll operation concepts. In that situation, the process is repeated.

Figure 2.1: Comprehensive Toll Study Technical Process



*O&M = Operations and Maintenance

Chapter 3:
Options Development and Cost Estimates

The ultimate objective of the SR 167 Corridor Completion project is to build the final segment of SR 167, connect it to I-5 and to the Port of Tacoma. The full-build concept consists of two general-purpose lanes and one HOV lane in each direction for a total of six lanes. However, the cost for the full-build project ($1.5B) and the funding gap necessitates consideration of a phased project implementation.

Phasing Options Studied

In order to provide a menu of investment options for the Legislature to consider, WSDOT and the stakeholder committee developed and evaluated a number of phasing options ranging from constructing one lane in each direction for a portion of the corridor, to eventually completing the SR 167 corridor in the full-build configuration. The stakeholders did not officially endorse any phasing option as preferred and they did not endorse breaking the project into phases.

At the August 25, 2011 stakeholder committee meeting, WSDOT presented 19 phasing options. The stakeholder committee reviewed the options and recommended three options for further analysis. These three options have the same configuration for the highway section between I-5 and SR 509, but the project scope between SR 161 and I-5 could vary as follows:

- one lane each direction (Phase 1)
- two lanes each direction (Phase 2)
- three lanes each direction (the full-build configuration known as Phase 3)

Staff reported these options to the WSDOT Toll Executive Committee. The Toll Executive Committee endorsed the three options recommended by the stakeholder committee and added three more at smaller investment increments. These smaller investment options provided a road map for how Phase 1 might be staged in three investment increments at roughly a quarter billion dollars each (Phase 1A, 1B and 1C).

Figures 3.1 through 3.6 illustrate these different phasing concepts and what components of the full-build project would be built in a given project phase:

Figure 3.1: SR 167 Corridor Completion – Phase 1A

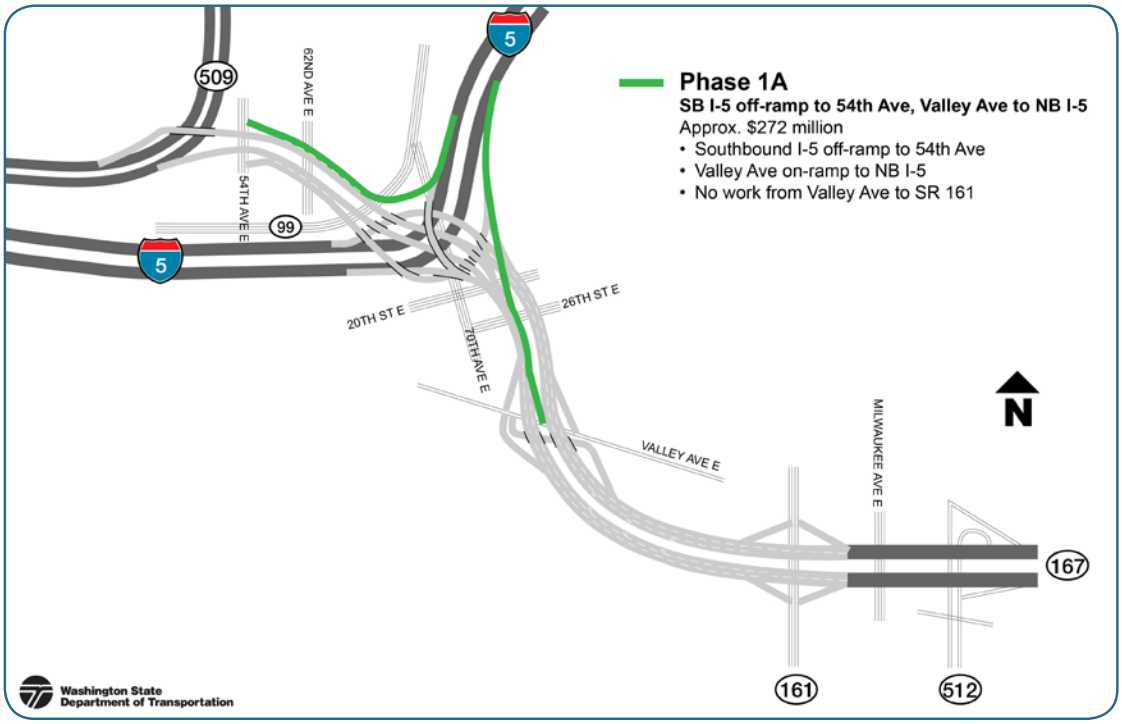


Figure 3.2: SR 167 Corridor Completion – Phase 1B

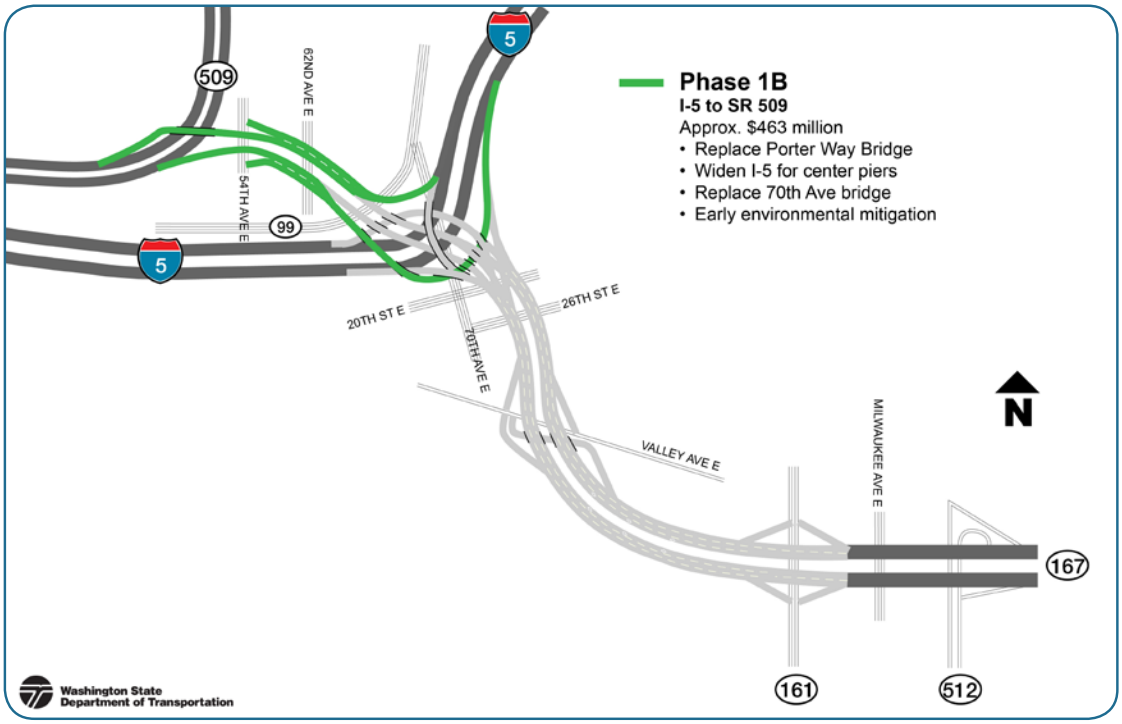


Figure 3.3: SR 167 Corridor Completion – Phase 1C

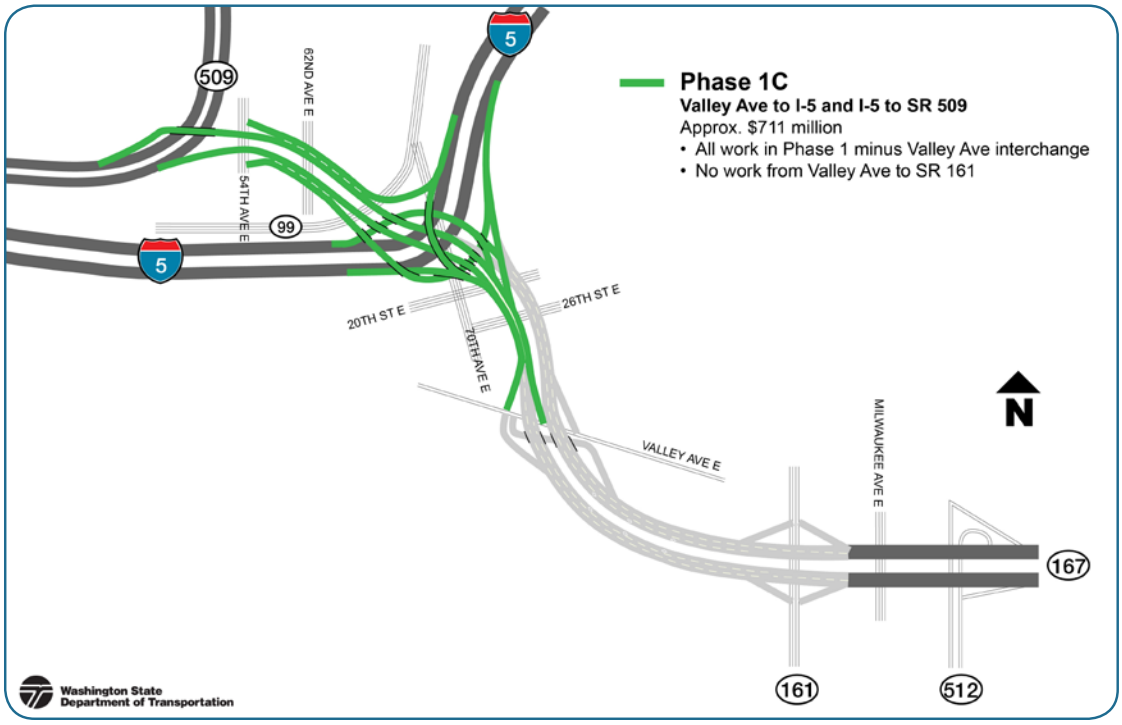


Figure 3.4: SR 167 Corridor Completion – Phase 1

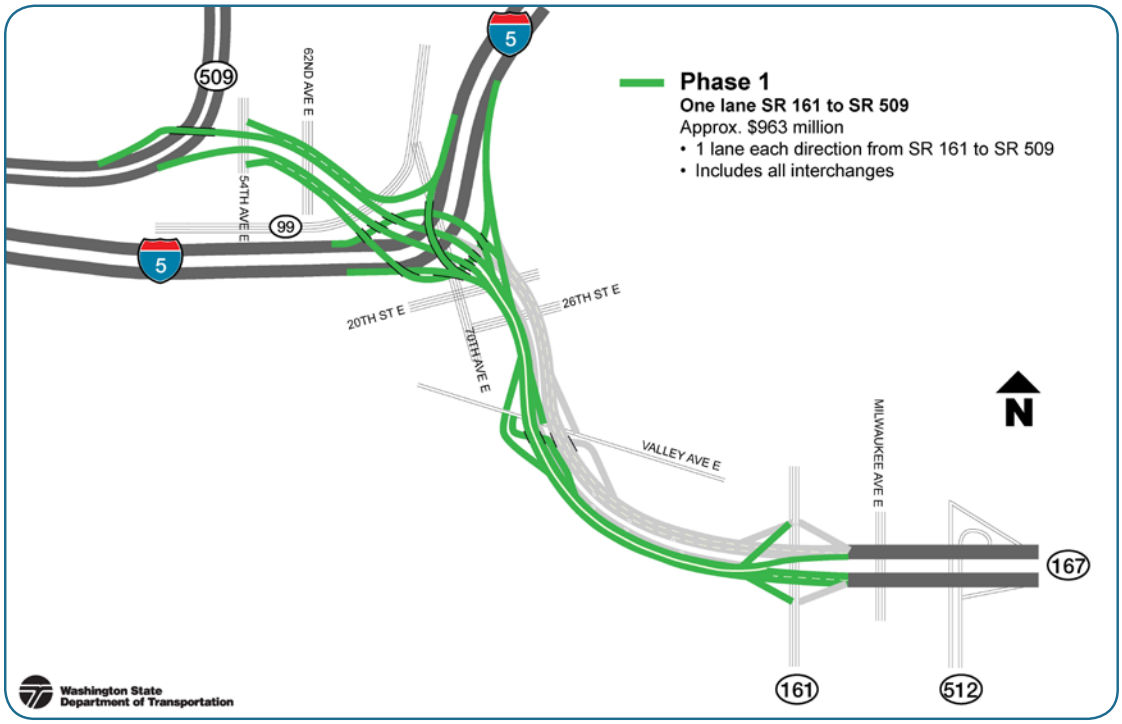


Figure 3.5: SR 167 Corridor Completion – Phase 2

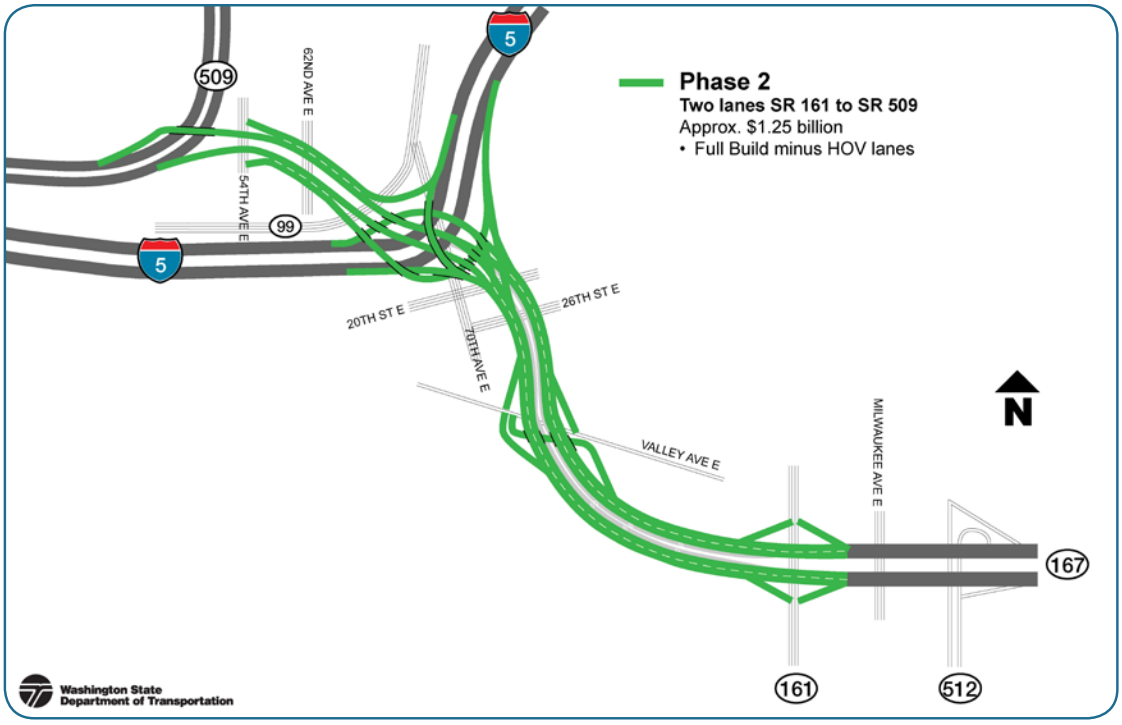
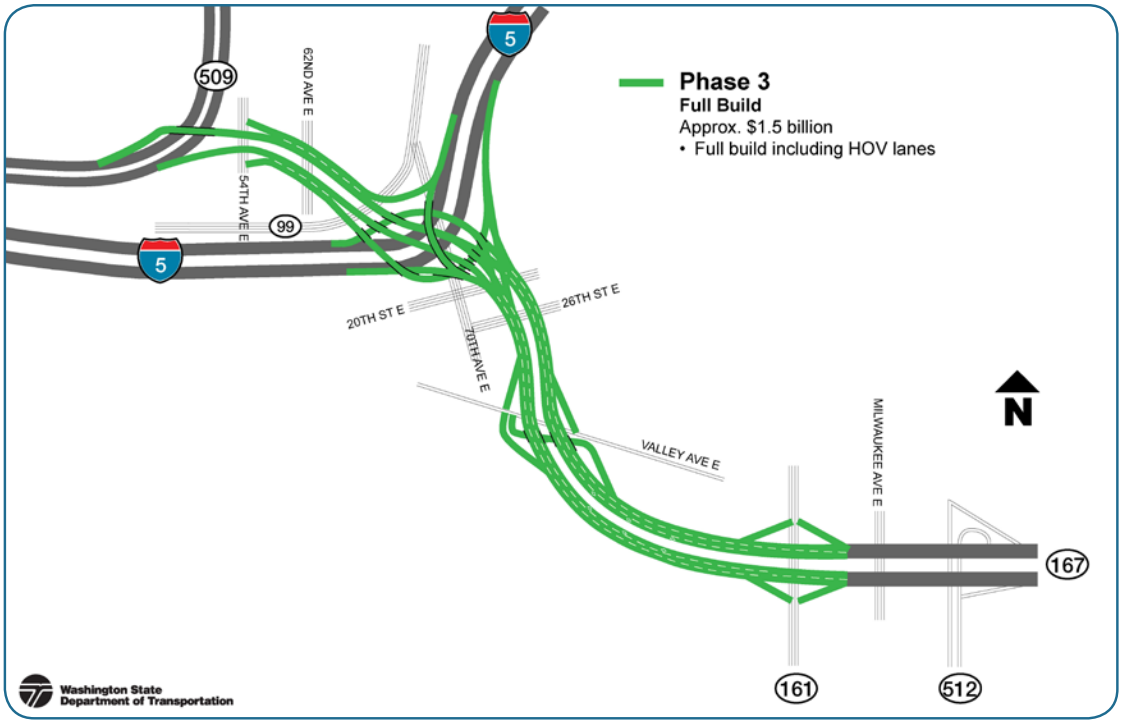


Figure 3.6: SR 167 Corridor Completion – Phase 3



Options Cost Estimates

Overview of the Cost Estimate Validation Process (CEVP)

WSDOT conducts risk-based cost-estimating processes using the CEVP cost-estimating tool. The CEVP process is done by means of workshops in which transportation projects are examined by a team of top engineers and subject matter experts. The CEVP team uses systematic project review and risk-assessment methods to identify and describe costs, schedule risks and evaluate the quality of the information. The CEVP process includes consideration of how risks can be reduced and which cost vulnerabilities and/or uncertainties can be managed or reduced.

