SR 99 Alaskan Way Viaduct Replacement Updated Cost and Tolling Summary Report to the Washington State Legislature

January 2010

Washington State Department of Transportation

Executive Summary
Why was this report prepared?

The Washington State Legislature approved Engrossed Substitute Senate Bill (ESSB) 5768 during the 2009 session, which identified a deep bored tunnel as its preferred option for replacing the SR 99 Alaskan Way Viaduct. ESSB 5768 committed a maximum of $2.8 billion in state funding to the replacement program, with $2.4 billion raised from existing state and federal sources and no more than $400 million raised from tolling the proposed bored tunnel. A $300 million contribution from the Port of Seattle brings the total replacement budget to $3.1 billion.

ESSB 5768 directed WSDOT to:

- Provide updated cost estimates for the SR 99 Alaskan Way Viaduct replacement, including the bored tunnel, to the legislature and governor by January 1, 2010;
- Consult with independent tunnel engineering experts to review the cost estimates and risk assumptions; and
- Prepare a traffic and revenue study to determine the potential for tolls to contribute to construction funding. The study should include an analysis of potential diversion, mitigation to offset diversion, and impacts on the performance of the facility from tolling.

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This report summarizes the work completed by WSDOT as required by the legislature. This work was comprised of four integral and related steps as illustrated in Exhibit 1:

Step 1 — The SR 99 bored tunnel has a cost which must be defined in order to identify the funding required. A revised, risk-adjusted tunnel cost estimate was the outcome of an updated cost assessment including elements of an enhanced Cost Estimate Validation Process (CEVP®) based on extensive cost and risk workshops, value engineering and design changes.

Step 2 — Tolling tunnel traffic is part of the funding equation. The City of Seattle's travel demand model was used to predict future traffic patterns for five toll scenarios after the tunnel and other program improvements have been completed.

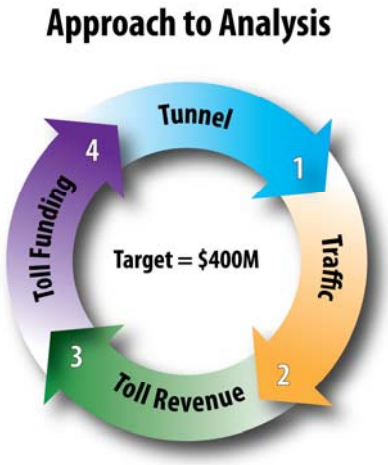


Exhibit 1 – Approach to Analysis

Step 3 — A revenue model was used to estimate gross annual revenues from the traffic projections, deduct costs for toll collection and facility operations and maintenance, and calculate net toll revenue.

Step 4 — The Office of the State Treasurer's financial advisors applied a financial model to determine the toll funding contribution that could be supported by borrowing against future net toll revenues for each of the five scenarios. When combined with

other identified funding, toll scenarios for which the SR 99 program is financially feasible were identified.

What is the SR 99 Alaskan Way Viaduct replacement and how much will it cost?

The southern mile of the SR 99 Alaskan Way Viaduct will be replaced by a one–mile-long side-by-side road with three lanes in each direction. The bridge and roadway work for this project, known as the S. Holgate Street to S. King Street Viaduct Replacement, is currently on advertisement to contractors and has been completely designed. The south end replacement is one of several safety and mobility projects in the corridor that are known as the "Moving Forward" projects[1].

An approximately two-mile-long bored tunnel, with two lanes in each direction, has been proposed to replace the section of viaduct along Seattle's downtown waterfront. The bored tunnel would be built beneath downtown. Once the remaining viaduct is removed, a four-lane surface street would be built along the central waterfront. WSDOT has advanced the design of the proposed SR 99 bored tunnel to approximately 15 percent and has pre-qualified four teams of interested contractors for the tunnel design-build contract.

Using the final design for the south end viaduct replacement and the current 15 percent design/engineering plans for the proposed bored tunnel, WSDOT updated the cost estimates for the SR 99 Alaskan Way Viaduct (AWV) replacement using an updated cost assessment including elements of an enhanced Cost Estimate Validation Process (CEVP®) based on extensive cost and risk workshops, value engineering and design changes. The updated costs estimates for the key project components are:

Exhibit 2 – AWV Replacement Projects Cost Estimate by Element

Project	2009 Cost Estimate (millions)*	2010 Cost Estimate (millions)*
S. Holgate Street to S. King Street viaduct replacement	$537	$483
Other Moving Forward projects and prior expenditures	$363	$345
SR 99 proposed bored tunnel and systems	$1,900	$1,960
Alaskan Way surface street and viaduct removal	$290	$290
Central waterfront construction mitigation	$30	$30
Total Cost Estimate	**$3,120**	**$3,108**

*All costs are rounded in year of expenditure dollars.

[1] Other "Moving Forward" projects include Yesler Way Vicinity Foundation Stabilization, Electrical Line Relocation, Battery Street Tunnel Fire and Safety Improvements, and Transit Enhancements and other Improvements.

In January 2009, Governor Gregoire, former King County Executive Sims, former Seattle Mayor Nickels and Port of Seattle Chief Executive Officer Tay Yoshitani agreed to replace the aging Alaskan Way Viaduct with a deep bored tunnel. In addition to the tunnel, the executives agreed to a program of investments, funded through state, local and federal sources, that includes improvements to Alaskan Way and other city streets, additional transit service and improvements to freight, bike and pedestrian pathways. At that time, the Port of Seattle stated its intent to contribute $300 million toward the replacement of the Alaskan Way Viaduct, to close the funding gap between $2.8 billion in state funding and the $3.1 billion cost to replace SR 99 through downtown Seattle. The port and state will enter into a memorandum of agreement to confirm the port's funding commitment in February 2010.

Can $400 million be raised by tolls?

WSDOT evaluated five scenarios to determine whether tolling could raise up to $400 million in funding for the replacement of the Alaskan Way Viaduct. These five scenarios considered a range of toll rates which vary by time of day and direction of travel according to a set schedule. Some of the scenarios would only toll the tunnel, while others would toll the tunnel as well as trips using ramps in the portal areas to access downtown.

The results of the analysis are:

- Three of the five scenarios could raise $400 million in toll funding. A fourth scenario comes close.
- Tolls should be different in each direction during peak periods due to directionality of traffic.
- Peak period tunnel toll rates could range from $2.75 to $5.00 in the year of opening (2015 dollars) or from $2.30 to $4.20 in 2008 dollars, depending on the scenario and direction of travel.
- A scenario charging a low toll rate during weekday peak periods, which would minimize diversion from the tunnel, could contribute approximately $100 million for construction funding.

How would the performance of the transportation system change with tolls?

The combination of the proposed bored tunnel and an improved Alaskan Way surface street would accommodate the future trips that use the Alaskan Way Viaduct today. The surface street would primarily handle trips to and from downtown Seattle while the bored tunnel would serve through trips.

If drivers were charged a toll to use the proposed bored tunnel, some drivers traveling through downtown Seattle would seek alternative routes, especially during off-peak times (midday, evenings and weekends). Some would use Alaskan Way, some would divert to other city streets, and some would choose I-5.

However, analysis of the transportation system in 2030 shows that tolling would result in little or no change to travel times for trips to and through downtown Seattle. Due to the little or no change to travel times, WSDOT is not recommending mitigation for diversion from the tunnel, if a toll is charged.

Other key findings from the 2030 transportation analysis are:

- The majority of drivers in peak periods would use the tunnel even if it is tolled. Of the peak period commute traffic that would use the tunnel if there were no toll, 69 to 81 percent would continue to use the tunnel with a toll rather than take city streets or I-5, which are congested during morning and evening commutes.
- During off-peak periods, drivers are more likely to divert. Of the off-peak period traffic that would use the tunnel if there were no toll, 54 and 58 percent would continue to use the tunnel with a toll.
- Many drivers who avoid the toll would choose to take an improved Alaskan Way, rather than other city streets or I-5, with the greatest percentage increase during off-peak periods. Approximately 12,700 vehicles would use Alaskan Way during off-peak periods if no toll were charged; between 18,550 and 19,050 would use it if there were a medium or high tunnel toll rate.
- As some drivers choose to take city streets or I-5 to avoid the tunnel toll during peak periods, trips from Ballard to West Seattle on Alaskan Way would take two to four minutes longer due to increased volumes; the same trip using Mercer Street and the tunnel would be up to two minutes faster than if there was no toll.
- Volumes on I-5 would increase the most during off-peak periods if the proposed bored tunnel is tolled. An expected vehicle volume of six percent would not significantly change travel times because there is some capacity on I-5 during off-peak periods.

What are the upcoming funding needs for the SR 99 Alaskan Way Viaduct replacement?

The 2009 Washington State Legislature committed $2.8 billion toward the replacement of the Alaskan Way Viaduct, including up to $400 million in funding from tolls. With this funding commitment, WSDOT has the needed authorization for construction of the south end viaduct replacement and to initiate the design-build contracting process for the proposed bored tunnel. Subsequent tolling and bonding authority will be necessary. The current project schedule assumes that bond authorization would be provided in 2011 and that bonds would be issued starting in mid-2012 (fiscal year 2013). The financial graphic in Exhibit 10 assumes that funding from the Port of Seattle will be received in 2016 and 2017. If this funding is received earlier in the replacement program, the financial plan will be updated accordingly. When the Port of Seattle funding is received, the project will need authorization to spend an additional $300 million.

Chapter 1.
How much will the replacement of the SR 99 Alaskan Way Viaduct cost?

The governor, WSDOT and the legislature are committed to delivering the SR 99 Alaskan Way Viaduct replacement within the $3.1 billion budget. The budget is based on the $2.8 billion funding commitment from the state legislature and a $300 million contribution from the Port of Seattle.

WSDOT updated the cost estimates for the Alaskan Way Viaduct replacement projects. The team assessed costs by using an enhanced CEVP® process that included extensive cost and risk workshops and iterative value engineering processes. The efficiencies and improvements developed from the value engineering process are used to not only improve function, but are also used to keep the replacement program within budget if cost increases were to occur in other areas.

The 2010 cost estimate for the overall Alaskan Way Viaduct replacement remained unchanged from late year's estimate of $3.1 billion. The cost estimate for the proposed bored tunnel project increased by approximately $60 million over the 2009 estimate. However, cost savings realized on the S. Holgate Street to S. King Street Viaduct Replacement Project (one of the Moving Forward projects) kept the total cost of the viaduct replacement projects within the $3.1 billion budget. The 2010 cost estimate is broken out by project or element and is summarized in Exhibit 3.

Exhibit 3 – Updated 2010 Alaskan Way Viaduct Replacement Projects Cost Estimate by Element

Project Element	Most Likely Cost (millions)[1]
S. Holgate Street to S. King Street viaduct replacement	$483
Other Moving Forward projects and prior expenditures	$345
SR 99 proposed bored tunnel and systems	$1,960
Alaskan Way surface street and viaduct removal[2]	$290
Central waterfront construction mitigation[2]	$30
Total Replacement Cost Estimate	**$3,108**

[1]All costs are rounded in year of expenditure dollars.
[2]The cost estimates for the Alaskan Way surface street, viaduct removal, and construction mitigation have not been updated. Additional design work and construction planning for these project elements will inform future cost estimate updates.

What was the previous cost estimate to replace the SR 99 Alaskan Way Viaduct?

When Governor Gregoire, former King County Executive Sims, and former Seattle Mayor Nickels were evaluating potential options for replacing the Alaskan Way Viaduct along the central waterfront, a preliminary cost estimate for the bored tunnel was prepared in December 2008/January 2009. The executives also relied on previously prepared estimates that established the costs of replacing the south mile of the viaduct,

demolishing the structure along the waterfront, and re-constructing Alaskan Way. The updated estimates are based on more advanced engineering plans.

Exhibit 4 – 2009 Alaskan Way Viaduct Replacement Projects Cost Estimate by Element (Dec 2008/Jan 2009)

Project Element	Most Likely Cost (millions)*
S. Holgate Street to S. King Street viaduct replacement	$537
Other Moving Forward projects and prior expenditures	$363
SR 99 proposed bored tunnel and systems	$1,900
Alaskan Way surface street and viaduct removal	$290
Central waterfront construction mitigation	$30
Total Replacement Cost Estimate	**$3,120**

*All costs are rounded in year of expenditure dollars.

What is the cost estimate for the SR 99 S. Holgate Street to S. King Street Viaduct Replacement Project?

The S. Holgate Street to S. King Street Viaduct Replacement Project will replace the south mile of the viaduct, near Seattle's sport stadiums, with a side-by-side road with three lanes in each direction and new access into and out of downtown Seattle. This project is one of the Moving Forward projects, which were agreed to by the state, county and city in early 2007.

Since the S. Holgate Street to S. King Street Viaduct Replacement Project is currently being advertised to potential contractors, the updated cost estimate for this portion of the Alaskan Way Viaduct replacement reflects the final project design. The reduction in the estimate is largely due to the redesign of the crossing at S. Atlantic Street, which is now designed to be an above-grade rather than a below-grade crossing. Like the previous design, the overcrossing will improve freight mobility and reliability by providing an alternate route over train tracks located on S. Atlantic Street. The new design is less complex to build, and the components are less expensive to construct. In addition, this new design allows for an integrated roadway connection between Alaskan Way and E. Marginal Way, a connection that the old design did not allow.

Exhibit 5 – S. Holgate Street to S. King Street Viaduct Replacement Project Cost Elements

	2009 Cost Estimate (millions)	2010 Updated Cost Estimate (millions)*
Construction	$385	$330
Right of way costs	$75	$63
Preliminary and final design	$77	$90
Total	**$537**	**$483**

*All costs are rounded in year of expenditure dollars.

What is the cost estimate for the proposed SR 99 bored tunnel?

The 2010 cost estimate for the proposed bored tunnel is $1.96 billion, an approximately $60 million increase from the 2009 cost estimate. Though the cost estimate for the proposed tunnel increased, changes to the design have and will mitigate several significant risks that were identified during the estimating process.

Changes have been made to the proposed bored tunnel and portals, including the following:

- Moving the alignment of the tunnel's south end to Alaskan Way instead of through Pioneer Square on First Avenue. This change would avoid impacts to the historic Pioneer Square Historic District, as well as impacts to individual historic buildings, reduce the total number of buildings affected, reduce construction difficulty and reduce traffic disruptions during construction.
- Moving the tunnel's north portal under Sixth Avenue instead of Aurora Avenue. This change would allow WSDOT to avoid complex and costly staging to keep traffic moving on SR 99 during construction, reduce contractor conflicts, reduce the right of way needs, and reduce the impacts to businesses along the affected roadway.
- Changing the overall tunnel alignment. Shifting the north and south portals allowed curves in the tunnel to be lessened, which would create a safer environment for drivers.

The net rise in the tunnel cost is due primarily to the lengthening of the tunnel. The new portal configurations resulted in an overall increase in length of 640 feet.

Exhibit 6 – 2010 Proposed Bored Tunnel Alignment

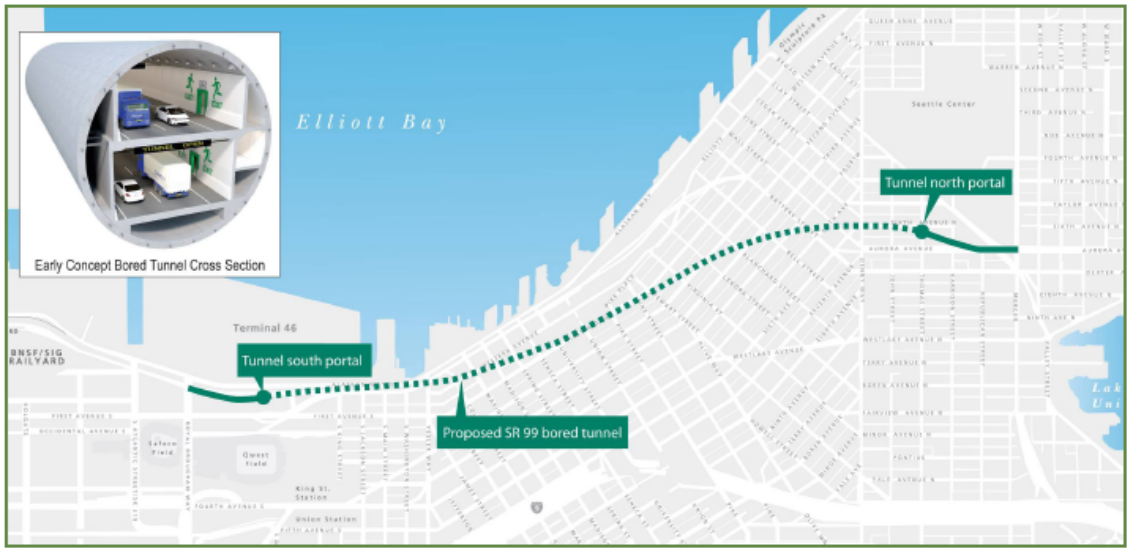


Exhibit 7 – 2009 SR 99 Bored Tunnel Cost Estimate (Dec. 2008/Jan. 2009)

	2009 Cost Estimate (millions)*
Construction (including construction management)	$1,062
Right of way	$149
Preliminary and final design	$118
Risk and escalation	$571
Total	**$1,900**

*Estimates reflect year of expenditure dollars.

Exhibit 8 – 2010 SR 99 Bored Tunnel Cost Estimate

	2010 Cost Estimate (millions)*
Construction (including construction management)	$1,224
Right of way	$152
Preliminary and final design	$169
Risk and escalation	$415
Total	**$1,960**

*Estimates reflect year of expenditure dollars.

How was the bored tunnel cost estimate prepared?

An extensive and iterative six-month cost and risk assessment was undertaken to identify the probable cost and schedule for the proposed SR 99 bored tunnel, north and south access facilities and systems components. Both the base cost and the risk register were continuously revised and updated during the six-month process. The assessment involved a number of independent, highly-qualified subject-matter experts and cost estimators experienced in tunnels, underground construction and megaproject delivery. Additionally, as required by the legislature, independent tunnel engineering experts were consulted and their comments considered in the development of the cost and risk assessment.

How will the costs for the proposed bored tunnel be managed?

By engaging in a thorough cost assessment process, using independent experts, and quantifying risk and risk-mitigation actions, WSDOT has a higher level of confidence that the significant project costs and risks have been indentified. Since these risks are better understood, they can be effectively and proactively managed. Strategies have been developed to manage each of the identified risks, and as design advances, we will continue to indentify, address, and retire risks, supplemented by the pre-qualified design-build contractors. In addition, WSDOT will continue to make improvements in design, and conduct additional value engineering workshops, allowing for more advanced management of risks.