Updated Cost Estimates

A key task in the SR 167 Corridor Completion - Comprehensive Tolling Study was to develop updated construction and operations and maintenance (O&M) cost estimates that reflect current market conditions and project scope. In February 2012, WSDOT conducted a CEVP workshop to update 2008 CEVP cost estimates for the full-build project and for "Option B," which later evolved into Phase 1. Subsequent to the 2012 CEVP workshop, cost estimates were completed for Phases 1A through 1C and for Phase 2 (two lanes in each direction, no HOV lanes).

In preparing for the February 2012 CEVP workshop, WSDOT staff reviewed the construction contract bid prices for the previous few years. Ultimately, the unit bid prices for the SR 167 Corridor Completion project were lowered by 20% with the exception of structures costs, which remained at the same level used in the 2008 CEVP. The updated CEVP assumed that construction would begin in 2016 and included inflated construction dollars to 2021. The CEVP team also reviewed risk factors applied in the 2008 CEVP process and made appropriate adjustments to the risk factors.

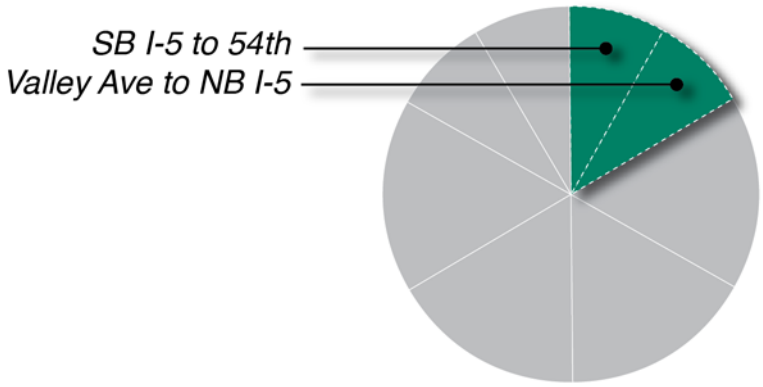
The WSDOT Real Estate Services Office prepared an updated cost estimate of the remaining right of way to be acquired for this project.

The pie charts on the following pages illustrate the scope and cost of each phase. The full-build option, described as Phase 3, is illustrated as the complete "pie." The remaining phases are illustrated in subsequent pie segments and differ from the full-build option:

- Phase 2 – no HOV lanes
- Phase 1 – construct one lane in each direction for the full length of the corridor
- Phase 1C – eliminate the segment between SR 161 and the Valley Ave. interchange
- Phase 1B – construct only the western segment of SR 167 from the I-5 interchange to SR 509 near the Port of Tacoma
- Phase 1A – the smallest phase, constructing a southbound I-5 exit to 54th Ave. in Fife and a northbound on-ramp from Valley Ave. to I-5

The following figures (Figures 3.7 - 3.12) show the break-out cost summaries and scope elements for each project phase:

Figure 3.7: Phase 1A

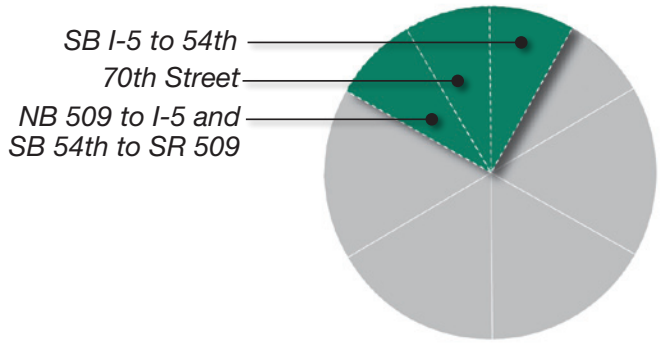


SB I-5 to 54th Ave., Valley Ave. to NB I-5

Cost-estimate: **$272 million**

- Project Phase Elements include:
  - southbound I-5 off-ramp to 54th Ave.
  - Valley Ave. on-ramp to NB I-5

Figure 3.8: Phase 1B

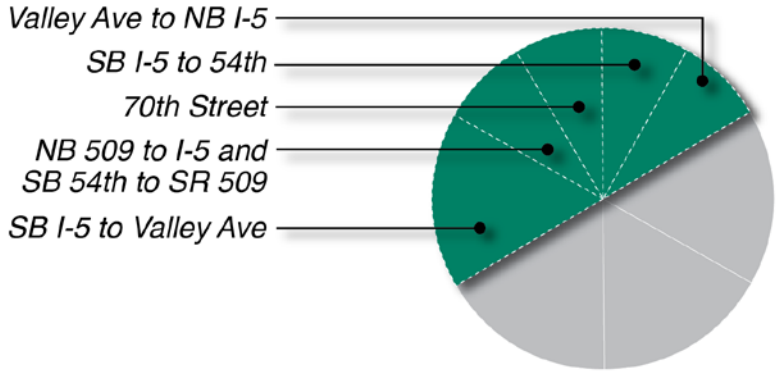


I-5 to SR 509

Cost-estimate: **$463 million**

- Project Phase Elements include:
  - the full-build segment from SR 509 to I-5
  - replace Porter Way & 70th Ave. bridges over I-5
  - widen I-5 for center piers
  - early environmental mitigation

Figure 3.9: Phase 1C

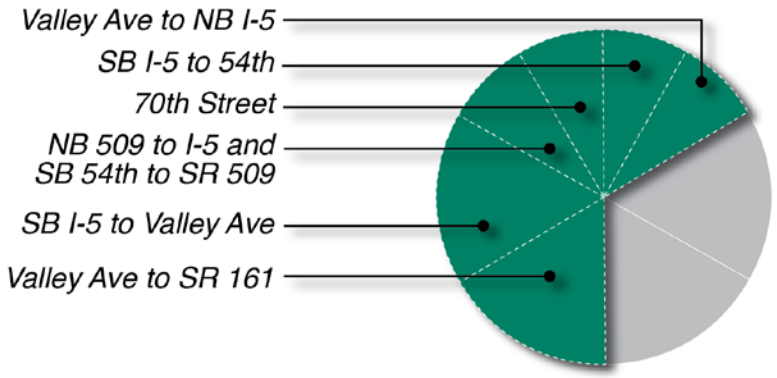


Valley Ave. to I-5 and I-5 to SR 509

Cost-estimate: **$711 million**

- Project Phase Elements include:
  - all work in Phase 1 *minus* Valley Ave. interchange, and no work from Valley Ave. to SR 161

Figure 3.10: Phase 1



SR 161 to SR 509

Cost estimate: **$963 million**

- Project Phase Elements include:
  - 1 lane each direction from SR 161 to SR 509
  - all interchanges

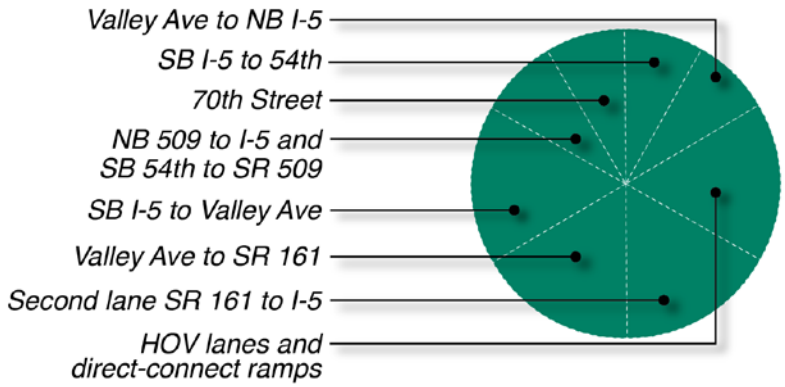
Figure 3.11: Phase 2

SR 161 to SR 509

Cost estimate: **$1.25 billion**

- Project Phase Elements include:
  - 2 lanes each direction from SR 161 to I-5
  - all interchanges

Figure 3.12: Phase 3



Full-build including HOV lanes

Cost estimate: **$1.5 billion**

Phases 1A through 1C and Phase 1, Phase 2 and Phase 3 were all subjected to financial analyses in order to determine what net tolling contribution each phase could reasonably contribute to the estimated construction cost. The specific details and results of the financial analysis are described in Chapter 5.

Table 3.1 (next page) summarizes 2012 cost estimates for all project phases in both uninflated and inflated dollars:

Table 3.1: Updated Cost Estimates for All Project Phases

Scenario	Phase	Cost in 2012 $*	Cost in Year of Expenditure $**
Full-build (Phase 3)	PE	$93,000,000	$101,000,000
	RW	$157,000,000	$190,000,000
	CN	$1,018,000,000	$1,205,000,000
	Total	**$1,268,000,000**	**$1,496,000,000**
Phase 2***	**Total**	**$1,060,000,000**	**$1,250,000,000**
Phase 1	PE	$55,000,000	$60,000,000
	RW	$157,000,000	$190,000,000
	CN	$603,000,000	$713,000,000
	Total	**$815,000,000**	**$963,000,000**
Phase 1C	PE	$41,000,000	$44,000,000
	RW	$107,000,000	$128,000,000
	CN	$456,000,000	$539,000,000
	Total	**$604,000,000**	**$711,000,000**
Phase 1B	PE	$24,000,000	$26,000,000
	RW	$101,000,000	$123,000,000
	CN	$268,000,000	$314,000,000
	Total	**$393,000,000**	**$463,000,000**
Phase 1A	PE	$11,000,000	$11,000,000
	RW	$101,000,000	$123,000,000
	CN	$118,000,000	$138,000,000
	Total	**$230,000,000**	**$272,000,000**

Notes:

* Estimates were developed in 2012 and subject to adjustment based on economic conditions.

** Construction assumed to start in 2016 and end in 2020.

*** Phase 2 cost estimate was interpolated from the full-build.

Tolling Concepts and Toll Equipment Cost Estimates

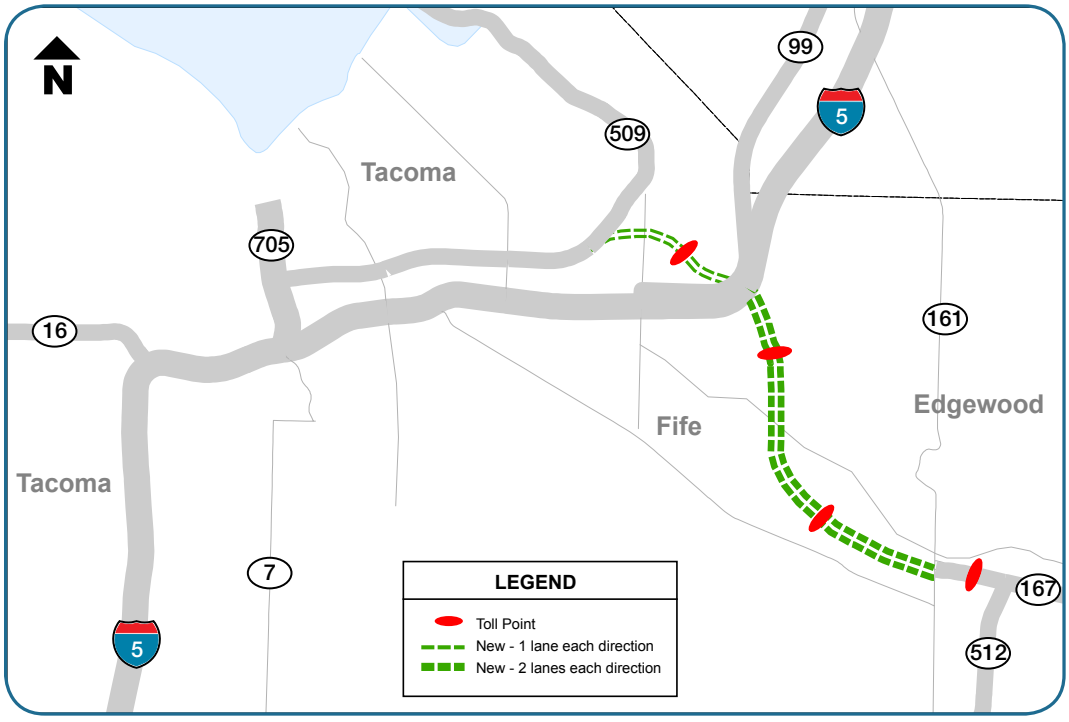
The 2010 Toll Feasibility Study identified and analyzed six options with different phasing and tolling combinations. Three of the six options looked at tolling some of the existing roadways as well as the new corridor. The existing facilities considered for tolling included SR 167 just east of SR 161/ Meridian Ave. and SR 509 south of Alexander Ave., and converting the newly-built HOV lane on I-5 to a high-occupancy-toll lane.

Initial Toll Concept

The initial toll concept was carried forward from the 2010 Toll Feasibility Study. It includes three toll collection points along the corridor and one toll collection point on the existing section of SR 167 just east of the SR 161 interchange in Puyallup. The concept was developed with the focus on maximizing revenue and minimizing diversions to non-tolled corridors. It was also assumed that tolls would be variable by time of day.

The initial tolling option concept is illustrated in Figure 3.13.

Figure 3.13: 2010 Toll Feasibility Study Tolling Concept



At their September 27, 2011 meeting, WSDOT staff reviewed the draft results with the stakeholders. At this meeting the participating stakeholders and legislators objected to tolling existing facilities. Consequently, all the options analyzed from that point on focused on tolling only the new corridor.

The toll collection points would be applied as shown in Figures 3.14 through 3.19 below for Phases 1A through 1C, Phase 1, Phase 2 and Phase 3 (full-build). The tolling capital cost estimates are provided in the section following these figures.