What prior funds have already been expended?

WSDOT initiated work to replace the Alaskan Way Viaduct in 2001, including the environmental process. Program expenditures, through June 30, 2009, total approximately $325 million. This includes Moving Forward projects as well as the following activities:

- Preliminary engineering, right of way purchases and construction of the first phases of the S. Holgate to S. King Street Viaduct Replacement Project.
- Contributions to the City of Seattle's Spokane Street Viaduct Project and a new Fourth Avenue off-ramp on the structure.
- Environmental review, including publication of a draft environmental impact statement (EIS) in 2004, supplemental draft EIS in 2006, and preparation of a second supplemental draft EIS to be published in fall 2010.
- Engineering and design for previously considered alternatives, such as an elevated structure, cut-and-cover tunnel and integrated elevated structure.
- Right of way purchases for property that would be required along the corridor, regardless of the preferred alternative.
- Other improvements to minimize construction impacts.

What is the project schedule?

The following milestones were assumed in the 2010 cost estimate:

- Completion of column safety repairs and electrical line relocation projects
- Issue draft bored tunnel request for proposals to pre-qualified design-build teams – February 2010
- Begin bridge and roadway construction on the S. Holgate Street to S. King Street Viaduct Replacement Project – Summer 2010
- Announce apparent best value for SR 99 bored tunnel design-build contract – January 2011
- Receive Record of Decision from the Federal Highways Administration (FHWA) – mid- 2011
- S. Holgate Street to S. King Street Viaduct Replacement Project, including a grade-separated crossing at S. Atlantic Street, open to traffic – Late 2014
- Open SR 99 bored tunnel to drivers – December 2015

Chapter 2.
How much funding has been committed to replace the SR 99 Alaskan Way Viaduct?

What funding has been provided by the state and federal government?

The cost to replace the Alaskan Way Viaduct has been estimated at $3.1 billion. As outlined in ESSB 5768, the state's contribution to the replacement program is capped at $2.8 billion, with $2.4 billion already committed through existing state and federal funding sources and up to $400 million assumed to be provided through tolling. The committed federal and state funding sources include:

Exhibit 9 – Program Funding from State, Federal and Local Sources

State Sources	**Funding (millions)**
2003 Gas Tax (Nickel Funding)	$253.1
2005 Gas Tax (Transportation Partnership Program)	$1,558.7
Multi-modal Transportation Funding	$200.0
Motor Vehicle Fund Special C Account	$47.4
Total State Committed Sources	**$2,059.2**
Federal Sources	**Funding (millions)**
National Highway of Significance *	$7.5
Bridge Replacement (FY 2014-2017)	$72.6
Emergency Relief	$48.3
SAFETEA-LU "Project of Regional and National Significance"	$199.3
SAFETEA-LU High Priority Project	$10.1
Federal Demonstration Project (Prior)	$4.0
Total Federal Committed Sources	**$341.8**
Local Sources	**Funding (millions)**
All Local Sources**	$6.5
Total Local Committed Sources	**$6.5**
Total State, Federal, and Local Committed Sources	**$2,407.5**

*Funding from the National Highway of Significance Program is paying for the installation of automated closure gates on the Alaskan Way Viaduct.
**Local sources include: City of Seattle and Private Utilities (betterments)

What funding has been committed by the Port of Seattle?

In January 2009 the Port of Seattle stated its intent to contribute $300 million in funding toward the replacement of the Alaskan Way Viaduct. The port made this commitment based on its support for options that maintain capacity in the SR 99 corridor. In addition, the S. Holgate to S. King Street Viaduct Replacement Project will provide more reliable connections between the port's container terminals by building a grade-separated crossing of SR 99 and the railroad tracks. The project will also improve connections between the nearby interstate freeways and the port's container terminals.

The Port of Seattle is working with WSDOT to develop a memorandum of agreement that outlines the benefits of the Alaskan Way Viaduct replacement projects to freight mobility, the commitment of funding, and each agency's responsibilities. The port commission is expected to consider this memorandum of agreement for approval in February 2010. It is expected that the majority of the port's funding would become available toward the end of the replacement program.

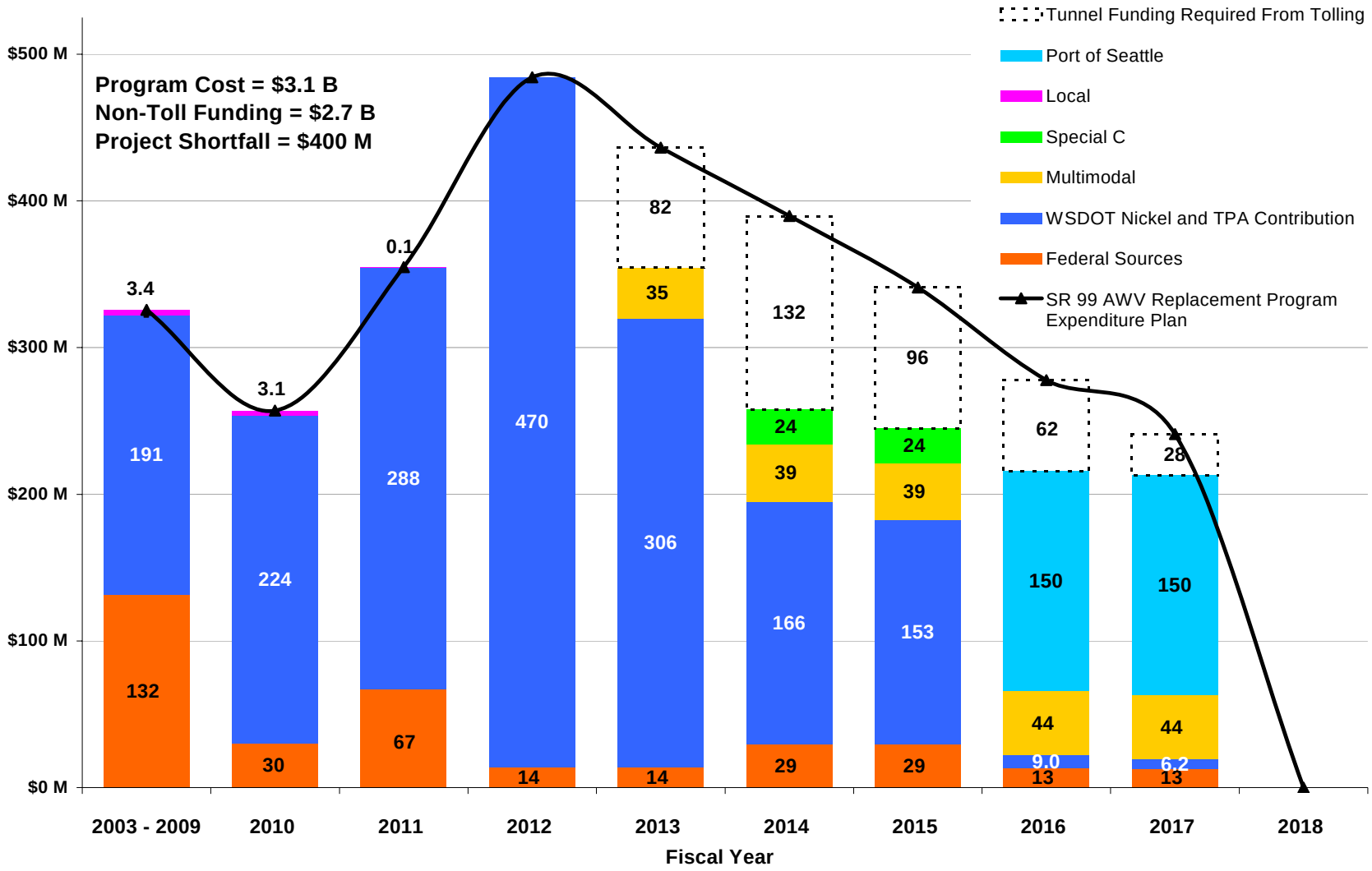
What is the remaining funding gap?

After the federal, state and Port of Seattle funded commitments to replace the Alaskan Way Viaduct, there remains a $400 million funding gap. The 2009 Washington State Legislature assumed that up to $400 million of the state's $2.8 billion funding commitment could be raised through tolls.

Both the amounts and timing of funds are important in determining a project's financial feasibility. It is necessary not only for the total funding to match the overall capital expenditures, but also to ensure that timing of those sources of funds coincides with the construction expenditure schedule. As part of this aging process, funding sources with certain restrictions need to be matched with their appropriate uses.