Figure 3.14: Phase 1A with Toll Collection Points

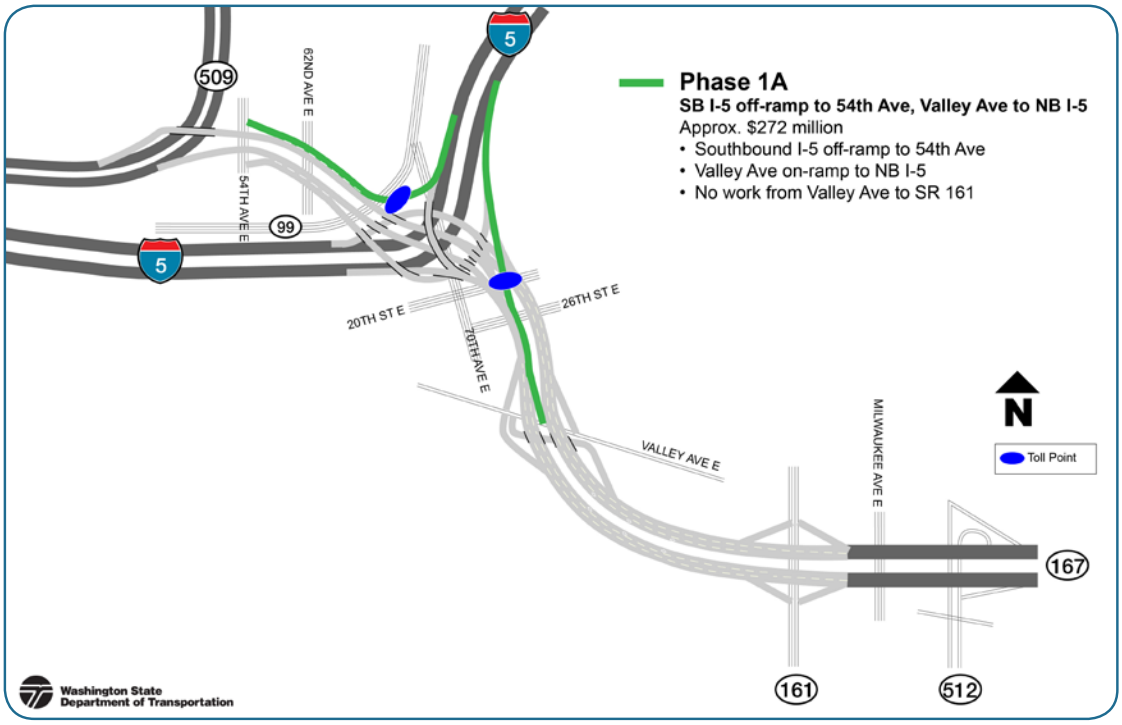


Figure 3.15: Phase 1B with Toll Collection Points

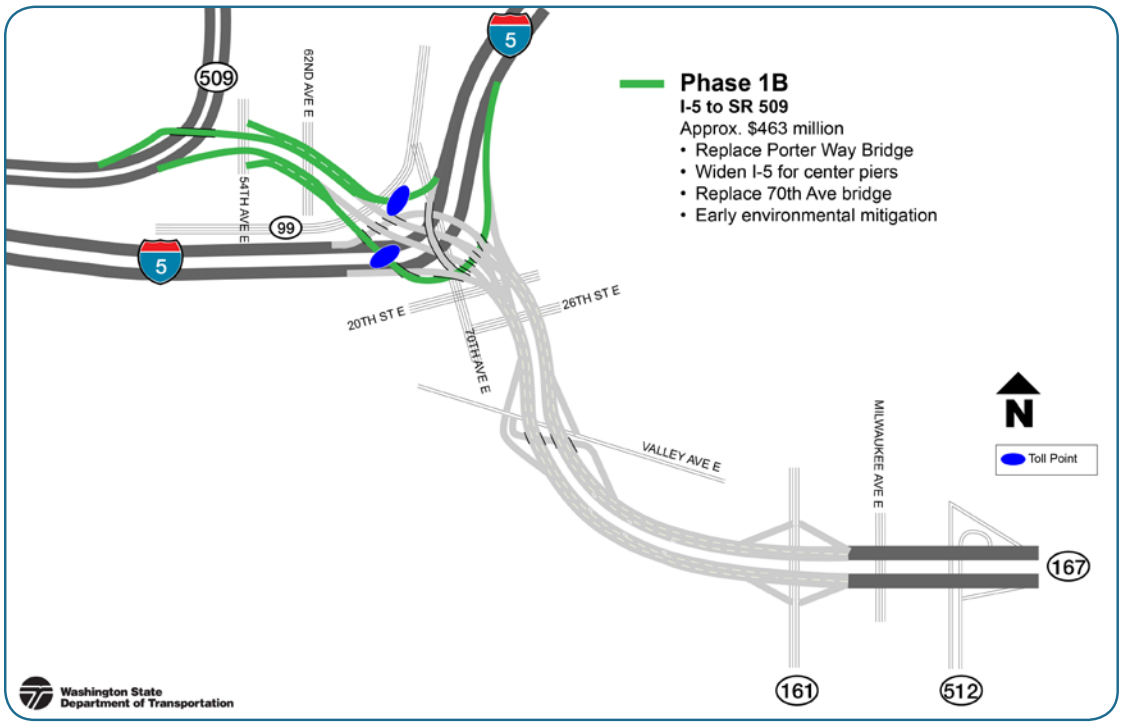


Figure 3.16: Phase 1C with Toll Collection Points

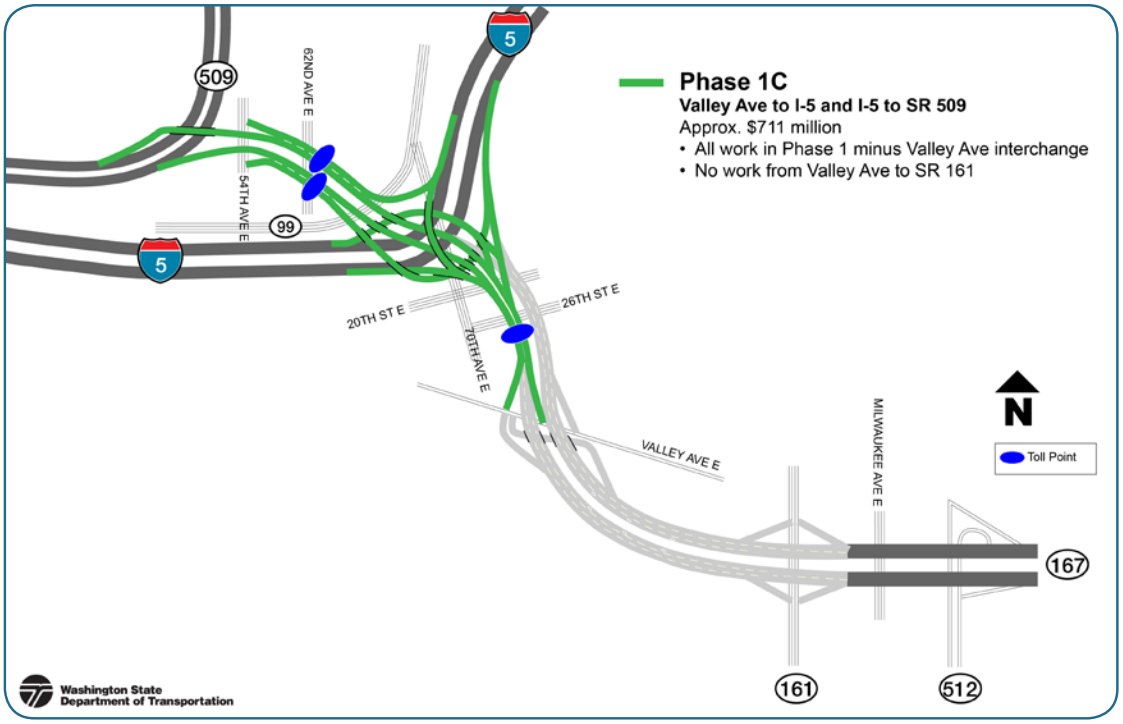


Figure 3.17: Phase 1 with Toll Collection Points

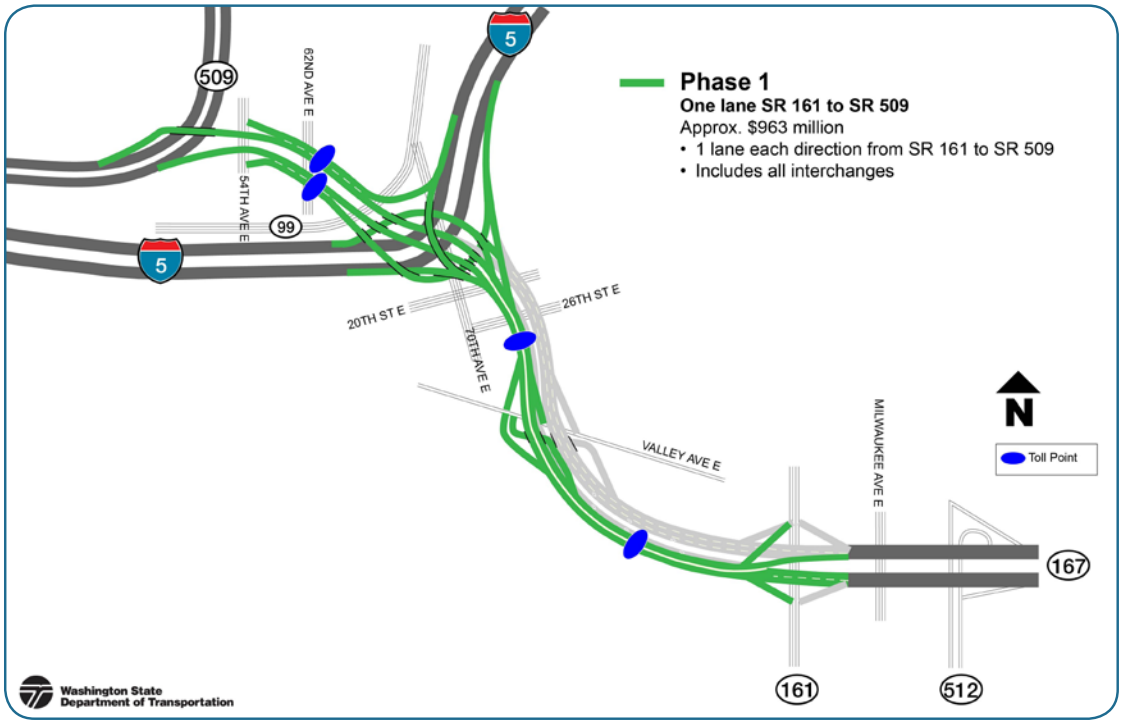


Figure 3.18: Phase 2 with Toll Collection Points

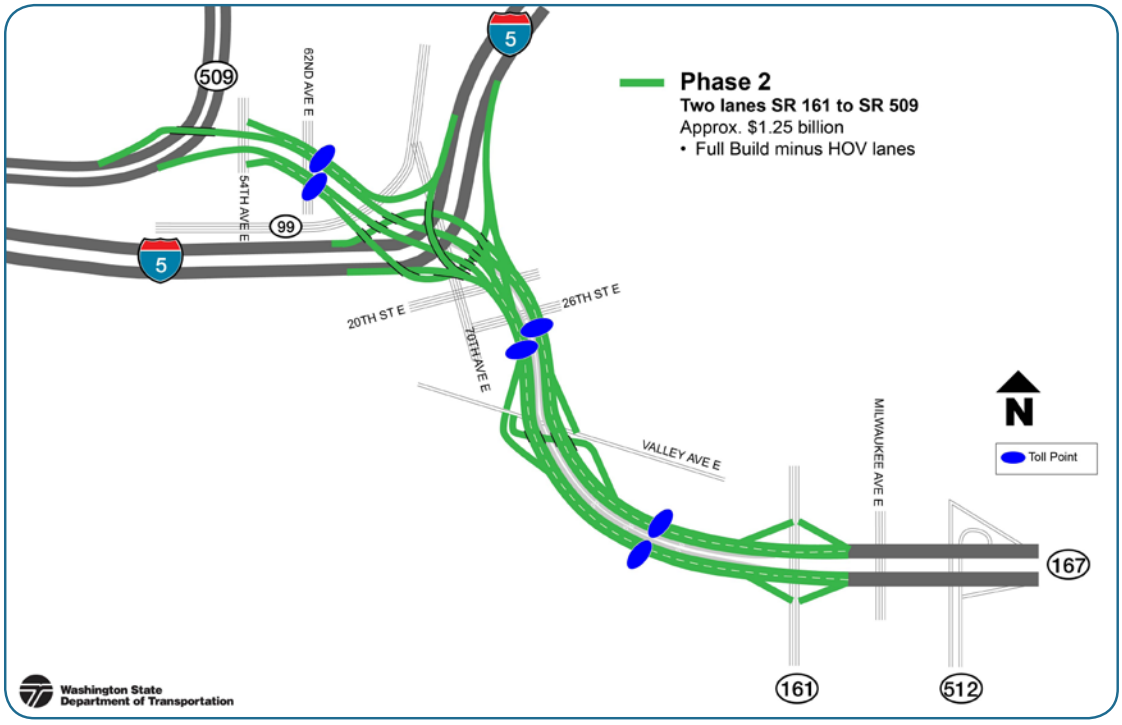
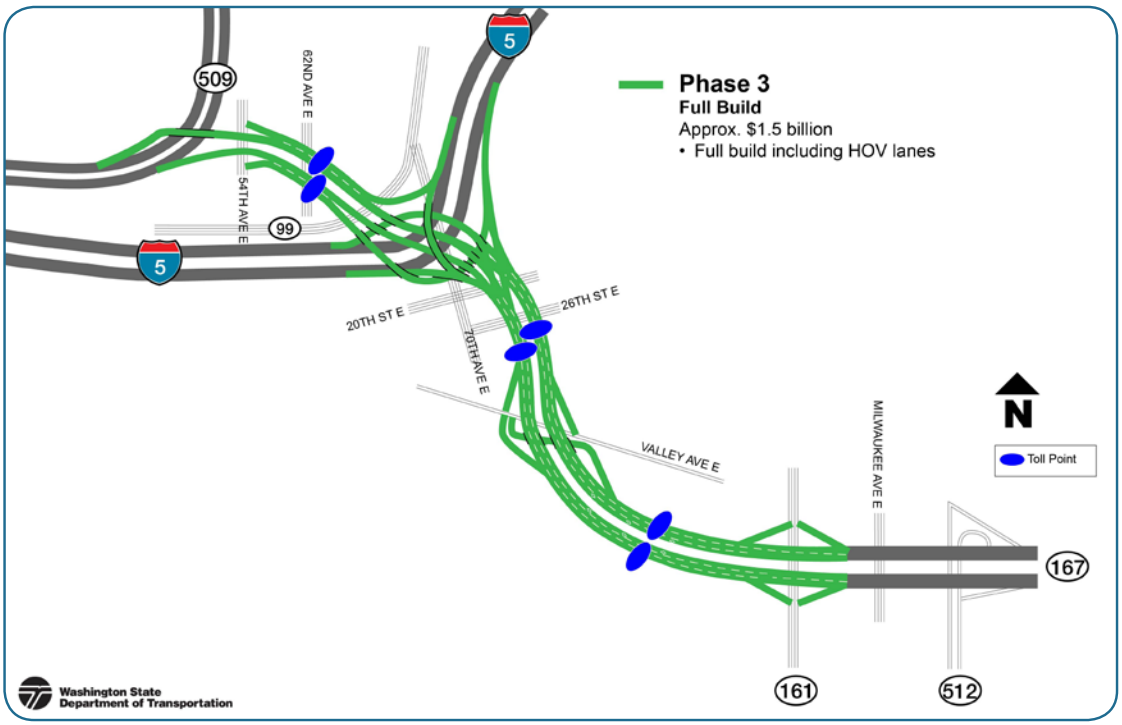


Figure 3.19: Phase 3 with Toll Collection Points



Capital Cost Estimates for Toll Options

The cost estimates for each phasing option were developed using unit-cost information from other WSDOT toll projects such as the *I-90 Tolling and ATM Study* and the *Roadside Toll Systems Request for Proposal.* The *I-90 Tolling and ATM Study* was used as the basis for estimating civil elements of a toll system, such as power supply, back-up generators, overhead sign bridges and cantilever structures. The *Roadside Toll Systems Request for Proposal* was used as the basis for the tolling elements and equipment, such as the radio frequency identification (RFID) reader, digital video auditing system (DVAS) cameras, hybrid rate signs, photo tolling image server and storage, testing, training, annual maintenance and software. Each unit cost captures profit and overhead.

During the development of the *Roadside Toll Systems Request for Proposal,* the WSDOT General Toll Consultant (GTC) compared other state tolling agencies and material vendors to create a cost estimate. For software development and implementation, tolling equipment, training and testing costs, the GTC compared costs from the Georgia State Road Tolling Authority (GSRTA), Ohio Department of Transportation, Texas's Metropolitan Transit

Authority (METRO) and a confidential source. The GTC also talked to various toll vendors and suppliers to verify select unit-cost information. All cost estimates are reflected in each tolling estimate developed for the phasing options.

In addition to unit costs, certain assumptions were made regarding the tolling configuration for each phase option:

- Phase 1A would construct a general-purpose lane from southbound I-5 to 54th Ave. and from Valley Ave. to northbound I-5. It is assumed that two new toll collection gantries would be constructed, one for each new stretch of roadway. At each toll point, the estimate assumed one general-purpose lane and two 10-foot shoulders (one in each direction).
- Phase 1B would construct one general-purpose lane in each direction between I-5 and SR 509 plus auxiliary lanes between 54th Ave. and I-5. It is assumed that two new toll collection gantries would be constructed between I-5 and SR 509. At each toll point, the estimate assumed one 10-foot outside shoulder in each direction, in addition to two general-purpose lanes.
- Phase 1C would construct all components of Phase 1B, as well as one general-purpose lane in each direction between Valley Ave. E. and I-5. It has been assumed that one new toll collection gantry would be constructed between Valley Ave. E. and I-5 and those two new toll collection gantries would be constructed between I-5 and SR 509. At each toll point, the estimate assumed one 10-foot shoulder in each direction, in addition to the general-purpose lanes.
- Phase 1 would construct all components of Phase 1B, as well as one general-purpose lane in each direction between SR 161 and I-5. It is assumed that two new toll collection gantries would be constructed between SR 161 and I-5 (one between SR 161 and Valley Ave. E. and one between Valley Ave. E. and I-5) and that two new toll collection gantries would be constructed between I-5 and SR 509. At each toll point, the estimate assumed one 10-foot shoulder in each direction, in addition to general-purpose lanes.

The capital costs for each option were estimated based on the number of gantries and the tolling equipment on these gantries. The amount of tolling equipment required is a function of the number of lanes and shoulder widths along the corridor.

Chapter 4:

Traffic & Toll Modeling and Analysis

Introduction

A key step in determining how traffic will use the new corridor under a tolled scenario is developing a methodology and a travel-demand forecasting model. Concurrent with those steps is establishing and agreeing upon assumptions for the analysis. These assumptions can include, but are not limited to: future forecast year(s); population and economic growth; toll rates; and network growth assumptions and traffic diversions.

WSDOT has worked with local jurisdictions in Pierce County and the Port of Tacoma to create inputs for the travel demand model that was used for this study. This effort resulted in traffic forecasts on the SR 167 corridor with optimized toll rates.

Modeling Methodologies and Assumptions

In this study, two different modeling programs were developed for tolling and traffic forecasts. A four-step travel-demand model was used as the macroscopic model to look at region-wide demand forecasts and traffic distribution. It was also used to optimize toll rates for the traffic and revenue analysis.

To study the local traffic diversion within the sub-area of the corridor, the Dynamic Traffic Assignment (DTA) mesoscopic model was used. A "mesoscopic" traffic model provides a more detailed level of traffic operations and forecasting than is possible with the PSRC's regional travel demand model. This model helped to more accurately estimate traffic diversion by considering intersection delays at local arterials. The DTA model also allowed for a more detailed analysis of intersection geometry and traffic signal operations. These micro-level intersection analysis tasks are not typically reflected in macroscopic models such as the PSRC's regional travel demand model.

Macroscopic Model

A regional travel demand forecast model, commonly referred to as a macroscopic model, helps identify:

- how many people want to travel at the same time (travel demand)
- where people want to travel to/from
- how they travel (bus, car, etc.)
- which routes they will likely take
- relative traffic volumes, delay, travel times, speeds, etc.

Travel demand models also help differentiate and evaluate alternatives, and help explain the effects of proposed actions. They also create traffic forecasts for the number of people and vehicles that will use a transportation facility, thus helping explain the function of a transportation system or particular corridor.

In this study, the travel demand forecasts were conducted using the SR 520 final environmental impact statement (FEIS) model. This model is based on the Puget Sound Regional Council's (PSRC) regional travel demand model. The PSRC's travel demand model was selected because:

- It is used by transit agencies and by all cities, counties, and the state within the central Puget Sound region.
- It is approved by FHWA for projects with federal funds.
- It has 30 years of data history with which to model.

Study Area

In the PSRC's regional travel demand model (macro model), the entire Puget Sound area is considered. It includes King, Pierce, Snohomish and Kitsap counties. The 2030 baseline roadway networks will be constrained to include funded projects only.

The study area boundaries for the DTA model were SR 509 to the north, River Road to the south, SR 167/512 to the east and Interstate 705 to the west. The model study area is shown in Figure 4.1 below.

Figure 4.1: SR 167 Corridor Completion Focused Study Area

Land Use Assumptions

The land use zone structure remains the same as in the PSRC model. Based on the newly completed SR 520 Toll and Revenue and Investment Grade Study, the 2030 projected employment and population growth rates were adjusted down by 3% and 1% respectively to reflect the effects of the recent economic recession.

Tables 4.1 and 4.2 summarize the land use data in the SR 167 study area as well as within Pierce County:

Table 4.1: Pierce County Land Use Summary – Before & After Reduction

Pierce County	2008	2030		Growth	
		Original	Adjusted	Change	%
Employment	265,900	342,100	332,100	66,200	25%
Household	317,800	421,700	417,500	99,700	31%

Table 4.2: Comparison of Focused Study Area Land Use with Adjusted Pierce County Land Use

Where	Land Use Type	2008	2030	Growth	
				Change	% Change
Pierce County	Employment	265,900	332,100	66,200	25%
	Household	317,800	417,500	99,700	31%
SR 167 Study Area	Employment	52,670	72,600	19,930	38%
	Household	39,160	58,110	18,950	48%

Analysis Years and Time Periods

The analysis periods in this study include the base year plus two future forecast years. The two future horizon years fulfill the financial analysis needs. The assumed analysis years are:

- Base year – 2008
- Future years – 2020 and 2030

All analyses were carried out for five daily time periods: AM peak period, midday, PM peak period, evening, and night, reflecting a 24-hour weekday.