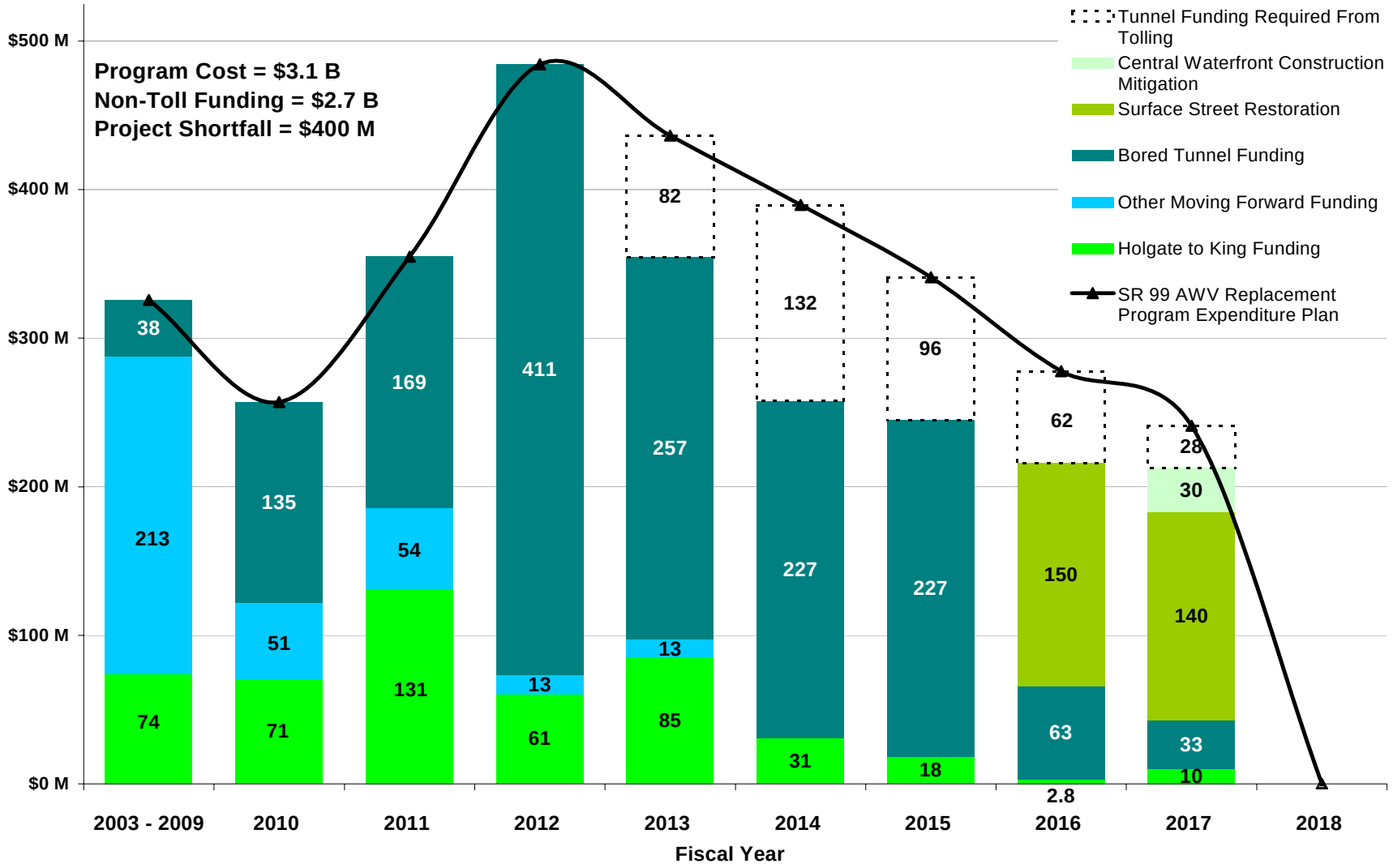
Exhibit 10 illustrates the estimated timing of capital expenditures (black line) and the timing of existing sources of funds (stacked bars) excluding tolls. The gap between the black line and the stacked bars represents the funding gap for which the toll funding contribution is targeted. Bonding authority in excess of $400 million will be required in order to deliver $400 million in construction funding, pay for capitalized interest during construction, and cover bond sale expenses.

Exhibit 10 – Program Expenditures and Funding by Source



Note: If funding from the Port of Seattle is received earlier than shown above, the financial plan and uses of those funds will be updated accordingly.

Exhibit 11 – Program Expenditures and Funding by Use

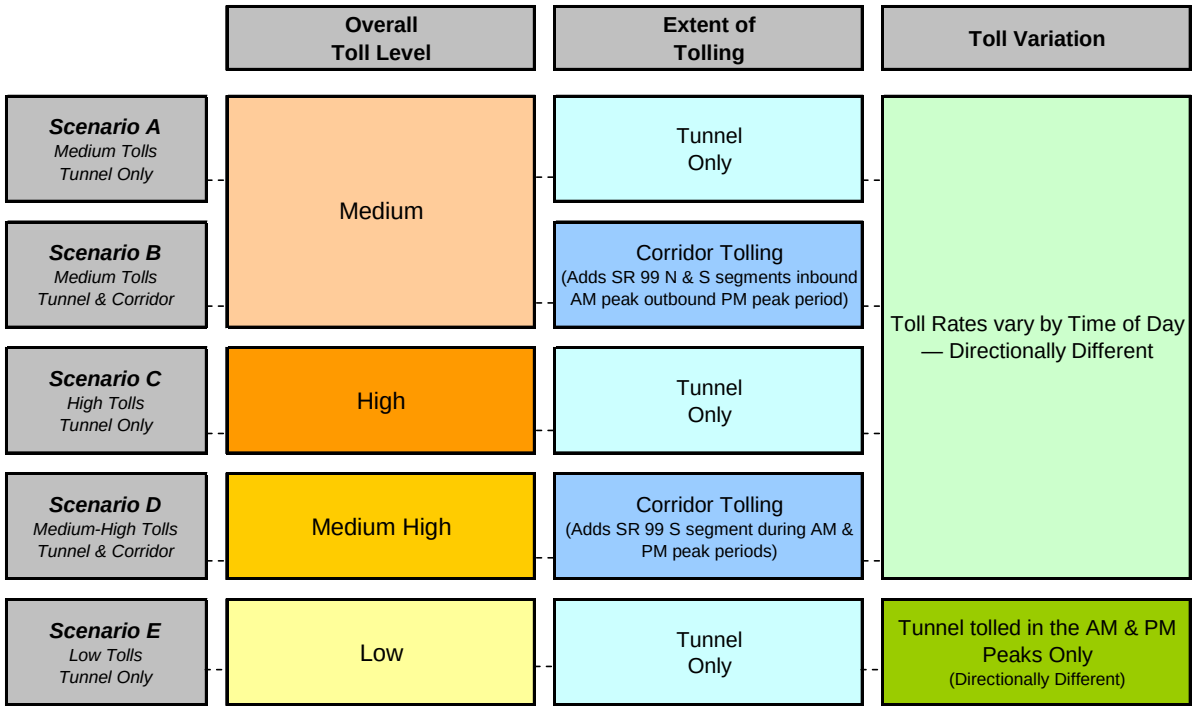


Note: If funding from the Port of Seattle is received earlier than shown above, the financial plan and uses of those funds will be updated accordingly.

Chapter 3.
What tolling scenarios were analyzed?

Five toll scenarios were evaluated to determine if they could contribute up to $400 million in funding for the SR 99 Alaskan Way Viaduct replacement, while at the same time encouraging through trips to use the proposed bored tunnel, especially during peak travel times. These scenarios include several variables, which are shown in Exhibit 12:

Exhibit 12 – SR 99 Bored Tunnel Toll Scenarios Analyzed



*All scenarios assume full AWV Program improvements and a tunnel open date of Jan 1, 2016

- **Geographic boundary.** Some scenarios evaluated tolls charged only in the tunnel while others also charged a toll to drivers who used the segments of the corridor north and south of the tunnel to get to or from downtown Seattle.
- **Toll rate.** A range of toll rates were evaluated based on the time of day, direction of travel, and a high, medium, or low toll rate approach.

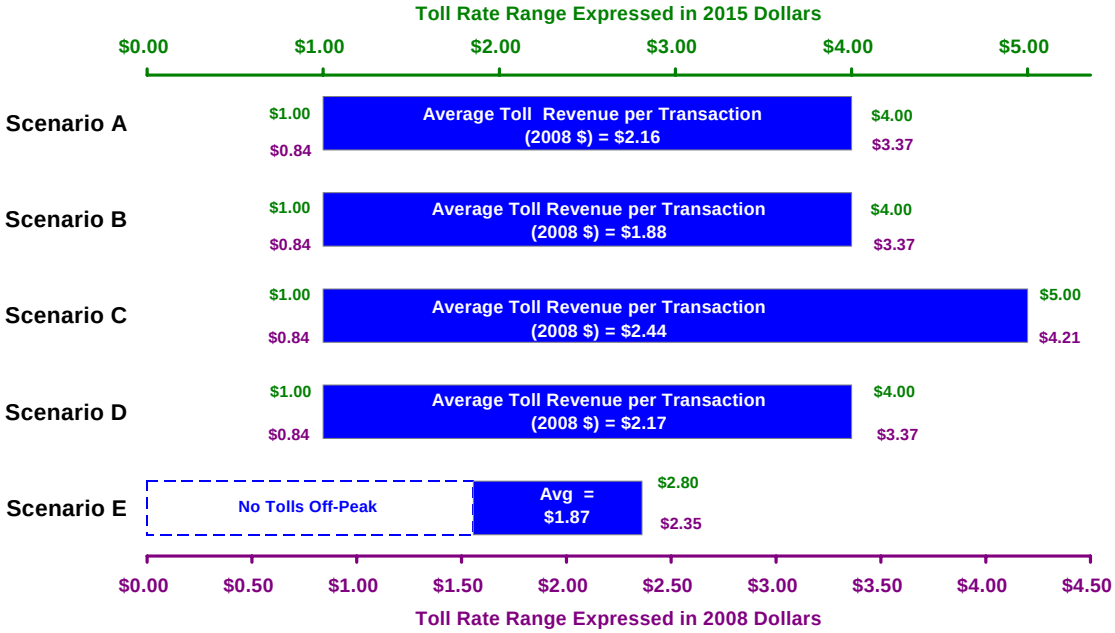
Key observations from previous traffic and tolling analysis conducted for the SR 99 corridor as well for the SR 520 bridge replacement informed the development of the scenarios:

- **Direction of traffic.** Traffic demand on SR 99 varies significantly by direction of travel. This finding suggests that tolls should be tailored to these variations.