The definition of time periods is as follows:

- AM Peak Period – 6 AM - 9 AM
- Midday Period – 9 AM - 3 PM
- PM Peak Period – 3 PM - 6 PM
- Evening Period – 6 PM - 10 PM
- Night Period – 10 PM - 6 AM

Value of Time

Value of time (VOT) is a critical component of toll modeling. It profiles the traveler's decision to decide between paying a toll to save time or to travel extra distances to avoid the toll, pick a different travel time to pay a reduced toll rate, or not make a trip at all. Travelers' perceptions of value of time or their willingness to pay a toll depends on the trip type, trip purpose, income level, time of day, alternative routes and options available and other factors. As part of the SR 520 Bridge Investment Grade Traffic and Revenue Study, a set of VOT values were developed to suit investment-grade level toll modeling analyses. These values are used for this study, with changes to medium and heavy truck values, in order to be more relevant for this corridor study area.

In a tolling analysis, the value of time is a critical piece of information that provides the link between the monetary cost of a toll and the time value of avoiding the toll. It provides an average dollar value of an hour of time and is an indicator of a traveler's willingness to pay tolls. Travel demand models use the values of time to identify the point at which travelers would rather pay tolls than change their travel behavior. In other words, it quantifies at what point travelers are willing to pay a toll rather than divert to a non-tolled corridor, choose another travel mode or travel destination, shift the time of departure, or consolidate trips to avoid or minimize tolls paid. Because values of time differ among individuals according to their trip purpose, time of travel, income levels and a host of other factors, it is necessary to develop aggregate values of time that conform to the input constraints of the regional travel demand model.

The current toll at Tacoma Narrows Bridge has a ratio of 1.5 and 2.5 of light truck values. Given the VOT for a light truck is $30 in the SR 520 study, the VOT for medium and heavy trucks has been modified to $45 and $75 respectively. Table 4.3 (next page) shows the value of time used in the travel demand model for this study.

Table 4.3: Values of Travel Time By Time Period (2010 Dollars)

	Value of Time ($/hour)				
Mode	**AM**	**Midday**	**PM**	**Evening**	**Night**
Non-Work SOV	9.62	9.62	9.62	9.62	9.62
HOV2	24.05	15.39	18.28	16.36	21.16
HOV3+	27.05	15.11	19.09	15.11	24.39
Vanpool	128.41	46.94	74.10	46.94	110.30
Home-Based Work (HBW) SOV by Income Quartile					
1st Quartile	9.62	9.62	9.62	9.62	9.62
2nd Quartile	13.82	13.82	13.82	13.82	13.82
3rd Quartile	16.83	16.83	16.83	16.83	16.83
4th Quartile	22.85	22.85	22.85	22.85	22.85
Light Truck	30.05	30.05	30.05	30.05	30.05
Medium Truck	45.06	45.06	45.06	45.06	45.06
Heavy Truck	75.11	75.11	75.11	75.11	75.11

SOV – Single Occupancy Vehicles

HOV2 – High Occupancy Vehicles with one driver and one passenger

HOV3+ – High Occupancy Vehicles with one driver and two or more passengers

Base Year Model Validation

The purpose of the model validation is to compare the model results to observed data, ensuring that the model simulates the reality seen in the field. The base year model validation was conducted at the freeway and major arterial level only. The daily volumes were compared to counts at various locations within the study area. Network parameters and attributes were adjusted where necessary so the model forecasts more closely match the counts. A difference in value up to 15% is the threshold for validations. Changes or adjustments in the base year model were applied to future year models as well.

Mesoscopic Model

As noted earlier, a DTA mesoscopic model was used to more accurately identify traffic diversion by accounting for intersection delays at local arterials. Due to the complexity of mesoscopic modeling and input requirements, a smaller study area was analyzed for three time periods of a day – morning, evening and mid-day peak periods.

Analysis Years and Time Periods

The analysis focused on two future horizon years: 2020 and 2030. Analyses for the evening and night periods were not carried out in the mesoscopic model due to resource and schedule limitations. Also the difference between the macroscopic and mesoscopic model results during off-peak periods is not as great as the peak periods; therefore results from the macroscopic model were used for evening and night periods. Thus, the total daily traffic forecast is the summation of AM, midday, and PM traffic forecasts from the mesoscopic models and evening and night traffic forecasts from the macroscopic models.

Analysis Inputs

The key analysis components for the mesoscopic model included the following:

- travel demand trip tables from macroscopic model
- the PSRC's macroscopic model includes 11 different trip modes; all were loaded into the mesoscopic model
- a traffic profile by 15-minute increments over the analysis time periods in the study area
- the traffic profile was used to create trip tables for 15-minute demands for six-hour simulation time periods for both AM and PM periods and nine-hour simulation time periods for midday periods
- intersection controls, associated delays, signal timings and phasing for 58 signalized intersection locations
- geometry and lane configurations for intersections, interchanges and ramps

Phasing Options Traffic and Toll Modeling

The 2030 baseline network includes all existing roadway facilities plus currently-funded projects. The establishment of a 2030 "baseline" network creates a future starting point from which various improvement phases can be compared for changes in traffic flows and/or diversions.

Phase 1 Analysis

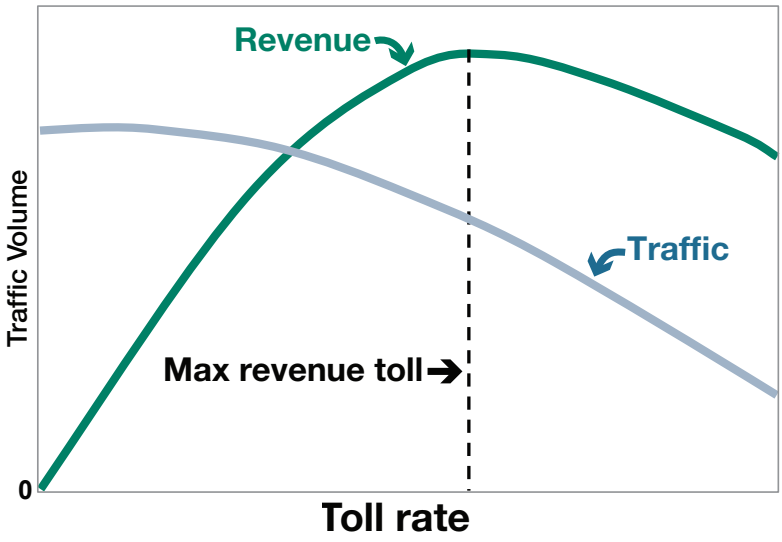
Given the Phase 1 concept and the macroscopic and mesoscopic model assumptions, finding optimal toll rates for each travel mode in each time period is a key analysis task. This section describes the toll optimization process and the results of traffic forecasts and revenues for Phase 1.

Toll Rate Optimization

As part of the toll optimization process, multiple model runs were made with different toll rates to map the relationship between toll segment traffic volumes and revenues (Figure 4.2). These model runs helped select a toll rate that optimized the revenue and system performance. The 2030 toll optimization was conducted in the macroscopic model run to assess single-occupancy vehicle (SOV) trips. The toll rates for light trucks, defined as two axles with four or more tires weighing less than 16,000 pounds, were the rates used for passenger cars. The rates for medium and heavy trucks were assumed to be 1.5 and 2.5 times of the passenger car rates, respectively. Medium trucks are defined as single unit, six or more tires with two to four axles, and weighing between 16,000 and 52,000 pounds gross weight. Heavy trucks are defined as a double-unit with five or more axles and weighing more than 52,000 pounds gross weight. Both the revenues and traffic volumes on three segments of the extensions were evaluated during the toll optimization.

Figure 4.2 shows the balance between toll revenue rates and the projected volumes of motorists willing to pay tolls. The figure also shows that an excessively high toll rate will substantially diminish the number of motorists willing to pay what they perceive as excessive toll rates.

Figure 4.2: The Relationship Between Toll Rate, Traffic and Revenue



The toll rate changes were incrementally increased by 20 cents, with a minimum rate of 25 cents. To find the optimal toll rates for each time period, both the optimal total revenues and the reasonable usages were considered. Table 4.4 shows the optimized toll rates for autos by time periods.

Table 4.4: 2030 Phase 1 Optimized Toll Rates for Autos (2010 Dollars)

	SR 509 - I-5		I-5 - Valley Ave.		Valley Ave. - SR 161	
	NB	SB	NB	SB	NB	SB
AM	0.75	0.50	0.75	0.95	0.75	1.35
MD	0.50	0.50	0.60	0.60	0.90	0.90
PM	0.55	1.00	1.10	0.90	1.90	0.90
EV	0.30	0.40	0.90	0.55	0.90	0.55
NI	0.30	0.30	0.50	0.70	0.50	0.70

The debt-financing assumptions include toll-financing policy guidelines issued by the Office of the State Treasurer. These guidelines require the assumption of a constant toll rate over the expected life of a given toll. This guideline directs that toll rates not increase over time. Assuming future inflation, actual toll revenues will decline over time under this guideline.

Results

The total daily traffic forecast is the sum of AM, midday, and PM traffic forecasts from the mesoscopic models and evening and night traffic forecasts from the macroscopic models with the toll rates shown on the previous page. The daily forecast traffic volumes and gross toll revenues are shown in Table 4.5.

Table 4.5: 2030 Phase 1 Daily Volumes and Toll Revenues

Segment	Description	Total Volume Crossing Toll Point			Toll Revenue (2010 Dollars)		
		Toll - Auto	Toll - Trucks	Total	Toll - Auto	Toll - Trucks	Total
1	SR 167 between I-5 & 54th Ave.	6,180	8,980	15,160	$3,309	$6,147	$9,456
2	SR 167 between I-5 & Valley Ave.	18,140	10,650	28,790	$13,645	$9,532	$23,177
3	SR 167 between Valley Ave. & SR 161	21,310	9,870	31,180	$24,450	$11,227	$35,676
		45,630	29,500	75,130	$41,403	$26,905	$68,308

Phase 1A Analysis

This section describes the toll optimization process and the results of traffic forecasts and revenues for Phase 1A.

Toll Optimization

Based on the optimal toll rates in Phase 1, several different toll rates were tested to see if the rates from Phase 1 are still optimal. The results of the toll optimization analysis indicate that Phase 1A has the same optimal rates as Phase 1 for the same segments.

Results

Taking the toll rates as in Phase 1, the daily forecast traffic volumes and revenues for Phase 1A were estimated and are shown in Table 4.6.

Table 4.6: 2030 Phase 1A Daily Volumes and Toll Revenues

Segment	Description	Total Volume Crossing Toll Point			Toll Revenue (2010 Dollars)		
		Toll - Auto	Toll - Trucks	Total	Toll - Auto	Toll - Trucks	Total
1	SR 167 between I-5 & 54th Ave.	1,866	3,974	5,840	$1,076	$3,184	$4,260
2	SR 167 between I-5 & Valley Ave.	7,218	4,167	11,385	$5,219	$3,696	$8,915
3	SR 167 between Valley Ave. & SR 161	0	0	0	$0	$0	$0
		9,084	8,141	17,225	$6,295	$6,880	$13,175

Phase 1B Analysis

This section describes the toll optimization process and the results of traffic forecasts and revenues for Phase 1B.

Toll Optimization

Using the Phase 1 optimal toll rates as the starting point, several different rates (with an incremental increase or decrease of 10 cents) were tested. The toll optimization results reveal that Phase 1B optimal toll rates are very close to the Phase 1 rates; hence, Phase 1 toll rates were used in the subsequent traffic and revenue analysis.

Results

Taking the toll rates as in Phase 1, the daily forecast traffic volumes and gross toll revenues for Phase 1B are shown in the following table.

Table 4.7: 2030 Phase 1B Daily Volumes and Toll Revenues

Segment	Description	Total Volume Crossing Toll Point			Toll Revenue (2010 Dollars)		
		Toll - Auto	Toll - Trucks	Total	Toll - Auto	Toll - Trucks	Total
1	SR 167 between I-5 & 54th Ave.	4,400	9,680	14,080	$2,413	$6,696	$9,109
2	SR 167 between I-5 & Valley Ave.	0	0	0	$0	$0	$0
3	SR 167 between Valley Ave. & SR 161	0	0	0	$0	$0	$0
		4,400	9,680	14,080	$2,413	$6,696	$9,109

Phase 1C Analysis

This section describes the toll optimization process and the results of traffic forecast and revenues for Phase 1C.

Toll Optimization

Based on the optimal toll rates in Phase 1, several different rates (with an incremental increase and/or decrease of 10 cents) were tested. The toll optimization results reveal that Phase 1C optimal toll rates are very close to the Phase 1 rates; hence, Phase 1 toll rates were used in the subsequent traffic and revenue analysis.

Results

Taking the toll rates as in Phase 1, the daily forecast traffic volumes and revenues for Phase 1C are shown in the following table.

Table 4.8: 2030 Phase 1C Daily Volumes and Toll Revenues

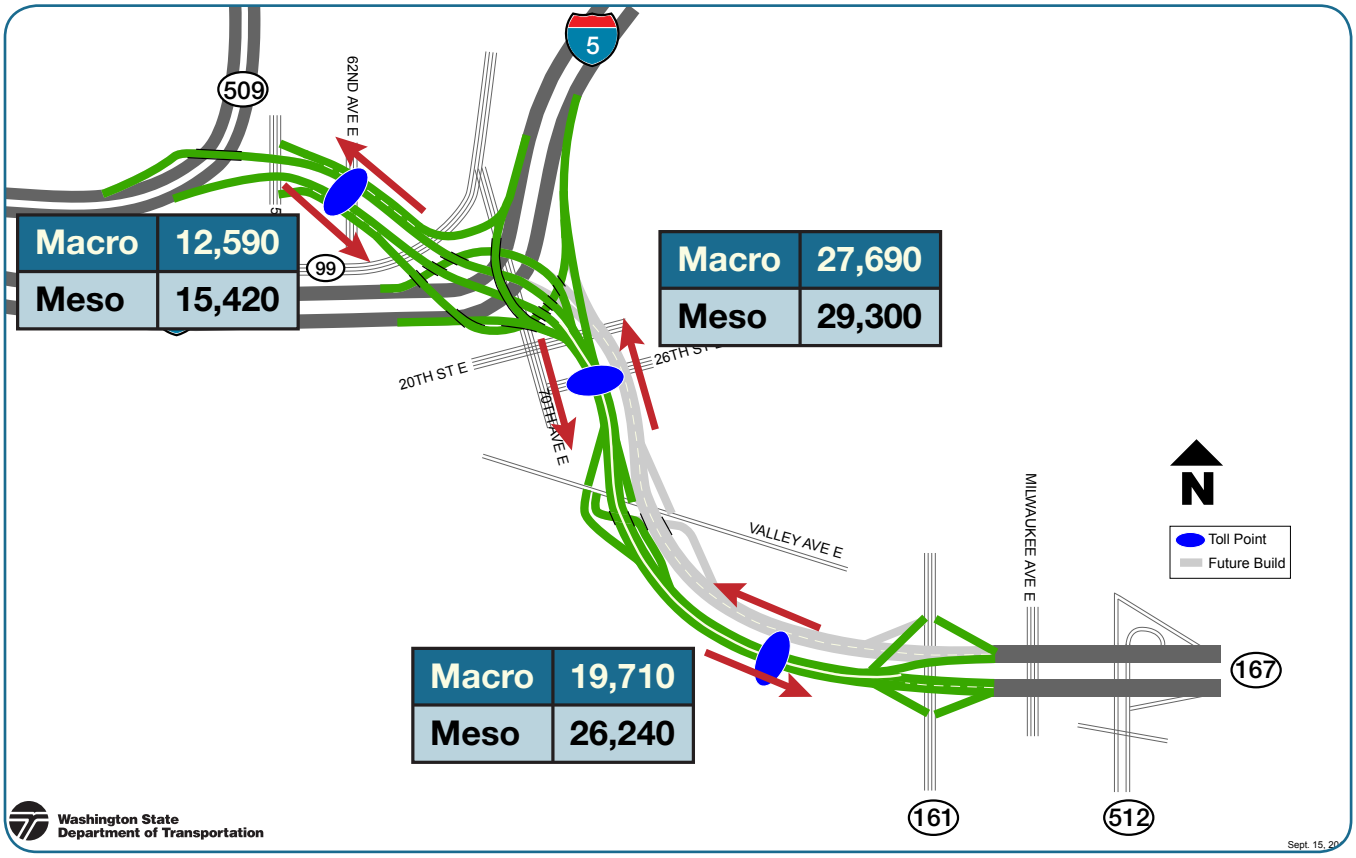
Segment	Description	Total Volume Crossing Toll Point			Toll Revenue (2010 Dollars)		
		Toll - Auto	Toll - Trucks	Total	Toll - Auto	Toll - Trucks	Total
1	SR 167 between I-5 & 54th Ave.	5,460	8,920	14,380	$3,093	$6,619	$9,711
2	SR 167 between I-5 & Valley Ave.	13,450	7,920	21,370	$9,963	$7,132	$17,094
3	SR 167 between Valley Ave. & SR 161	0	0	0	$0	$0	$0
		18,910	16,840	35,750	$13,055	$13,750	$26,805

Findings

A macroscopic travel demand forecasting model was first used to analyze various scenarios. Initial results showed that Phase 1 is a better tolling option in comparison to other scenarios for the purpose of optimizing traffic flow and potential toll revenue generation. A macroscopic model does not accurately assess local intersection controls that cause additional vehicle delays. Also, it does not strictly enforce roadway capacity limits (where the volume to capacity ratio is equal to or less than one). To obtain an accurate traffic diversion summary, a mesoscopic model was developed and applied. The mesoscopic model takes intersection delay at local arterials into account while assigning traffic to the network.

Figure 4.3 presents 2030 average weekday volume comparisons between macroscopic and mesoscopic models. The mesoscopic model provides greater detail and better accuracy in forecasting future traffic on the local arterials within the study than the macroscopic model. Therefore the results from the mesoscopic model were used in the subsequent financial analysis.