- **Time of day.** There are several alternate routes to the proposed bored tunnel and those alternatives are most viable during off-peak times when they are not congested. This suggests that variable tolling should be employed so that tolls would be lower during off-peak times to keep traffic in the tunnel and discourage diversion. Also, tolls can be used most effectively to manage traffic and optimize revenue when they vary by time of day.
- **Price sensitivity.** Drivers begin to divert even at relatively low toll rates.
- **Toll optimization.** After a certain point, higher toll rates do not generate more revenue. Every facility has an optimal toll rate that balances revenue generated by each trip with the number of trips taken. If toll rates are set higher, revenue will begin to decline.
- **Inflation.** Toll rates need to generally keep pace with inflation. If toll rates are not adjusted for inflation, the buying power would decline over time, which would eventually lead to growth in demand sufficient to degrade facility performance.

Exhibit 13 shows the range and average of the weekday toll rates for each of the five scenarios analyzed in this report. The lowest toll rate would generally be for the overnight toll rate, except for Scenario E, which would not charge drivers a toll during non-peak periods. In most cases the highest toll would be charged to drivers traveling southbound in the afternoon peak period.

Exhibit 13 – Range of Weekday Tolls for Tunnel Trips by Scenario



SR 99 tunnel toll rates are expected to vary by time of day and direction according to a set schedule so that drivers would know in advance what they can expect to pay to use the bored tunnel. Tolls also would vary by day of the week with weekend tolls being lower than tolls at the same time of day on a weekday. The average revenue per

transaction shown in Exhibit 13 is intended for comparing the weighted average toll across the scenarios, and does not reflect a specific toll that a user would pay.

What is Toll Scenario A?

Toll Scenario A would toll only the proposed bored tunnel and is based on a medium toll rate structure. Medium tolls are designed to balance revenue generation with managing traffic. The weekday toll rates tested under Toll Scenario A are:

Exhibit 14 – Weekday Toll Rates for Toll Scenario A

Weekday Toll Rates	2008 Dollars	2015 Dollars
Maximum Morning Toll Rate	$2.94	$3.50
Maximum Afternoon Toll Rate	$3.37	$4.00
Average Revenue per Transaction	$2.16	$2.57

What is Toll Scenario B?

Toll Scenario B applies the same tolls to the proposed bored tunnel as Toll Scenario A. In addition, Scenario B adds a toll to drivers who use the segments of SR 99 north and south of the tunnel to access downtown in the morning and depart from downtown in the afternoon. Known as a segment toll, drivers would be charged a toll if they used SR 99 south of the tunnel from the Spokane Street Viaduct and exited at S. King Street, or if they used the northern section of SR 99 south of the Aurora Bridge and exited before the north tunnel portal.

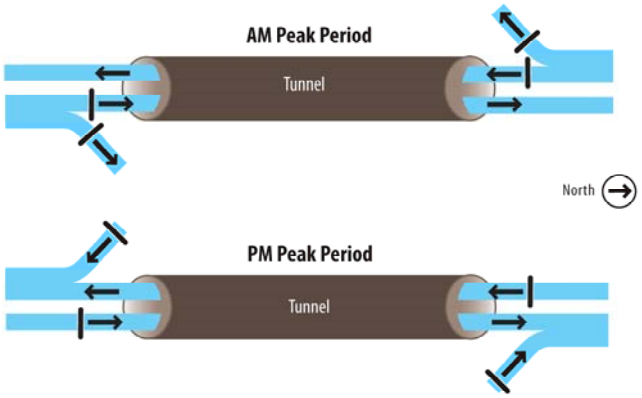


Exhibit 15 – Proposed Segment Tolls

If drivers drove through the tunnel or used the north and south segments of SR 99 during off-peak times, they would not be charged a segment toll. Trips into downtown during the morning and trips out of downtown in the afternoon would be charged a segment toll.

Exhibit 16 – Weekday Toll Rates for Toll Scenario B

Weekday Toll Rates	2008 Dollars	2015 Dollars
Maximum Morning Toll Rate	$2.94	$3.50
Maximum Afternoon Toll Rate	$3.37	$4.00
Average Revenue per Transaction	$1.88	$2.24
Peak Period, Peak Direction-only Segment Toll Rate (for non-tunnel trips)	$1.05	$1.25

What is Toll Scenario C?

Toll Scenario C tolls the tunnel with high toll rates designed to maximize gross revenues, and thus, toll funding.

Exhibit 17 – Weekday Toll Rates for Toll Scenario C

Weekday Toll Rates	2008 Dollars	2015 Dollars
Maximum Morning Toll Rate	$3.37	$4.00
Maximum Afternoon Toll Rate	$4.21	$5.00
Average Revenue per Transaction	$2.44	$2.90

What is Toll Scenario D?

Toll Scenario D analyzed a medium-high toll rate of the tunnel that would be between the rates of Toll Scenarios A and C. It also included a segment toll on the portion of SR 99 south of the tunnel to the Spokane Street Viaduct. The south-only segment toll was tested because of significant investments made in this section of the corridor. In addition this section of the corridor has limited access and fewer alternative routes available to drivers, which limits the potential for diversion. In this scenario, both directions of the south segment would be tolled during both the morning and afternoon peak travel times. If drivers stay on SR 99 through the tunnel, they would only pay the tunnel toll.

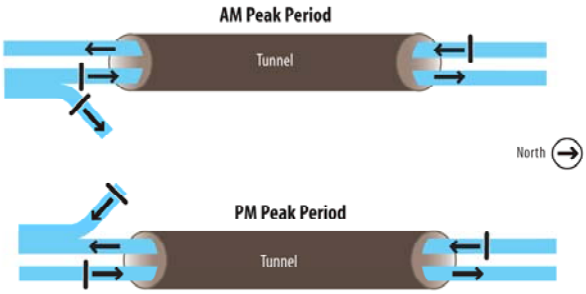


Exhibit 18 – Proposed Segment Tolls

Exhibit 19 – Weekday Toll Rates for Toll Scenario D

Weekday Toll Rates	2008 Dollars	2015 Dollars
Maximum Morning Toll Rate	$3.37	$4.00
Maximum Afternoon Toll Rate	$3.37	$4.00
Average Revenue per Transaction	$2.17	$2.58
Peak Period-only South Segment Toll Rate (for non-tunnel trips)	$1.26	$1.50

What is Toll Scenario E?

Toll Scenario E tested low toll rates sufficient to minimize congestion in the tunnel during peak travel periods only. This has the effect of minimizing toll diversion of traffic at the expense of revenue generation. The toll rates are the lowest of all the scenarios, and there are no weekend or segment tolls.

Exhibit 20 – Weekday Toll Rates for Toll Scenario E

Weekday Toll Rates	2008 Dollars	2015 Dollars
Maximum Morning Toll Rate	$1.85	$2.20
Maximum Afternoon Toll Rate	$2.36	$2.80
Average Revenue per Transaction	$1.87	$2.23

Would trucks, transit, and carpools pay a toll?

The toll rates, if any, which would be paid by trucks, transit and carpools would be determined by the Washington State Transportation Commission. It was assumed in this traffic and revenue analysis that trucks would pay a rate depending on the number of axles, similar to the Tacoma Narrows Bridge toll rate structure.

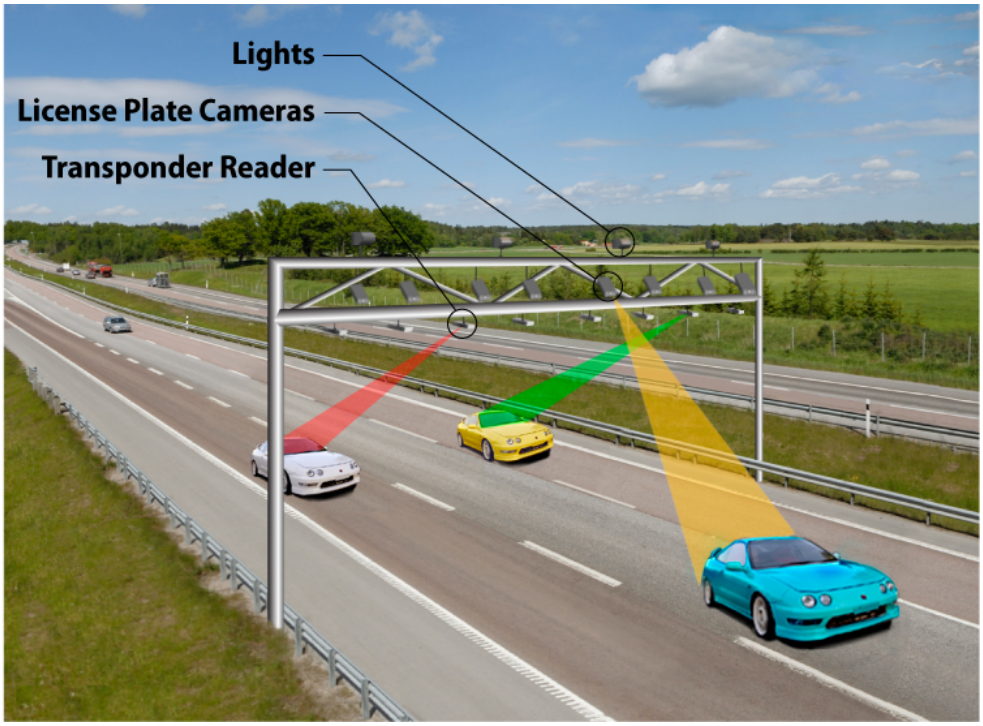
The traffic and revenue analysis did not assume that transit would be charged a toll. It also did not assume that carpools would pay a toll.

How would tolls be collected?

Tolls would be collected electronically; there would be no toll booths. Drivers would have transponders linked to prepaid accounts. License plate recognition would identify users and assess tolls accordingly. As vehicles approach the toll collection point, an overhead reader would search for a transponder. If a transponder is detected, the system would automatically identify the user's account and deduct the appropriate toll.

If the driver did not have a valid transponder, then one of the following would occur: a license plate transaction would be initiated based on license plate recognition; or a current customer would be identified from the license plate and the toll deducted from their account.

Exhibit 21 – Visual Demonstration of Electronic Toll Collection



Chapter 4.
How much funding could be generated by toll revenue?

For the purposes of this report, it was assumed that the proposed bored tunnel would open to drivers in late 2015 and that tolling would begin January 1, 2016. To fund construction of the tunnel, the State of Washington would need to borrow against future net toll revenues in order to capture the value of future toll collection. This would be done by issuing bonds for which net toll revenues would be pledged toward the bond principal and interest payments. The dollar value of the bonds sold, and thus the funding contribution from tolls, is directly related to four factors:

- When bonds must be sold;
- How the financing is structured;
- How the market perceives the traffic and revenue risk of the tunnel, and the market assessment of how that risk is shared between potential bondholders and the state; and
- The financial market conditions, including interest rates, at the time bonds are sold.

The Office of the State Treasurer completed an analysis of the five tolling scenarios. The results of this analysis show that four of the scenarios would generate close to or more than the $400 million directed by the legislature. Toll Scenario E, which assumes the lowest toll rates, would raise approximately $100 million in funding.

- Toll Scenario A would yield $384 million in toll funding for the Alaskan Way Viaduct replacement. This toll scenario could be modified to generate the required funding.
- Toll Scenario B would yield up to $460 million in toll funding for the Alaskan Way Viaduct replacement. This exceeds the level of toll funding authorized by the legislature by $60 million.
- Toll Scenario C would yield $406 million in toll funding for the Alaskan Way Viaduct replacement. This scenario most closely meets the target for toll funding.
- Toll Scenario D would yield $439 million in toll funding for the Alaskan Way Viaduct replacement. This exceeds the level of toll funding authorized by the legislature by $39 million.
- Toll Scenario E would yield approximately $100 million in toll funding for the Alaskan Way Viaduct replacement. This would result in large funding gaps beginning in 2014 and continue through the life of the construction period. In order for the replacement of the Alaskan Way Viaduct to be fully funded in this scenario, other funding sources would be required to fill the remaining gap of approximately $300 million.

Exhibit 22 – Toll Funding Contribution by Scenario

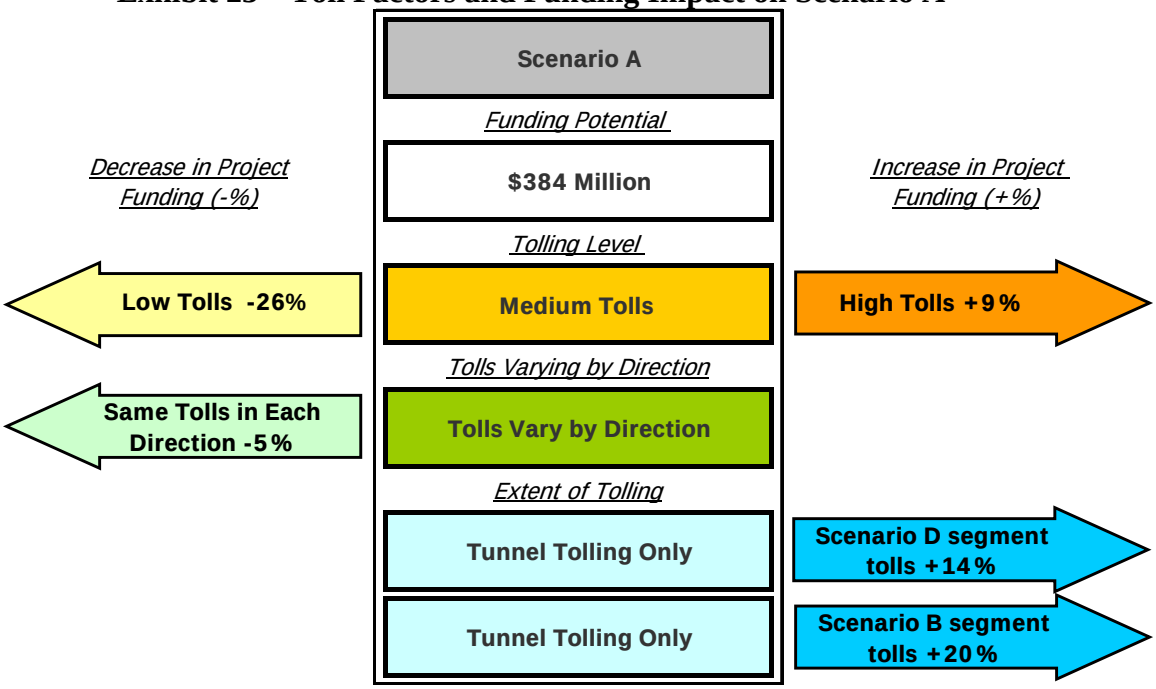
	Date Revenue Operations Begin	Program Unfunded Need = Target Toll Funding (YOE $s)	Fiscal Years with Unfunded Needs after Toll Funding Contribution	Toll Funding Contribution		Toll Funding Target Shortfall		Share of Overall Program Cost Funded
				Total Possible	% of Need	Unmet Need	% Unmet	
Scenario A *Medium Tolls Tunnel Only*	**1/1/2016** (mid FY 2016)	**$400 M**	**FY 2016-17**	**$384 M**	***96%***	**$16 M**	***4%***	***99%***
Scenario B *Medium Tolls Commuter Corridor Tolls*	**1/1/2016** (mid FY 2016)	**$400 M**	**None**	**$460 M**	***115%***	**None**		***100%***
Scenario C *High Tolls Tunnel Only*	**1/1/2016** (mid FY 2016)	**$400 M**	**None**	**$406 M**	***102%***	**None**		***100%***
Scenario D *Medium-High Tolls/Limited Access Corridor Tolls*	**1/1/2016** (mid FY 2016)	**$400 M**	**None**	**$439 M**	***110%***	**None**		***100%***
Scenario E *Low Tolls Peak Periods Only*	**1/1/2016** (mid FY 2016)	**$400 M**	**FY 2013-17**	**$100 M**	***25%***	**$300 M**	***75%***	***90%***

Notes: State Fiscal Year is from July 1 to June 30, e.g., FY 2016 = 7/1/2015 to 6/30/2016

How would different approaches to tolling affect funding?

Several factors were evaluated in this analysis, including toll rates, the geographic boundaries of tolls, and tolling of other routes. The example below shows the relative effect these factors have on how much funding can be generated from tolls.

Exhibit 23 – Toll Factors and Funding Impact on Scenario A



What assumptions were made?

In order to determine how much gross revenue would be generated from tolling the bored tunnel, the following assumptions were made about toll collection methods, collection rates and real toll rates:

- Eighty percent of toll transactions are assumed to be paid by prepaid accounts by the end of the first year of operations. Prepaid account use is expected to increase by two percent each year, eventually reaching 90 percent of all transactions. This assumption is based on WSDOT's experience with the Tacoma Narrows Bridge.
- Pay-by-plate transactions would be assessed a fee to offset the additional processing costs of reading the plate images, obtaining electronic payment by self-identified users and/or generating and issuing a collection. This fee would be added to the gross toll revenue and is estimated to be approximately $1.00 in 2009 dollars.
- Uncollected toll transactions would result in a 2.5 percent reduction in gross revenue. A ramp-up period to account for the potential of lower demand during the initial years of operation was also assumed. These two assumptions provide an

extra layer of conservatism in forecasting revenues at the beginning of toll operations.

- Tolls would increase to keep pace with inflation.