Figure 4.3: Phase 1 Forecasted Usage (average weekday in 2030)

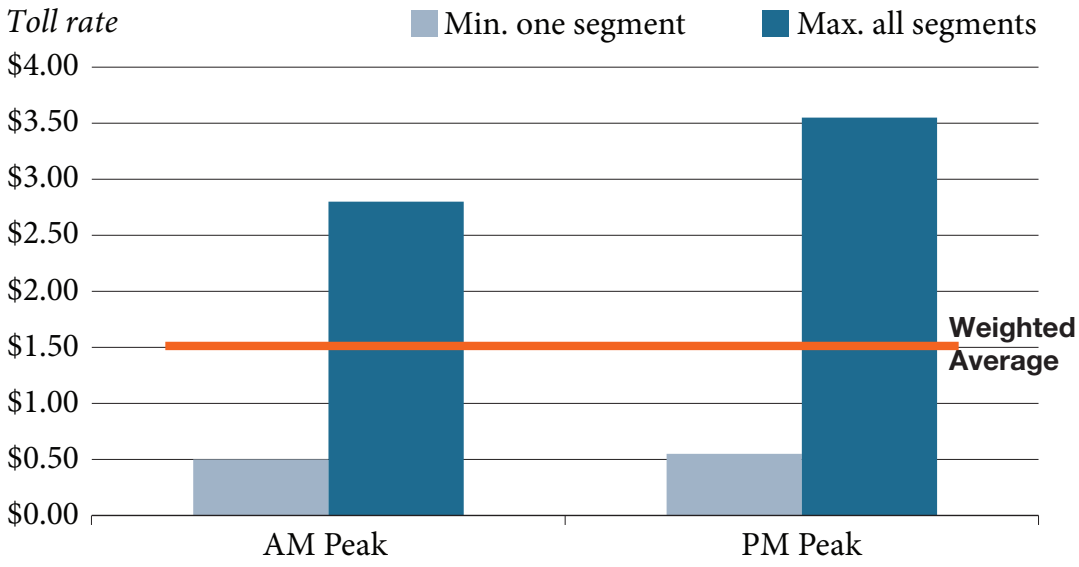


The traffic and toll modeling analysis revealed the following:

- The maximum toll a passenger car driver would pay is $3.55 with the optimized toll rates found for Phase 1 (2010 dollars) if they traveled on all three segments in the peak direction (northbound) in the PM peak period.
- The minimum toll a passenger car driver would pay is $0.30 (2010 dollars) if they traveled only on northbound SR 167 between SR 509 and I-5 during the evening period, or in either direction between SR 509 and I-5 during the night period.
- The maximum toll passenger car drivers would pay during the AM peak period would be $2.80 if they traveled on all three new segments.
- The lowest toll passenger car drivers would pay during the AM and PM peak periods would be $0.50 and $ 0.55 respectively if they traveled on only one segment of the new corridor.

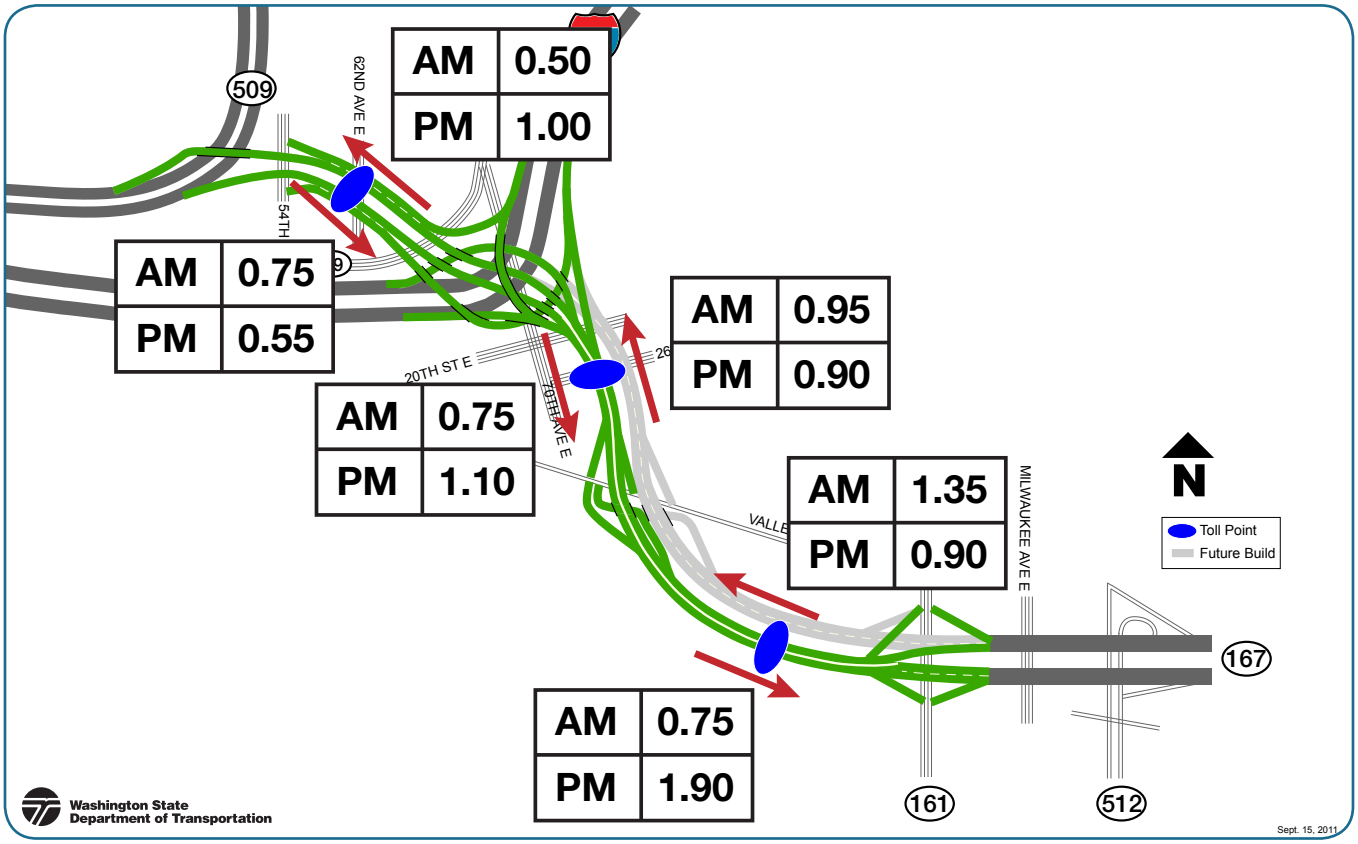
Figure 4.4 below shows the minimum and maximum projected tolling costs to the driver. Figure 4.5 shows AM and PM peak auto toll rates for Phase 1.

Figure 4.4: Phase 1 Minimum & Maximum Cost to Driver*
(2010 dollars for passenger vehicles)



* Min/max amounts for *Good To Go!* rates; an additional toll of $1.70 would be applied to Pay By Mail transactions

Figure 4.5: Phase 1 Peak Auto Toll Rates



- A subsequent phasing analysis created several sub-sets of Phase 1: Phase 1A, Phase 1B and Phase 1C. Ultimately Phase 1 is the sum of Phases 1A through 1C. By employing a segmented tolling approach, Phase 1 would generate the highest gross toll revenue while Phase 1B would generate the lowest. The cost estimates for each phase option differ for roadway construction/maintenance as well as toll collection, toll equipment operations and maintenance.

An in-depth financial analysis was needed to understand which option would produce maximum net toll revenues for the analysis period of the project. Chapter 5 documents the details and results of the financial analysis.

Traffic Impact Analysis

To assess the potential impacts of tolling on adjacent facilities, this study examined the traffic pattern changes using the Phase 1 PM peak hour as an example. The study compared the tolled condition to the no-build and the full-build with no tolls at selected Screenline locations (see Figure 4.6). Screenlines are imaginary lines that cut across a group of parallel roadways within the same travel shed. They are established to help modelers calibrate the base year model to ensure the model is capable of replicating real world traffic flow patterns across these Screenlines.

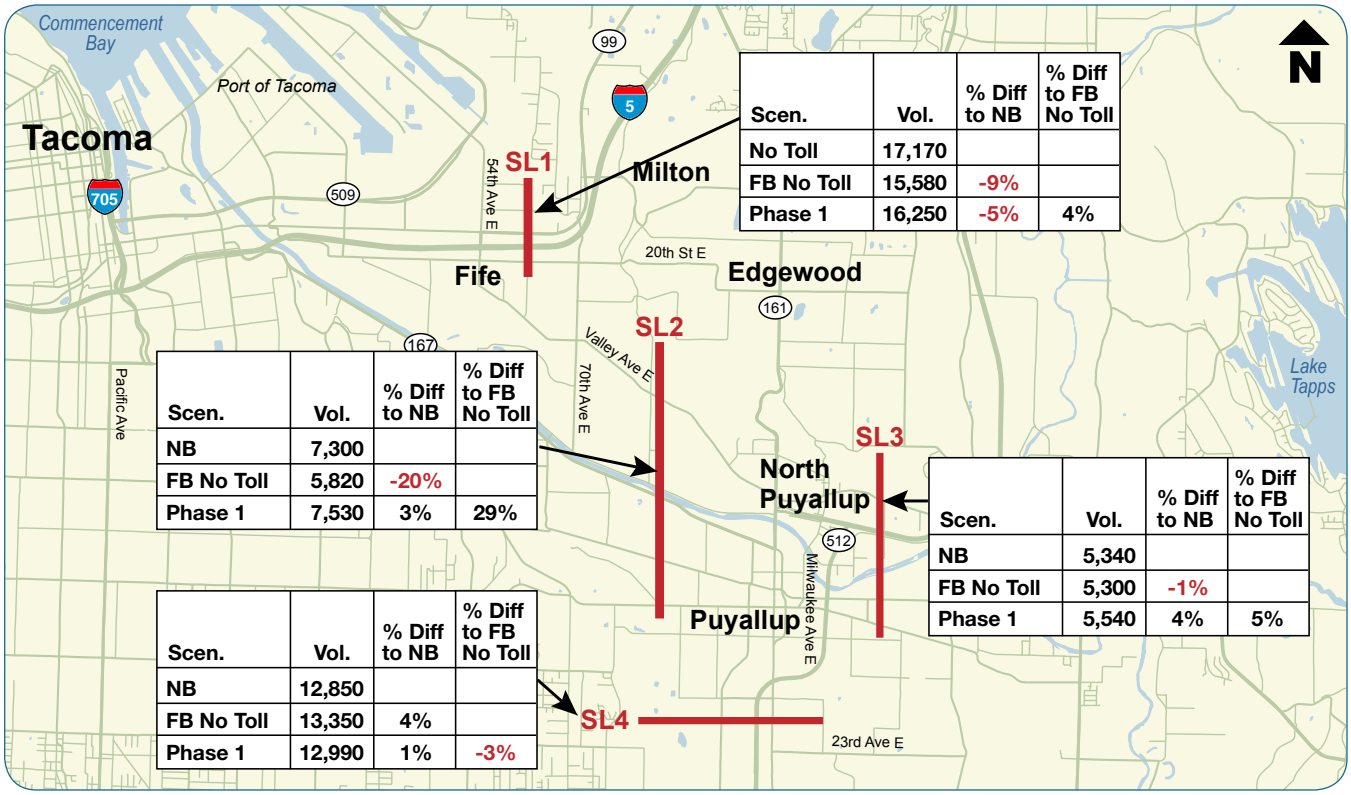
Screenline 1 covers I-5 general-purpose and HOV lanes, SR 99 and 20th Street E. Screenline 1 shows that if the full-build option was constructed and no tolls were charged, traffic on the above referenced facilities would decrease by 9% during the 2030 PM peak hour. Building the Phase 1 option and charging a toll is expected to reduce traffic by 5% on those same facilities in 2030. A reduction of traffic by five percent on a facility like I-5 will improve the average speed on that facility.

Screenline 2 includes Valley Ave. E., N. Levee Road E., River Road E., W. Stewart Ave. and W. Pioneer Ave. Building the full-build option, and not charging tolls, would reduce traffic on the above referenced roadways by 20%. Building Phase 1 with tolls could increase the traffic by 3% on those roadways.

The model did not project significant differences at Screenlines 3 and 4.

Figure 4.7 shows daily AM peak hour and PM peak hour demands. The typical capacity of a freeway lane with mixed passenger and truck traffic is 1,800 vehicles per hour. The traffic modeling analysis indicates that if only one lane is built in each direction and no toll is charged, the traffic demand for the new corridor from SR 161 to I-5 is expected to reach or exceed its traffic capacity during both AM and PM peak hours. This finding suggests that if Phase 1 is implemented, some traffic management techniques such as tolling will need to be used to keep traffic moving through the new corridor.

Figure 4.6: 2030 PM Peak Hour Traffic Comparison: Phase 1 with Toll compared to No-Build and Full-Build with No Toll



Scen.	Vol.	% Diff to NB	% Diff to FB No Toll
No Toll	17,170		
FB No Toll	15,580	-9%	
Phase 1	16,250	-5%	4%

Scen.	Vol.	% Diff to NB	% Diff to FB No Toll
NB	7,300		
FB No Toll	5,820	-20%	
Phase 1	7,530	3%	29%

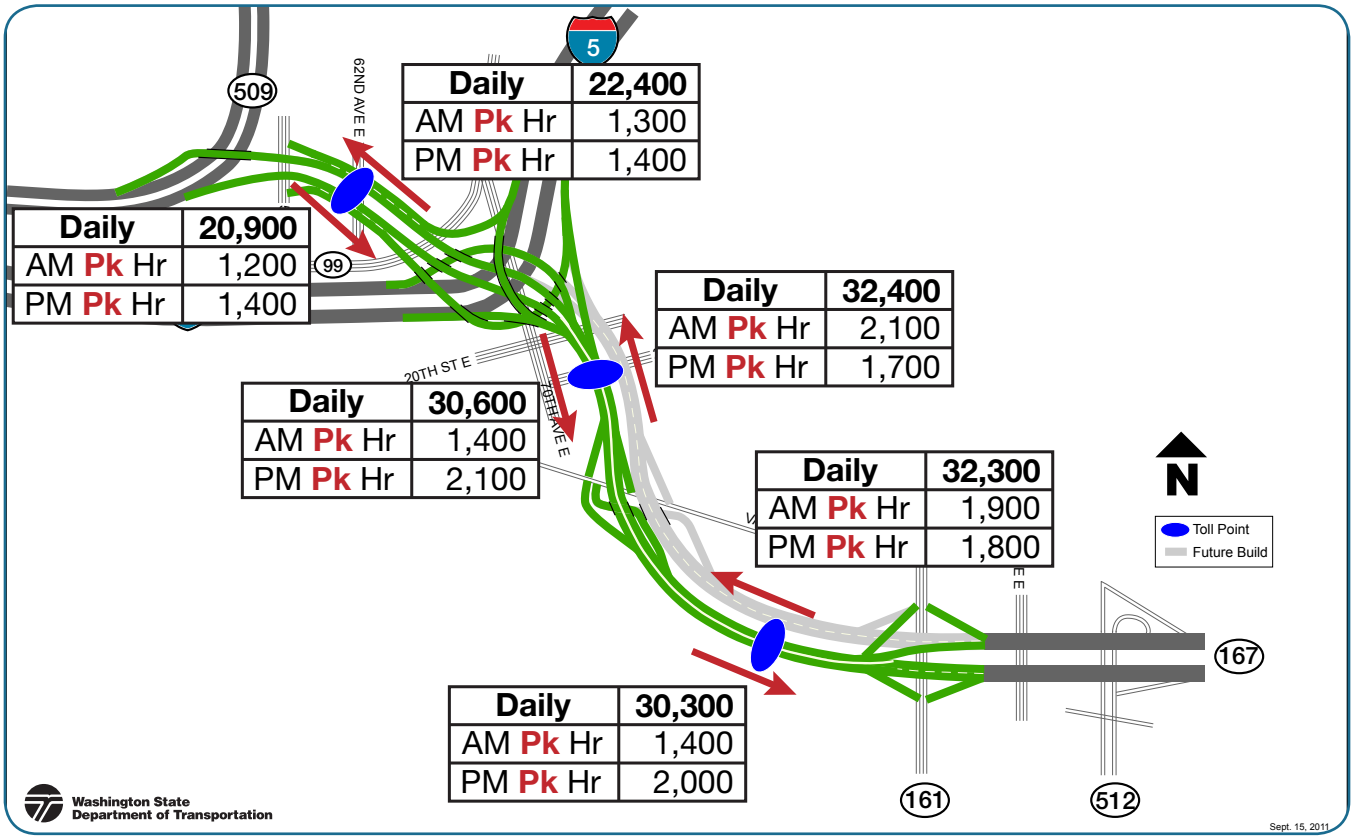
Scen.	Vol.	% Diff to NB	% Diff to FB No Toll
NB	5,340		
FB No Toll	5,300	-1%	
Phase 1	5,540	4%	5%

Scen.	Vol.	% Diff to NB	% Diff to FB No Toll
NB	12,850		
FB No Toll	13,350	4%	
Phase 1	12,990	1%	-3%

Additional Analysis: Phase 1 Corridor Usage with No Tolls.

To assess the potential underlying traffic demand associated with Phase 1, a no-toll analysis was conducted for the year 2030. The result is shown in Figure 4.7.

Figure 4.7: Phase 1 No-Toll Forecasted Usage (average weekday in 2030)



Chapter 5:
Financial Analysis

Overview

The tolling analysis process is conducted in a series of steps, including identifying project specifications, developing a concept of operations, and modeling traffic and revenue projections before analyzing the financial component. This chapter contains the assumptions, methodologies and results that were used to estimate the revenue and financial capacity of the SR 167 Corridor Completion project.

The results of the financial analysis indicate that tolling could provide up to $65 million in funding based on current assumptions. While this amount falls below the total capital needs of the project, tolling could provide other financial benefits, including a revenue contribution toward routine operations and maintenance (O&M) of the roadway and its structures, an expense that would otherwise be covered by other state resources. In addition, financial analysis results are largely a function of the gross traffic and revenue outputs produced during the travel demand modeling process. As explained in Chapter Four, the gross traffic and revenue outputs are a function of current and projected economic conditions in the region. Should economic variables improve, the revenue-generating potential of the corridor may increase via an increased willingness of SR 167 users to utilize the facility at higher toll rates. These modeling refinements and further tailoring of the toll rate structure could help reduce projected financial shortfalls.