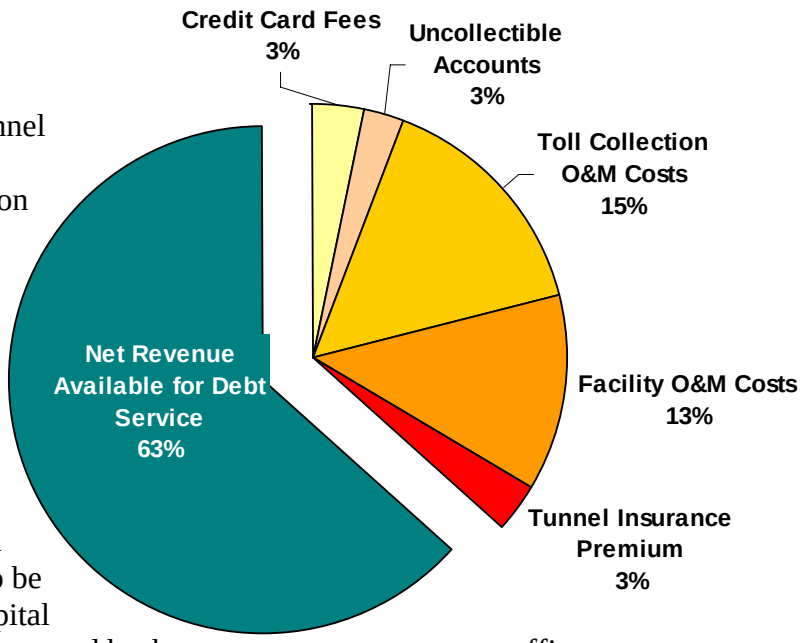
Gross revenue was calculated at a daily level by multiplying weekday and weekend traffic projections for cars and trucks by the appropriate toll rates, which vary by direction and time period. These daily revenue estimates were then multiplied by a factor of 110 for weekend days (52 Saturdays, 52 Sundays, six non-weekend holidays), with the remaining 255 days per year allocated as weekdays.

What expenses would be paid out of the gross toll revenue?

After the gross revenue from the five tolling scenarios was identified, deductions were made for credit card fees, the operation and maintenance of the toll collection system, and the operation and maintenance of the proposed bored tunnel. The net toll revenue after these deductions would be the amount available for debt service. The following assumptions are consistent with those used for the SR 520 tolling analysis prepared for the state legislature in 2009.

- **Credit card fees.** The cost of banking fees related to credit card payments for tolls were assumed to be 3.0 percent of the gross revenues. Additional gross revenue deductions of 1.5 percent in the first year, and 0.45 percent thereafter were assumed to account for additional credit card fees associated with customer account refunds.
- **Collection system.** Toll collection for the bored tunnel would be coordinated in a unified back office operation being developed for SR 520, the Tacoma Narrows Bridge, and SR 167.
- **Toll collection operation and maintenance (O&M).** The annual costs to maintain the toll collection equipment are estimated to be 15 percent of the initial capital cost for the in-road equipment and back office system hardware.

Exhibit 24 – Uses of Gross Toll Revenues (2030)



- **Tunnel operation and maintenance.** Annual operating and maintenance costs are estimated be $5 million (2009 dollars) in order to ensure the tunnel remains open and functioning for drivers.
- **Tunnel insurance.** The cost to insure the tunnel and cover both asset replacement and business interruption costs are estimated to be $2 million per year (2009 dollars), beginning in 2016.

The costs for major rehabilitation and replacement were not included in the net toll revenue forecasts because we assume these costs would be covered after debt payments have been made. Contributions to a rehabilitation and replacement reserve account could be made annually, and could be sized each year with consideration given to future significant expenditures that would be required. In lieu of a reserve account, major preservation could be paid directly.

What financing assumptions were made?

The Office of the State Treasurer established several key assumptions for how the tunnel toll bonds would be structured and sold:

- The toll bonds would be 30-year general obligation/motor vehicle fuel tax (GO/MVFT) bonds that are backed by and repaid from net toll revenues, with additional backing or credit support from the Motor Vehicle Fuel Tax Fund and, ultimately, the full faith and credit of the State of Washington. This is referred to as a "triple pledge." It would make the toll bonds essentially equivalent to the state's general obligation bonds from a financial market perspective. The triple pledge is consistent with the approach for SR 520. Triple pledge bonds have the same highly favorable cost of borrowing, issuing, and servicing as other state general obligation bonds.
- The first bond issue would occur in fiscal year 2013 when toll funding would be first needed, with subsequent bond issuances assumed every other year.
- The pledge of toll revenue to repay debt was assumed to be net of operations and maintenance expenses, which is an industry convention that ensures sufficient funding to collect toll revenues and maintain the tunnel which is generating the revenue.
- The issued bonds would have a maximum maturity of 30 years, consistent with State of Washington constitutional and statutory requirements for general obligation bonds.

How do these findings compare to previous toll analysis?

WSDOT completed a preliminary toll analysis in December 2008 to assist with the selection of options to be considered in the environmental process for the central waterfront section of the Alaskan Way Viaduct. Picking up where that preliminary analysis left off, this report provides the more detailed analysis necessary to further

decisions about funding the proposed bored tunnel based upon toll revenue. The following chart compares the 2008 work to this 2009 analysis.

Exhibit 25 – Comparison to Previous Study

2009 Study Difference from 2008	Impact on Traffic, Revenue and Funding
Construction is advanced and accelerated; tolling would now start in fiscal year 2016 instead of fiscal year 2019	– 30-year toll traffic and revenue projections are lower when tolling starts earlier, and – Higher construction spending in the early years increases interest costs
Refined toll collection operation and maintenance costs were based on higher 2009 SR 520 estimates	– Reduces net revenues available for financing, and thus, toll funding
An expanded overall program of improvements is planned for adjacent city streets	– Network improvements make alternatives more attractive, resulting in less toll paying traffic in the tunnel
Higher peak period tolls were tested	+ Increases net revenues available for financing, and thus, toll funding

The higher tolls assumed in four of the five scenarios tested in 2009 help to offset the downward impacts of the other three key revisions from the preliminary 2008 analysis, thereby maintaining a toll funding contribution in the $400 million range.

Projecting the traffic, revenue and funding from tolling the tunnel is a dynamic and evolving process. Additional refinements to the travel demand model as well as revised toll collection operations and maintenance costs based upon recent vendor bids will be considered when the investment-grade financial plan is prepared.

Chapter 5.
How would tolling affect the transportation system?

The proposed bored tunnel and other investments in city streets and transit would change who uses SR 99 regardless of whether a toll is charged. Access ramp locations would be moved further to the north and south ends of downtown Seattle, and Alaskan Way along the waterfront would have additional lanes. This would result in less traffic on SR 99 through downtown Seattle than occurs today on the existing Alaskan Way Viaduct, as many people would shift their trip to the new routes.

Charging a toll to drivers in the bored tunnel would make it more likely that longer trips would use the tunnel. For drivers making shorter trips, paying a toll would be a greater part of the total trip cost, making it more attractive for those trips to use city streets or I-5.

Thus, charging a toll would provide capacity for longer trips through downtown Seattle. When a new toll is charged on a previously toll-free road, traffic patterns are likely to change as drivers look for ways to reduce the costs of driving. These changes can take the form of one or more of the following:

- **Mode diversion.** A change in how someone makes a trip to avoid a toll or share the costs, such as choosing to take transit.
- **Time of travel changes**. A change in when a trip is taken to a time of day when a lower toll rate is charged.
- **Trip frequency or consolidation.** A reduction in the frequency that a trip is made, including eliminating the trip altogether.
- **Trip destination.** A shift in travel to a new destination to avoid a toll.
- **Route diversion.** Choosing to take another route to avoid a toll.

How does the transportation system function today?

The SR 99 Alaskan Way Viaduct provides a route to and through downtown Seattle for neighborhoods and industrial areas on the west side of the city, including West Seattle, Ballard, Greenwood, Queen Anne, Magnolia, Interbay and Duwamish. It is an important north-south route that serves as an alternate to I-5 for Seattle drivers, as well as drivers from Tukwila, Burien and other west side cities. In addition to I-5 and SR 99, there are several city arterials that run parallel to the Alaskan Way Viaduct including Alaskan Way, Second Avenue and Fourth Avenue.