A summary of financial capacity results by phasing option is provided in Table 5.1 on the following page. The time period for the analysis is 30 years (2020-2050). The results illustrated for Phase 2 and the full-build option were extrapolated from the results of Phase 1, however, these scenarios were not evaluated during the financial analysis process.

Table 5.1: Funding Capacity Summary by Phasing Option

Phasing Option	Capital Funding Contribution[1]
Phase 1A	--
Phase 1B	--
Phase 1C	$5-15 M
Phase 1	$40-65 M
Phase 2 (Est.)*	Up to $65 M*
Phase 3 - Full-build (Est.)*	Up to $65 M*

* These scenarios were not evaluated as part of the financial analysis process; capital funding contributions extrapolated by WSDOT based on results of Phase 1 analysis.

[1] Funding range based on sensitivity testing of gross traffic and revenue projections.

Gross Traffic and Revenue Inputs

Gross traffic and revenue (T&R) forecasts serve as the primary input and starting point for the net revenue and financial analyses. Gross T&R projections were prepared for two horizon years, 2020 and 2030, and are estimated as average weekday values within those forecast years. Because the net revenue and financial analyses are conducted at an annual level for a 30-year horizon, daily estimates must be expanded to annual values and interpolated and/or extrapolated beyond the two modeling years.

Toll Traffic and Revenue Annualization

To estimate annual traffic and revenue from an average weekday estimate, assumptions for the number of weekdays and weekend days must first be established. For this analysis, each forecast year was assumed to include 110 weekend days (52 weeks x two weekend days, plus six non-weekend holidays), and 255 weekdays, totaling 365 total days. In cases where weekend daily traffic is projected to be the same as weekday daily traffic, the annual expansion factor would be 365. However, because traffic volumes are historically lower on weekends than weekdays, the expansion factor must be reduced.

For this analysis, historical traffic data indicated that weekend daily travel on the southern portion of the SR 167 corridor at 7th Ave. N. amounts to approximately 83% of weekday daily traffic. Similar trends were also exhibited on River Road west of 9th Street N.W., where weekend traffic amounted to about 78% of weekday daily traffic.

This information yields an expansion factor of 343 [255 weekdays + (110 weekend days x 80%)]; however, because traffic data are based on toll-free travel, further adjustments must be applied to account for the potential of higher traffic diversion rates during off-peak weekday periods and weekends. By comparing toll and toll-free modeling results, weekday traffic diversion

rates during the mid-day period amounted to more than 55%. With more opportunity to divert to uncongested alternatives on a weekend, and to account for uncertainties associated with the fact the road does not exist today, a higher diversion rate was assumed. As a result, an annual expansion factor of 300 was used, meaning weekend toll traffic is projected to be 40% of weekday traffic.

The same factor cannot be applied to the annualization of revenue, since different toll rates will be charged on weekends. For instance, if an hour on a given weekend exhibits the same traffic volumes as the same time period on a weekday, less revenue will be collected on the weekend due to the lower toll rate charged. To account for this difference, a lower annualization factor weighted according to the proposed weekend toll schedule is used for the annual expansion of toll revenue. For this analysis, a revenue expansion factor of 290 was applied.

To allow for the potential of higher weekend traffic and revenue and thus a higher annualization factor, a sensitivity test was performed on the baseline model results. The test, which increased gross traffic volumes and revenue by 10%, is described in further detail below.

Traffic and Revenue Sensitivities

Gross traffic volumes and revenue projections were prepared for each of the Phase 1 build options (1A, 1B, 1C, and 1). Additional sensitivity tests were also performed on these projections to provide a forecast range of high, medium and low T&R results. Table 5.2 summarizes the sensitivity tests evaluated.

Table 5.2: Traffic and Revenue Sensitivity Adjustments

T&R Case	T&R Adjustment
High	+10%
Medium	--
Low	-20%

Traffic and Revenue Interpolation / Extrapolation

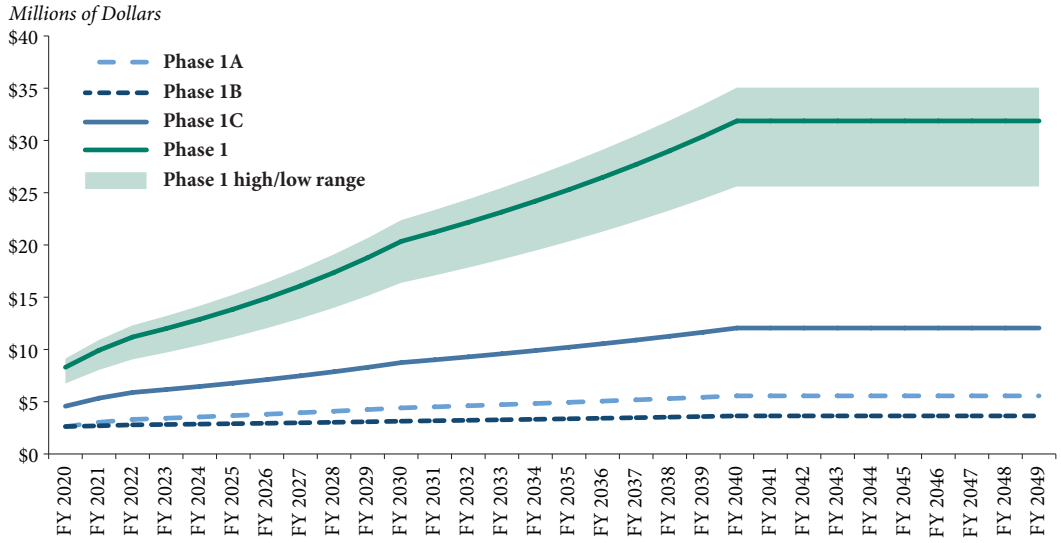
Traffic and revenue forecasts were prepared for two horizon years, 2020 and 2030; however, the net revenue and financial analyses must consider each year within the 30-year forecast period. With an assumed opening in fiscal year 2020, which aligns with the first model year, traffic and revenue values can be estimated for 2021-2029 by estimating the compound annual growth rate (CAGR) between 2020 and 2030, then applying that growth rate to each year beyond 2020. From 2031 to 2040, traffic and revenue were assumed to grow at 50% of the growth exhibited between 2020 and 2030, and no growth was assumed beyond 2040.

Annual Gross Revenue Projections

Gross traffic and revenue results for Phases 1A, 1B, 1C and 1 are shown in Figure 5.1 below. For illustration purposes, the sensitivity test range of +10% to -20% is shown for Phase 1. The same ranges were applied to the other phasing options, but not illustrated on this chart.

In general, Phase 1 shows the greatest revenue-generating potential, while Phases 1A to 1C demonstrate much lower capacity.

Figure 5.1: Projected Total Gross Toll Revenue by Phase for the Medium Scenarios



Net Revenue Process and Assumptions

Gross toll revenue estimates for each of the four investment options and three forecasted traffic scenarios were used as the basis for calculating net revenues. Reductions for uncollectible accounts, credit card fees, and O&M costs were incorporated into a separate net revenue forecast model to calculate total net revenue. The methodology used in the analysis employed similar assumptions as previous WSDOT toll studies, with some updates to reflect recent experiences on SR 520 and the Tacoma Narrows Bridge.

In Figure 5.2, the flow of gross revenues, depicted as water leaving the tap, is allocated to fixed and variable costs associated with tolling the SR 167 Corridor Completion, displayed as buckets. Bucket locations along the water flow are indicative of the importance of each variable relative to the operation of the toll facility and reflect where cost allocations generally occur.

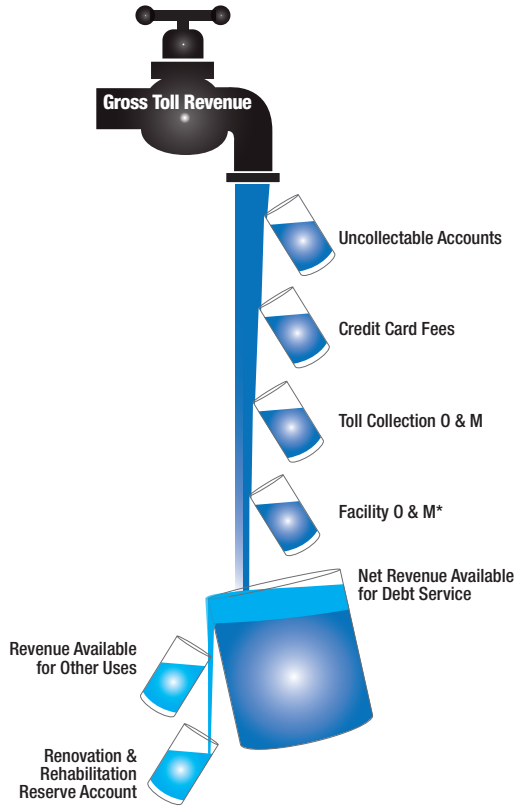
Uncollectible accounts represent the revenue leakage due to hardware error, non-payment, or unidentifiable transactions. As revenue leakage is not incorporated into the initial gross toll revenue, the value is provided in a separate item which is used to calculate adjusted gross toll revenue. The adjusted gross toll revenue provides the basis for deducting operational costs and fees to calculate net revenue.

Credit card fees, estimated as a percent of adjusted gross toll revenue, include an additional factor for fees related to account refunds. Credit card fees are incurred as a charge by the processing vendor and banks, and appear as a reduction to revenue.

O&M costs are allocated to two sub-categories representing toll collection and facility related costs. Toll collection O&M costs consists of state operations costs, customer service center (CSC) vendor costs and toll collection system (TCS) vendor costs. State operation costs reflect the SR 167 share of system-wide back office costs, inclusive of accounting, management, and marketing functions. Cost allocations for CSC and TCS are inclusive of costs for toll transaction processing, back office operations and toll collection equipment.

The following sections provide further information on how each cost element was derived to calculate total net toll revenues. Costs are adjusted by a set rate of 2.5% annual inflation unless otherwise noted.

Figure 5.2: Gross Toll Revenue Allocations



* Facility O&M expenditures will be incurred on the completed corridor regardless of whether or not tolling is implemented. As such, an alternative funding source, such as WSDOT's maintenance program ("M Program"), would be required to fund facility O&M if tolling is not implemented in the corridor.

Uncollectible Revenue

Uncollectible revenue, or revenue leakage, is losses attributable to toll evasion, electronic toll collection errors, or insufficient information about the vehicle owner. Forecasts for uncollectible revenue have been developed using an activity-based workflow, which estimates the probability that a toll transaction will become uncollectible under a variety of scenarios. These scenarios include:

- insufficient account balance
- unreadable license plates
- insufficient information about vehicle owner
- toll evasion/non-payment of toll invoice

Credit Card and Banking Fees

After removing uncollectable accounts from the total gross revenue, the resulting adjusted gross revenue is used as a basis to calculate variable credit card and banking fees. WSDOT will accept credit and debit cards for the payment of tolls on SR 167 Corridor Completion, as well as for the purchase of *Good to Go!* transponders. WSDOT's experience at the Tacoma Narrows Bridge has been that 85% of revenue transactions are collected via credit and debit cards. For forecasting purposes, this study uses a slightly higher assumption of 90%, reflecting higher *Good to Go!* usage. The fee rate associated with this form of payment is assumed to be 2.5% of the amount collected by credit card, plus a small allowance for account refunds.

Toll Collection Operating and Maintenance

Toll collection O&M costs include all administrative and technical functions required for processing toll transactions and collecting revenue from customers. Beginning with the task of identifying a transaction on the roadway, to recording the transaction, to ultimately collecting payment, the toll collection process requires involvement and coordination by three distinct operating units:

- the WSDOT Toll Division (state operations)
- the Customer Service Center (CSC) vendor
- the Toll Collection System (TCS) vendor

Costs associated with the state and CSC services are incurred on a statewide basis, and will be allocated according to the share of total toll transactions at each facility. In addition to potential tolling on the SR 167 Corridor Completion, three other Washington State corridors are currently tolled: SR 167 HOT lanes, the Tacoma Narrows Bridge (TNB) and SR 520. Support for these corridors is overseen by the WSDOT Toll Division. Current toll

transaction forecasts for planning and operational estimation purposes yield a projected distribution of costs between existing and planned projects. The TNB share is considerably less than that for SR 520 because TNB tolls are only collected in one direction. SR 167 is a HOT lane facility adjacent to two, toll-free general-purpose lanes in each direction. As such, the facility has a relatively low share of toll transactions.

TCS vendor costs are not allocated on a statewide basis, and are not subject to this distribution.

State Operations

Oversight functions performed by state staff include the following activities:

Management

The WSDOT Toll Division will provide leadership and operations oversight. Duties also include monitoring vendor operations, coordinating staff, and reporting to the Legislature, Transportation Commission, and WSDOT executives.

Accounting/Audit/Finance

Accounting and finance staff will oversee the reporting of costs and revenues associated with the SR 167 tolling operations, and will also track trends in the general financial health of the facility. Staff will work with the Customer Service Center back office to ensure state accounting systems properly interface with the CSC system. Routine audits will also be conducted to verify revenues and ensure costs have been properly categorized.

Marketing

Communications staff will primarily help SR 167 corridor users understand tolling, choose the appropriate payment option, and provide support for toll rate-setting efforts.

In addition to staffing for management, accounting, and marketing, state operations costs also include standard business expenses for rent, office supplies, computers, and communication equipment. In addition, the state will also incur all printing and postage costs.

Customer Service Center and Toll Collection Systems Vendor Costs

In addition to direct state operations, customer service center and the toll collection systems are operated and maintained by external vendors.

Customer Service Center (CSC)

The Customer Service Center is responsible for all front-end functions, including operation of *Good To Go!* walk-in centers, websites, and email/telephone support. In addition, the CSC is also responsible for processing all account and non-account based toll transactions (i.e., *Good To Go!* and Pay By Mail).

The primary driver in forecasting CSC vendor costs is the total volume of toll transactions that will be processed by the CSC, which also serves as proxy for the second driver, which is the expected volume of *Good To Go!* customer accounts.

For the purpose of forecasting, CSC vendor costs are estimated on a per-transaction basis, where each transaction is multiplied by a unit cost and then totaled for the given forecast year. In practice, CSC vendors may choose to price contracts according to different transaction or account tiers, where unit prices may decline as the volume of transactions increases.

This potential for economies of scale is also captured in the SR 167 forecast by assuming that a single back-office vendor will be responsible for processing all toll transactions across WSDOT's toll facilities. For the purpose of this analysis, the system of facilities was assumed to include the Tacoma Narrows Bridge, SR 520, the SR 167 HOT lanes, and the SR 167 Corridor Completion.

Toll Collections Systems (TCS)

Toll collections systems include all equipment and software required for identifying a toll transaction and transmitting data about that transaction to the customer service center for processing. Sometimes referred to as "lane systems," this equipment includes transponder readers, cameras, and other communication devices that need regular maintenance to ensure the system is functioning properly. WSDOT has provided the fixed annual cost estimates for TCS costs that include but are not limited to the following duties:

- aligning and/or recalibrating transponder readers and cameras
- cleaning camera lenses
- maintaining equipment connections
- monitoring/auditing equipment performance

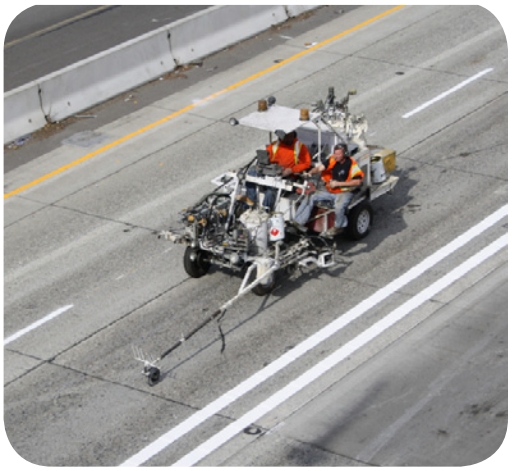
As specified by WSDOT, the same TCS fees will be incorporated into all four phases and three scenarios amounting to $44.07 million over the forecast period, after adjustments for 2.5% annual inflation.

Facility (Roadway and Structures) Operations and Maintenance

Routine operation and maintenance (O&M) of the corridor is critical to providing continuous, uninterrupted toll revenue generation. Proper maintenance of the facility also ensures that the expected level of service is provided to motorists. Typically, facility O&M activities include:

- paving and patching repair
- maintaining drainage systems, culverts and slopes
- roadside and landscape maintenance
- weed control
- snow and ice control
- disaster maintenance including road closures, detours and emergency repair not involving major construction; and
- maintenance of pavement striping and markings, guardrails, highway lighting systems, traffic signs, lane restriping, pothole repair, traffic operations, signage, and litter pickup.

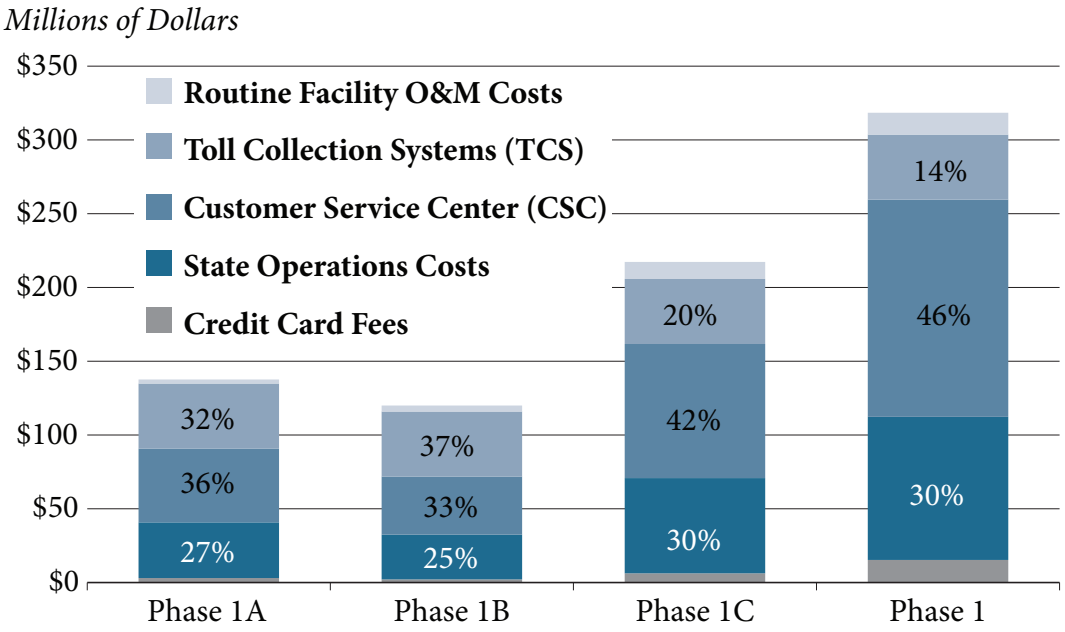
Facility O&M cost estimates for SR 167 were prepared by WSDOT, and derived from historical maintenance costs in the corridor as well as other similar facilities. These activities help to preserve safety and travel reliability along the corridor.



Summary of Costs and Net Revenue Available for Financing

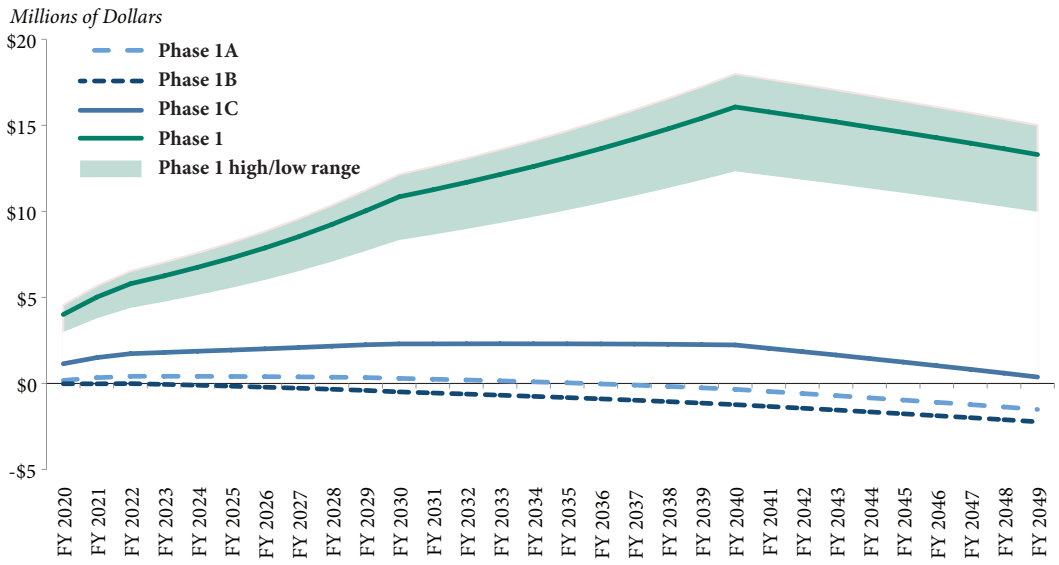
In comparing the medium growth scenario of the four phasing options, as shown in Figure 5.3, the majority of total costs are associated with toll collection O&M. Customer Service Center costs represent the single largest cost component, ranging from a low of 31% for Phase 1B to just over 41% for Phase 1. Including fixed toll collection system (TCS) costs of $44.07 million over the forecast period, total vendor O&M costs range from 54% of total costs for Phase 1 to 67% for Phase 1B. Adjusting TCS costs to account for the number of tolling facilities associated with each phase will lead to lower O&M costs for Phases 1A through 1C and would be consistent with similar assumptions used in other WSDOT projects.

Figure 5.3: Comparison of Total Forecasted Costs for Each Phase (FY 2020-FY 2039)



Removing O&M costs and credit card fees from the adjusted gross toll revenue by fiscal year provides an annual comparison of net toll revenue for the four phases. As illustrated in Figure 5.4, the four phases provide varying levels of coverage for forecasted credit card fees and O&M costs. Phase 1 provides the greatest opportunity for covering costs and generation of capital funding contributions, as total net toll revenues remain positive throughout the forecast period, including consideration of the alternative Phase 1 high and low-scenario ranges. Total net toll revenues for the Phase 1 medium growth scenario peak in fiscal year 2040, and decline thereafter due to no assumed growth in traffic, declining real toll rates, and continued escalation in O&M costs as a result of forecasted inflation adjustments. Before fiscal year 2040, declining real toll rates and increasing costs were more than covered by increases in gross revenue, the result of traffic growth projections.

Figure 5.4: Projected Total Net Toll Revenues by Phase for the Medium Growth Scenario



Phases 1A and 1B do not appear conducive to generating capital funding contributions, but tolling may still provide other benefits in the form of demand management and phased construction. Additional sensitivity analysis on the current scenarios, using toll rates that keep pace with cost inflation, may also be considered as a means to increase net toll revenue. The impact of higher toll rates on the volume of toll transactions and diversion, however, will reduce the magnitude of any anticipated additional net toll revenue.

Additional revenue generated by tolling SR 509 to I-5 and I-5 to Valley Road in both directions, as contemplated in Phase 1C, provides positive net toll revenue over the forecast period. Despite higher Toll Collection System (TCS) costs in relation to total gross toll revenue in comparison to Phase 1, net toll revenue remains positive. Higher forecasted traffic growth in comparison to Phases 1A and 1B results in sustained net toll revenue growth until fiscal year 2040, after which there are no further forecasted increases in demand, and net toll revenues decline. Increasing toll rates to keep pace with costs could, at a minimum, result in a level net revenue stream beyond fiscal year 2040.

Financial Analysis Assumptions and Findings

To determine the financial capacity of the SR 167 project, three key forecast inputs were evaluated:

1. cash flow available for debt service (CFADS)
2. capital sources and uses (S&U) before financing
3. debt instrument and associated terms (type of bond, interest rate, coverage requirement, etc.)

The first of these items is supplied by the net toll revenue forecast, which is assumed to be the primary source of revenue pledged for debt service. The projected revenue stream is the greatest factor in determining how much funding can be generated for the project, as debt payments (principle and interest) cannot exceed the amount of revenue available for debt service.

The second item, capital sources and uses before financing, provides a schedule of the amount and timing of funding available from non-toll funding sources, which is used to determine the remaining funding needed from tolls. Lacking other sources, toll funding was assumed to be needed for the full project cost, ranging from $250 million to $1 billion depending on the build option selected. In addition, due to the planning-level nature of this analysis, it was assumed that all toll proceeds would be delivered in fiscal year 2017, or available for project uses on July 1, 2017. Interest accrued on outstanding debt between fiscal year 2017 and the first year full year of repayment (fiscal year 2022), was assumed to be capitalized.

Finally, the type of debt and associated terms help determine the underlying cost of borrowing. In the case of SR 167, a combination of current interest bonds (CIBs) and capital appreciation bonds (CABs) with mid-level credit ratings was assumed. A summary of financing terms assumed in this analysis is provided in Table 5.3 below.

Table 5.3: Assumed Financing Terms

Category	Assumption
Coverage Ratio	1.5x
Interest Rate (CIBs)[1]	6.25%
Interest Rate (CABs)[2]	7.75%
Issuance Timing	FY 2017
Maximum Maturity	30 years

[1] Current Interest Bonds
[2] Capital Appreciation Bonds

Financing assumptions shown above were informed by current market conditions and adjusted to account for potential interest rate risk and other market-driven variations at the time of debt issuance. Other assumptions, such as the maximum maturity, were developed based on general state policies concerning the issuance of toll-backed bonds. In addition to these assumptions, it is the general goal of the state to strive for level debt service to minimize the burden of escalating bond payments over the financing horizon. For the purpose of this analysis, toll rates were not assumed to escalate over time, so any growth in revenue is fully attributable to increased demand (vehicle traffic) in the corridor. As a result, limited growth in the gross revenue stream provides for a near-level structuring of debt payments; consistent with current policies of the Office of the State Treasurer.

Financial Analysis Findings

Of the four build options evaluated, two were capable of generating excess funding for capital uses after accounting for all revenue adjustments and O&M expenditures. Funding levels from these scenarios, however, amounted to less than 10% of the total project need, indicating that other resources would be required to provide a balanced finance plan for the SR 167 Corridor Completion.

Phase 1, which produced the highest gross and net revenue streams, would be capable of generating $40-65 million of financial capacity through tolling, while the projected capital cost amounts to approximately $1.5 billion.

Phase 1C also produced positive net revenues throughout the forecast horizon, resulting in a capital funding capacity of $5-15 million. This amount could provide sufficient funding for tolling-related infrastructure such as camera equipment, transponder readers and gantries, but it would not provide a substantial contribution to roadway construction.

Phase 1A and 1B do not appear conducive to generating capital funding contributions, but tolling may still provide other benefits in the form of congestion mitigation.

Table 5.4 on the next page is a summary of financial results.

Table 5.4: Summary Revenue and Financial Analysis Results

	T&R Scenario	Gross Toll Revenues	Adjusted Gross Revenues†	Toll Collection O&M + Banking Fees	Facility O&M Expenses	Net Toll Revenues Before R&R	SR 167 Capital Cost	Toll Equipment Capital Cost	Toll Funding for Capital Expenditures‡	Remaining Funding Need
PHASE 1A	**HIGH**	*FY 2020-49* **$154 M**	*FY 2020-49* **$146 M**	*FY 2020-49* **($144 M)**	*FY 2020-49* **($3 M)**	*FY 2020-49* **-$1 M**	**$250 M**	**$7 M**	--	**$257 M**
	LOW	*FY 2020-49* **$112 M**	*FY 2020-49* **$106 M**	*FY 2020-49* **($117 M)**	*FY 2020-49* **($3 M)**	*FY 2020-49* **-$14 M**			--	**$257 M**
PHASE 1B	**HIGH**	*FY 2020-49* **$109 M**	*FY 2020-49* **$103 M**	*FY 2020-49* **($123 M)**	*FY 2020-49* **($4 M)**	*FY 2020-49* **-$24 M**	**$500 M**	**$7 M**	--	**$507 M**
	LOW	*FY 2020-49* **$79 M**	*FY 2020-49* **$75 M**	*FY 2020-49* **($102 M)**	*FY 2020-49* **($4 M)**	*FY 2020-49* **-$31 M**			--	**$507 M**
PHASE 1C	**HIGH**	*FY 2020-49* **$316 M**	*FY 2020-49* **$299 M**	*FY 2020-49* **($221 M)**	*FY 2020-49* **($12 M)**	*FY 2020-49* **$67 M**	**$750 M**	**$10 M**	**$15 M**	**$745 M**
	LOW	*FY 2020-49* **$230 M**	*FY 2020-49* **$218 M**	*FY 2020-49* **($175 M)**	*FY 2020-49* **($12 M)**	*FY 2020-49* **$31 M**			**$5 M**	**$755 M**
PHASE 1	**HIGH**	*FY 2020-49* **$774 M**	*FY 2020-49* **$733 M**	*FY 2020-49* **($328 M)**	*FY 2020-49* **($15 M)**	*FY 2020-49* **$390 M**	**$1 B**	**$13 M**	**$65 M**	**$948 M**
	LOW	*FY 2020-49* **$563 M**	*FY 2020-49* **$533 M**	*FY 2020-49* **($255 M)**	*FY 2020-49* **($15 M)**	*FY 2020-49* **$264 M**			**$40 M**	**$973 M**

NOTES:

† After deduction for revenue leakage / uncollectible accounts.

‡ Estimated net bond proceeds in FY 2017, assuming 1.5x coverage and interest rates of 6.25% and 7.75% on CIBs and CABs, respectively.

Chapter 6:

Stakeholder Outreach, Public Involvement and Environmental Justice

The intent of the public outreach in this study is to provide information about the project to elected officials, key stakeholders and the local community, and to gather input about how tolling could provide funding to construct the SR 167 Corridor Completion project.

Overview

Website: WSDOT leads with the web. The study's website: (www.wsdot.wa.gov/projects/sr167/completion/) provides information about the study, its progress and meeting materials, and is a way for the public to ask questions or comment on the study. WSDOT received four emailed comments from the public. Most of the comments supported building and tolling the project.

Public opinion survey: A public opinion survey was conducted in June 2011. Questions covered travel behaviors, support for constructing the completion, support for tolls on the corridor and other relevant topics. The survey is covered in more detail later in this chapter.

Direct outreach to key stakeholders and elected officials: A number of key decision makers and elected officials are included on the project's stakeholder committee. WSDOT Olympic Region Administrator Kevin Dayton also presented the current status of the project to the Fife City Council on September 11, 2012, and to the Tacoma City Council Environment & Public Works committee on October 10, 2012.

Public outreach: On October 6, 2012, project representatives staffed a booth at the Fife Harvest Festival. Approximately 140 people approached the booth to learn more about the project and to ask questions. The overriding response was enthusiasm for building the project, and building it soon. When tolls entered the discussion, the response was more muted, with about half the people supporting the idea of tolls and half not supporting tolls.

Focus groups: Focus groups were conducted with members of the general public and the freight and business community in October and November 2012. Questions covered travel behaviors, support for constructing the completion, support for tolls on the corridor and other relevant topics. The focus groups are covered in more detail later in this chapter.

Environmental documentation: If WSDOT develops a funding option that includes tolls, the Record of Decision and all discipline studies will be reevaluated since the use of tolls as a funding option was not analyzed as part of the original proposed project. Additional information about this topic is available later in this chapter.

Stakeholder Committee

Roles and responsibilities
The stakeholder committee, comprised of local jurisdictions and partner agencies, was asked to help define study parameters, serve as a sounding board when discussing issues, review technical products, help develop consensus on evaluation criteria, help define corridor options, and agree on preferred phasing and tolling options. Stakeholder committee members were also asked to keep their executive management and policymakers informed of the study's progress.

The stakeholder committee's role was designed to be consensus-driven when making decisions and recommendations. The committee defined "consensus" as being able to agree upon recommendations that might not be ideal for all committee members, but were acceptable to all. During the study process, the committee reached consensus on most key decisions and recommendations. In matters where consensus was not reached, the committee members voted and the majority vote carried decisions and recommendations forward.

Members:
WSDOT established a 20-member stakeholder committee to provide input and recommendations throughout the study process. WSDOT staff familiar with the history of the project invited representatives from the following entities to participate in that formal stakeholder group:

- City of Auburn
- City of Edgewood
- Federal Highway Administration
- City of Fife
- Freight Mobility Strategic Investment Board (FMSIB)
- City of Pacific
- Pierce County
- Puget Sound Regional Council
- City of Puyallup
- Puyallup Tribe of Indians
- South Sound Chamber of Commerce Legislative Coalition
- Port of Tacoma
- City of Tacoma
- Tacoma – Pierce County Chamber of Commerce
- Washington Trucking Association

In addition to the formal members listed above, other agencies, individuals and legislative staff expressed interest in staying informed about this study and also attended some meetings. In accordance with their request, WSDOT provided copies of all meeting materials, including meeting notes, agendas and presentation materials, to:

- Legislators from Districts 2, 25, 26, 27, 28, 29, 30, 31, 47
- SSA Marine
- Puyallup/Sumner Chamber of Commerce
- Staff Council, House Republican Caucus
- Discovery Institute
- Riverside Fire & Rescue

Legislative participation
Legislators of all districts within the SR 167 Corridor Completion project were invited to participate in the stakeholder committee meetings. Although not every representative or senator was able to participate in every committee meeting, there was extensive participation by legislators and legislative staff in the stakeholder committee meetings.

Stakeholder Committee Meetings

Seven stakeholder committee meetings were held during the course of this study in 2011 and 2012. All committee meetings were held at the Port of Tacoma.

First Stakeholder Committee Meeting - August 25, 2011

At this meeting the committee members were familiarized with the study and discussed the following topics:

- toll study decision-making process
- previous options from the 2010 Toll Feasibility Study
- recommended phasing and tolling options for the first round of analysis
- proposed evaluation criteria
- proposed performance measures
- overall study methodology
- public involvement/outreach strategies
- selected three project phasing/tolling options for initial screening out of 19 options from the Toll Feasibility Study
- results from first public survey

Second Stakeholder Committee Meeting – September 27, 2011

At this meeting, the committee members were presented the results of the first round screening of toll/phasing options. The committee members were also given a short presentation on the potential options for public outreach. Key findings include:

- Tolling the corridor could reduce travel demand by half.
- A tolling point on SR 167 east of SR 161 would balance overall traffic flow, increase gross toll revenue and increase usage of the SR 167 corridor.

Major inputs received from this meeting included:

- Consideration and analysis of traffic diversion onto the parallel arterial network that could occur as a result of tolling the completion.
- Revisit/reconsider population and employment forecasts by option.

Third Stakeholder Committee Meeting – October 25, 2011

At this meeting, the committee members reviewed the preliminary results for four key metrics:

- daily revenue
- corridor usage
- sub-area performance
- corridor performance

Preliminary analysis results of the initial four options were presented. The "key message" for the study was reviewed and revised at this meeting. Stakeholders expressed their concerns of tolling any existing facilities in this study.

Fourth Stakeholder Committee Meeting – December 8, 2012

At this meeting, the committee members were provided responses to previously unresolved issues/questions related to tolling and traffic:

- lowered value of time (VOT) assumptions
- lowered growth forecasts
- updated regional model – *(These three factors lowered the daily gross revenue by two-thirds)*
- concerns that no escalation of toll rates to keep pace with inflation would further lower the toll funding contribution

There was also feedback provided to the committee from the WSDOT Toll Executive committee regarding overall study direction:

- further study traffic patterns, usage, and diversion through mesoscopic traffic model
- consider additional tolling options or phasing option in an effort to close the funding gap
- wait to perform financial analysis until efforts on the above are finished

The key message for public outreach was finalized and presented to this committee meeting as follows:

> *"Completion of the SR 167 corridor from Puyallup to SR 509 near the Port of Tacoma will require a significant amount of funding from multiple sources, including state gas tax, federal funding and other sources. However, these recognized funding sources are not sufficient to fund the project through final construction. Non-traditional sources, such as tolling, are being considered to fill the funding gap. This study will generate revenue projections from various tolling scenarios and considers the impacts tolling would have on the use of the facility and other roadways. This study was requested by the Legislature to help them decide how to fund this project."*

Fifth Stakeholder Committee Meeting – March 8, 2012

At this meeting, the committee members were given a briefing on these topics:

- 2012 legislative session and its implications for the SR 167 Corridor Completion project
- updated cost estimates/CEVP estimate numbers for various phasing options
- progress on developing the mesoscopic travel-demand model

The stakeholders were also given the opportunity to suggest new options for consideration and analysis. The stakeholders indicated significant concerns with proposals for phasing the project and the loss of focus on project completion at this meeting.

Sixth Stakeholder Committee Meeting – August 1, 2012

At this meeting, the committee members were given a briefing on the status of developing phase options and were also given a presentation on the results of the toll and traffic mesoscopic modeling. The project team presented and discussed the following topics at this meeting:

- draft results of the mesoscopic model for the option of building one lane in each direction
- selection of two/three incremental investment options for detailed financial analysis
- discuss and determine public outreach methods

Next steps from this meeting included the selection of two additional phasing options for detailed financial analysis:

- macroscopic modeling
  - identify optimum toll rate
  - generate input for mesoscopic model
- corridor usage forecast using mesoscopic model
- gross revenue projections for financial analysis
- financial analysis

The stakeholders indicated concerns regarding the phased approach and possible loss of focus on building the "full" SR 167 project. The stakeholders did not officially endorse the phased proposals but agreed to move them forward for financial analysis.

Seventh Stakeholder Committee Meeting - October 19, 2012

The key focus of this last stakeholder committee meeting was a presentation of the financial analysis results. At this meeting, the committee members were also briefed on progress on the upcoming focus groups and other public outreach activities.

The results of the detailed financial analysis were presented at this meeting.

- Financial analysis: The optimal net revenue range is between $40 and $65M for Phase 1 over 20 years.
- Other phases will generate considerably less net toll revenue during this timeframe.
- The projected net toll revenues for several phases will only fund tolling operations and maintenance, not construction over the 20-year period of analysis.

The committee also discussed the development of the final study report and next steps in the development of this report. A draft final report was delivered electronically to the committee members on December 6, 2012. Committee members were invited to participate in a feedback session that was held on December 17, 2012.

Public Opinion Survey

To better understand public attitudes and opinions about the SR 167 Corridor Completion project, WSDOT conducted a statistically valid public opinion telephone survey in June, 2011. Key findings of the survey included:

- A majority of respondents view construction of the SR 167 corridor as a priority. Only about one in ten indicated it was not a priority.
- Overall support for tolling the corridor is weak. More respondents opposed tolling than supported it. Approximately one-third of respondents were either neutral or did not hold strong opinions about tolling the project.
- A large majority of respondents indicated they would avoid the toll by taking a different route. This response suggests that some traffic diversion would occur if the project was tolled.
- Responses to the survey indicated a number of ways that support for tolling could be increased.
  - use toll revenue exclusively for the project
  - allow exemptions or discounts for transit and HOVs
  - vary toll rates by time of day
  - use gas tax revenue to pay for a share of the project

When interpreting the results of the survey it is important to keep in mind that respondents were presented with a hypothetical scenario. It is often the case that public opinion and travel behavior adjust after a project is implemented and real choices and trade-offs are better understood. For example, public approval of other variably-priced highways has typically increased after they have opened, presumably because the benefits are more apparent.

Focus Groups

Focus groups were conducted on Oct. 29-30, 2012 and Nov. 7-8, 2012 in Tacoma to further explore the public's attitude and awareness of the project and tolling as a potential funding source. Four focus groups were conducted; two had members of the general public and two were focused on business and freight customers. Participants were screened for those who travel between the Puyallup area and I-5 at least once a month to capture input from potential users of the highway completion. A mix of genders, ages, races, income levels, and business types were also recruited.

Participants were generally supportive of building the corridor and said they would use it once it was built, however their support of the project, and their likelihood of using the corridor, often dropped when tolling was introduced as a funding mechanism. Several said they would use other routes to avoid the toll. The promise of a faster trip did entice some in the group to see the value of the toll. The fact that tolling would be combined with other funding sources such as gas tax, federal funding, etc. did nothing to increase their support for tolling. When asked if they'd prefer a gas tax increase over a toll to help fund the project many participants wondered why everyone should pay for the project when most in the state will not use the completed highway.

The idea of variable-rate tolling was generally supported by most due to an understanding of how that system can reduce congestion. However, a number of participants stated that the toll must be reasonable. Support for segmental tolling, where the further one travels the more one pays, was generally supported by the groups. Those who would use the route multiple times a day, primarily businesses, especially liked the idea of segmental tolling.

Phasing of the project seemed to have little support among the groups. This concept was explained to them as starting off with perhaps constructing one lane in each direction, then adding lanes as needed. The idea of one lane in each direction held no interest for them – it would not relieve congestion. Two lanes in each direction were somewhat more acceptable, but many said that WSDOT needs to build for the future. A number of participants questioned the need for HOV lanes when all lanes would be tolled.

Environmental Justice

To use tolls as a funding mechanism for the SR 167 Corridor Completion project, the NEPA Record of Decision and all associated discipline studies will be re-evaluated. The use of tolls was not a funding option analyzed in the original proposed project. As such, potential impacts of tolling on environmental justice populations were not evaluated in the original EIS.

If WSDOT determines that it is feasible to proceed with tolls to fund the SR 167 Corridor Completion project, potential impacts of tolling on environmental justice populations will need to be evaluated to be in compliance with Title VI of the Civil Rights Act, Executive Order 12898 and associated policies and guidance from FHWA. Additionally, the original Record of Decision and supporting documents will be re-evaluated for changes as defined by NEPA requirements. Changes could include design changes, changed existing conditions, and incorporating updated or new regulations. Each discipline study and the ROD would be evaluated for significant changes regarding the tolling option and changed conditions since 2007. After reevaluating the tolling option in the context of the whole project, a decision will be made whether the necessary documentation is an update, or a supplement, to existing environmental documentation.

Chapter 7:
Key Findings and Next Steps

Public outreach on this comprehensive tolling study began with a public opinion survey and concluded with two sets of focus group meetings. The study also involved extensive levels of macroscopic and mesoscopic traffic and toll modeling activities. WSDOT worked closely with a stakeholder committee to formulate study methodologies, inputs, assumptions and phasing options during the course of this study.

Key findings are as follows.

Findings from Traffic and Toll Analysis

Nineteen phasing options were evaluated in this study. Six of the 19 options were carried forward into more detailed traffic and revenue analyses. These options ranged from building one lane in each direction for only a portion of the corridor to the full-build option.

Key findings are as follows:

- Phase 1 performs relatively better than other options in terms of funding capacity with $40 million to $65 million in net toll revenues expected to help pay for project construction.
- The funding capacity from project phases with smaller scopes than Phase 1 is not expected to be significant given the current economic conditions and study assumptions. With carefully structured toll rates and economies of scale realized with multiple state highway toll operations, tolling of these smaller options is expected to generate the revenue needed for ongoing facility maintenance and operations after deducting toll collection costs.
- Without future improvements to I-5 to accommodate traffic growth, increased congestion on I-5 will constrain SR 167 corridor usage and negatively affect toll revenue.
- Tolling could help manage traffic demand and make a phased approach (or incremental project implementation) more viable from both a traffic operations and a financial capacity standpoint.

Comparison to the 2010 Toll Feasibility Study

In comparison to the 2010 Toll Feasibility Study findings, the financial capacity of tolling from this study is significantly lower.

A number of factors contribute to this discrepancy, all based on updated economic and demographic factors as well as study assumptions:

- No tolling of existing facilities. The 2010 Toll Feasibility Study included the assumption of tolling existing SR 167 just east of Meridian Ave. This would negate the ability of travelers to divert and avoid paying the toll. Some tolling scenarios in the 2010 study also assumed that tolling the existing SR 509 and converting I-5 HOV lanes to HOT lanes would occur.
- Based on the SR 520 tolling data results, a lower value of time was assumed in this study in comparison to the 2010 study. A lower value of time means that travelers are less willing to pay a toll, leading to lower toll rates and higher traffic diversion.
- Lower population and employment forecasts as a result of the recent recession.
- No toll-rate escalation over time to keep up with inflation, as directed by the State Treasurer.
- Lower weekend traffic volumes and toll revenues.

Next Steps

Based on the results in this study, it is clear that a large portion of the remaining project costs will need to be funded by non-toll revenue sources. The definition of a project implementation plan, securing the remaining right of way and construction funding are critical next steps in moving this project forward. Although tolling may not generate enough revenue to help pay for project construction, it could be a viable element if the project is implemented in phases to ensure efficient traffic operations.

If the Legislature moves forward with some level of funding to continue project implementation, the following steps should be completed:

- **Complete Project Design:** Project design for project phases and the full-build phase will need to be completed.
- **Complete ROW Acquisition:** Approximately 30% of the necessary right of way needs to be purchased.
- **Review and update the project EIS:** The SR 167 Corridor Completion EIS will need to be revisited and potentially revised since the original project EIS did not include tolling as a funding strategy.
- **Investment-Grade Tolling Study:** If the Legislature decides that tolling is to be a funding mechanism for project implementation, an investment-grade toll study will need to be undertaken prior to the issuance of bonds for project implementation.

It should be noted that there is a high degree of uncertainty in toll revenue forecasting. This is especially true for a highway that does not currently exist. A number of assumptions for this study were made based on projects elsewhere in the state and around the nation.

These assumptions should be reexamined when more experience is gained from other similar projects, or as conditions, such as the following, change over time:

- **Population and employment growth forecasts.** Due to the recent economic recession, the forecasted long-term population and employment growths were reduced by 1% and 3%, respectively. The actual population and employment growth could be higher or lower than what is assumed in this study.
- **Value of time.** The value of time for passenger travel was taken from the SR 520 Investment Grade Study. The value of time for truck travel used in this study was higher than the SR 520 Investment Grade Study based on a literature search conducted by the WSDOT Urban Planning Office several years ago. A research on value of time specific to this corridor should be conducted if toll revenue will be part of the funding source for project construction.

- **The scope and timeline of other planned projects that affect usage of the SR 167 Corridor Completion.** Mesoscopic traffic simulations indicated that congestion on I-5 may constrain the amount of traffic that can get on and off I-5. A SR 509 connection to I-5 may bring extra traffic to I-5 through Fife and exacerbate I-5 congestion if no capacity improvements are made to I-5 to accommodate this growth. The extension of an HOV/HOT lane on existing SR 167 through Sumner may also affect the potential usage of the SR 167 corridor and expected toll revenue. This study should be updated as conditions or planned projects within the influence area of the SR 167 corridor evolve over time.
- **Toll rate.** The toll rate assumed in this study will remain flat over time, based upon policy direction from the Washington State Treasurer's Office. This means that the real value of the toll rate decreases over time due to the impacts of inflation. While this assumption may be needed to satisfy potential financial institutions in structuring debt repayment, the impact of actually holding toll rates constant over time presents challenges from both economic and traffic operation aspects. This assumption should be revisited as soon as possible.
- **Toll collection costs.** Toll collection and toll facility maintenance and operation costs, among other things, were first deducted from gross toll revenues before determining how much net revenue can be expected to fund project construction. Toll collection cost estimates for each phasing option were developed using unit-cost information from other WSDOT tolling programs. These estimates should be revisited and updated as necessary as more real-world data become available.

The amount of toll revenue expected to be available for construction is heavily dependent on the type of debt instruments used, market conditions and interest rates at the time the debt is issued, and the policy decisions regarding how debt and toll rates are structured. As such, these assumptions should be revisited and updated if market conditions change considerably in the future.

Appendix

Pierce County

Office of the County Executive

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January 22, 2013

Mr. Kevin Dayton, Olympic Regional Manager
Washington State Department of Transportation
5720 Capitol Boulevard SE
Tumwater, WA 98501-6703

Re: SR 167 Extension Comprehensive Tolling Study

Dear Mr. Dayton:

Thank you for the opportunity to review and comment on the Draft SR 167 Extension Comprehensive Tolling Study. WSDOT staff has done a commendable job in forecasting travel demand and finances associated with the tolling of the future construction of SR 167 between SR 161 to SR 509. The draft study reflects the sound work performed in analyzing a wide range of project alternatives. WSDOT should also be commended in their efforts in assuring that the public process encompassed the many types and levels of interest in this study.

An Important Project
The completion of SR-167 is the highest priority corridor project in the South Sound. It is the most important "mega-project" for the Port of Tacoma and our regional economy. Quoting from the Study:

Without the SR 167 Extension, the Port of Tacoma (and all Puget Sound ports) would find it more difficult to compete with other U.S. and Canadian ports for the movements of containers.

Page 2, "An Economic Assessment of the SR 167 Extension Project". WSDOT and Berk and Associates, April 5, 2007

We commend the state for its diligence in seeking innovative ways of financing this important corridor project. However, we would also suggest that the decision for implementing the SR 167 Completion Project should not be based on the level of tolls generated by the facility, but rather on the project's importance to freight mobility and to the statewide economy.

Complete SR 167…. Completely

We support the concept of a "complete" SR 167 Completion Project as a controlled access facility with at least two lanes in each direction and grade separations. This freeway should extend from SR 161 with interchanges inclusive of those with I-5 and SR 509.

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The SR 167 Extension Comprehensive Tolling Study carries through the concept of Option 1 which would be a one lane in each direction controlled access facility. It is understood that this option was selected through the balancing of such considerations as construction costs, toll revenues, and usage. However, given the importance of this project on the statewide mobility of freight, we would advocate that this project NOT be scaled down in its scope.

The SR 167 Completion Project

To reflect the project's true function, Pierce County supports changing its title to the "SR-167 Completion Comprehensive Tolling Study". The purpose of this project is to finish a long planned economic corridor to the Port of Tacoma and SR 509. The Port of Tacoma is an economic engine for Washington State (one of the most trade-dependent states in the country) with more than 43,000 family-wage jobs in Pierce County and 113,000 jobs across Washington State connected to Port activities.

We appreciate the opportunity to comment on the SR 167 Completion Comprehensive Toll Study.

Sincerely,

Pat McCarthy
Pierce County Executive

Tacoma

January 29, 2013

Kevin Dayton, P.E., Region Administrator
Washington State Department of Transportation
Olympic Region
P.O. Box 47440
Olympia, WA 98504-7440

Subject: SR167 Tolling Report

Dear Mr. Dayton:

On behalf of the City of Tacoma, I appreciate the opportunity to submit this letter in support of the SR167 extension project and request it be included in the Washington State Department of Transportation SR167 Tolling Report's appendix when transmitted to the Legislature.

The City of Tacoma strongly supports the completion of the SR167 corridor from Puyallup to the Port of Tacoma. This corridor will provide a vital economic link between the Port, valley warehouses, Eastern Washington farms, and will help to grow international trade in Washington. The project completes a missing link in the region's freeway network, improving the mobility of freight and general traffic. The project will reduce traffic congestion and vehicle idle time which will aide in improving air quality.

The SR167 Tolling Report was prepared at the direction of the Legislature to determine the feasibility of administering tolls within the corridor. Completing the project will require a significant amount of funding and non-traditional sources, such as tolling, to fill the funding gap. The Tolling Report discusses options for phasing or building only sections of the project due to the high cost of the full build option. As you know, full build includes two general purpose lanes and one HOV lane in each direction between I-5 and SR161, two lanes each direction between I-5 and SR509 and a full interchange with I-5. The City of Tacoma encourages the Legislature to allocate funding to build the full project. Building a partial project may reduce the potential for future funding to complete construction.

The SR167 extension is an important transportation infrastructure project for Tacoma, Pierce County, and Washington State. If we can provide more information, please do not hesitate to ask.

Sincerely,

T.C. Broadnax
City Manager

cc: Mayor Strickland and City Council Members
Public Works Department
Community and Economic Development Department
Government Relations Officer

Pierce County
Office of the County Council

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Joyce McDonald
Councilmember, District No. 2
Chair of the Pierce County Council

January 29, 2013

Mr. Kevin Dayton, Olympic Regional Manager
Washington State Department of Transportation
5720 Capitol Boulevard SE
Tumwater, WA 98501-6703

RE: SR 167 Extension Comprehensive Tolling Study

Dear Mr. Dayton:

On behalf of the Pierce County Council, I would like to thank you for the opportunity to comment on the Draft SR 167 Extension Comprehensive Tolling Study. WSDOT previously received a comment letter from Pierce County Executive Pat McCarthy which provides an excellent summary of Pierce County's support for the completion of SR 167.

The Pierce County Council and many other stakeholders in the region have long supported the SR 167 project. The completion of SR 167 is extremely important to the future economic well-being of the region and has long been planned. We believe that it is essential that this corridor be developed as a controlled access facility with a least two lanes in each direction and grade separations and should extend from SR 161 with interchanges inclusive of those within I-5 and SR 509. Any proposal to develop the corridor at a lesser capacity, such as described in Option 1 of the tolling study, should be rejected.

We appreciate the state for its continued efforts in support of the SR 167 project and look forward to continued progress towards completion of this vital transportation corridor.

Sincerely,

Joyce McDonald

Joyce McDonald
Chair of the Pierce County Council

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PUYALLUP SUMNER CHAMBER of COMMERCE

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February 1, 2013

Kevin J. Dayton, P.E.
Region Administrator
Washington State Dept of Transportation
P. O. Box 47440
Olympia, WA 98504-7440

RE: SR 167

Dear Mr. Dayton,

On behalf of the members of the Puyallup Sumner Chamber of Commerce, I am writing to extend our support for the SR 167 project to be included as an appendix for the Tolling Report. Our Chamber, both individually and as a member of the South Sound Chamber of Commerce Legislative Coalition, has identified the completion of SR 167 as a priority issue because of its impact on jobs creation and as a major freight corridor.

If you have any questions regarding our support of the SR 167 project, please do not hesitate to contact me.

Very truly yours,

Shelly Schlumpf,
President & CEO
Puyallup Sumner Chamber of Commerce