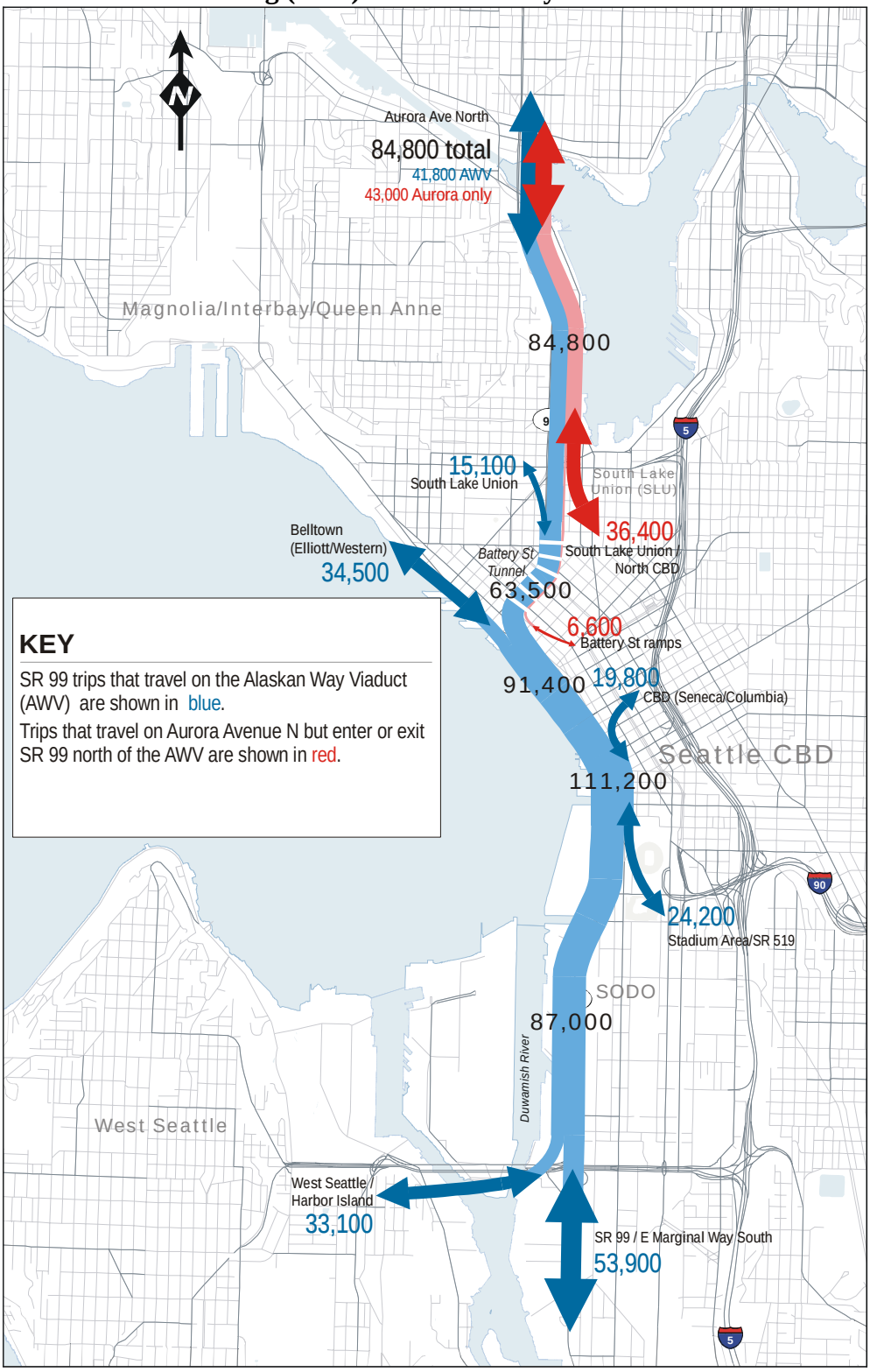
In the morning, the highest concentration of trips that use the viaduct begin in the downtown, Queen Anne, Fremont, Ballard and West Seattle neighborhoods. Most of these trips are destined to work or other activities in downtown Seattle, the Ballard/Fremont/Interbay areas northwest of downtown, or the SODO and Duwamish areas south of downtown.

Vehicle volumes on SR 99 are highest during the morning and afternoon commute times, when they total nearly twice the mid-day volumes in both directions. In the morning, volumes are heavier entering downtown. In the afternoon, volumes are heavier in the directions leaving downtown. Volumes are fairly balanced in the Battery Street Tunnel, which connects the north end of the Alaskan Way Viaduct to Aurora Avenue N. Exhibit 26, on the following page, shows the existing (2005) SR 99 weekday traffic patterns.

There are no sharp peaks in vehicle volumes on SR 99 during the weekend, but rather one flat peak that runs from mid-morning to early evening. The peak volumes on the weekends are slightly higher than the midday peak volumes seen during the week.

SR 99 currently provides transit access into downtown from north and south neighborhoods. Buses carry an estimated 11,900 transit riders in each direction per day north of downtown (entering/exiting at the Denny Way ramps), and 14,300 riders in each direction per day south of downtown. This accounts for about 25 percent of transit riders entering or leaving downtown from the south. There are currently no transit routes that use SR 99 to bypass downtown.

Exhibit 26 – Existing (2005) SR 99 Weekday Traffic Patterns



What improvements to the transportation system were assumed?

The program of investments agreed to by the governor, King County executive, and Seattle mayor in January 2009 was assumed to have been implemented by 2030, which is the traffic analysis' forecast year. The list of investments includes:

- A bored tunnel from approximately S. King Street to Republican Street with two lanes in each direction.
- New east-west surface streets reconnecting the grid across SR 99 at the tunnel's north portal, and new east-west streets to create local circulation in the south portal area.
- A new connection from Alaskan Way south of S. King Street to East Marginal Way south of S. Atlantic Street.
- A rebuilt Alaskan Way surface street with a connection from Battery Street to Pike Street, four lanes from Pike Street to Yesler Way, and six lanes from Yesler Way to S. King Street.
- A new public space along the central waterfront.
- Improvements to Mercer Street from Fifth Avenue N. to Elliott Avenue.
- Enhanced transit service, per the executives' recommendation, such as (1) a new Delridge RapidRide bus rapid transit line, (2) additional service hours on the planned West Seattle and Ballard RapidRide lines, (3) peak-hour express routes added to South Lake Union and Uptown from the north, and (4) local bus changes to several West Seattle and northwest Seattle routes.

In addition, it was assumed that the Alaskan Way Viaduct has been removed, the seawall along the central waterfront rebuilt, and the Battery Street Tunnel decommissioned.

How would volumes and travel times in the tunnel and on Alaskan Way change if the tunnel is tolled?

If drivers in the proposed bored tunnel are not charged a toll, the traffic model forecasts that 94,300 vehicles would use the tunnel each day in 2030. Daily volumes would decrease the most if drivers are charged a high toll, and would decrease the least if they are charged a low toll:

- Daily volumes would decrease by 36,900 or 39 percent if drivers are charged a high toll (Toll Scenario C).
- Daily volumes would decrease by 32,700 or 35 percent if drivers are charged a medium toll (Toll Scenario A).
- Daily volumes would decrease by 6,700 or 7 percent if drivers are charged a low toll (Toll Scenario E).

Exhibit 27 – Toll Rates, Configuration and Weekday Traffic Volumes by Scenario

	Test	Test Elements[1]		Maximum Peak Period, Peak Direction Toll (2015 $s)		2030 Weekday Traffic Volumes		
		Toll Configuration	Tunnel Toll Strategy	AM Peak (NB / SB)	PM Peak (NB / SB)	*Total Vehicles in both directions* AM Peak	PM Peak	Daily
	Toll Free	n/a	n/a	n/a	n/a	19,300	22,600	94,200
Anaylzed Toll Scenarios	A	AWV Bored Tunnel	Medium Tolls: Variable by Time of Day and direction of travel	$3.50 / $2.75	$3.25 / $4.00	13,700	17,500	61,700
	B	AWV Bored Tunnel	Medium Tolls: Variable by Time of Day and direction of travel	$3.50 / $2.75	$3.25 / $4.00	15,200	18,400	64,100
		SR 99 Segments: AM Peak Inbound & PM Peak Outbound Only		$1.25 / $1.25	$1.25 / $1.25	6,800*	9,800*	n/a
	C	AWV Bored Tunnel	High Tolls: Variable by Time of Day and direction of travel	$4.00 / $3.00	$4.00 / $5.00	13,100	16,000	57,400
	D	AWV Bored Tunnel	Medium - High Tolls: Variable by Time of Day and direction of travel	$4.00 / $3.00	$4.00 / $4.00	13,700	17,000	59,000
		SR 99 Segments: South, Peak Period Only		$1.50 / $1.50	$1.50 / $1.50	3,800*	5,300*	n/a
	E	AWV Bored Tunnel	Low Tolls: Peak Only and direction of travel	$2.20 / $1.85	$2.10 / $2.80	15,700	19,100	87,500

Volumes in the tunnel would be higher if drivers on the segments of SR 99 north and/or south of the bored tunnel are also charged a toll. Tolling the segments diverts some non-tunnel trips to other routes, which would improve the traffic flow on SR 99. The improvements to travel times in the corridor would make the tunnel more attractive to some through-trip drivers who otherwise would have used a different route. For example, results for Toll Scenario B show tunnel volumes could be 2,400 or four percent greater than under Toll Scenario A.

During peak periods, when alternate north-south routes are more congested, the percentage of vehicles that divert from the tunnel would be lower.

- Volumes would decrease by 6,300 or 32 percent in the morning and 6,600 or 29 percent in the afternoon if drivers are charged a high toll (Toll Scenario C).
- Volumes would decrease by 5,600 or 29 percent in the morning and 5,100 or 23 percent in the afternoon if drivers are charged a medium toll (Toll Scenario A).
- Volumes would decrease by 3,600 or 19 percent in the morning and 3,500 or 15 percent in the afternoon if drivers are charged a low toll (Toll Scenario E).

When the viaduct is taken down, Alaskan Way is proposed to become a four-lane city street that includes a connection over nearby rail lines to Elliott and Western avenues. This new connection would serve trips coming to and from northwest Seattle neighborhoods and industrial areas.

Vehicle volumes on Alaskan Way would be affected by whether the tunnel is tolled or not. If drivers in the proposed bored tunnel are not charged a toll, the traffic model forecasts that 26,300 vehicles would use Alaskan Way each day in 2030. This would change if the tunnel is tolled:

- Daily volumes on Alaskan Way would increase between 8,000 and 10,000 vehicles or between 31 and 38 percent if drivers are charged a medium or high toll to use the bored tunnel.
- Daily volumes on Alaskan Way would increase by 2,000 vehicles or eight percent if drivers are charged a low toll to use the bored tunnel.

Exhibits 28 and 29 show the toll impact on travel volumes for north-south facilities through downtown for both weekday and peak period trips.

Changes in volumes would affect travel times on Alaskan Way and through the bored tunnel.

- For drivers traveling in the a.m. peak hour from Ballard to the West Seattle Bridge using Alaskan Way, their trip would take 16 minutes if no toll is charged or would take one to two minutes longer if the tunnel is tolled. This longer travel time is because of the added volumes on Alaskan Way.
- For drivers making the same trip in the a.m. peak hour from Ballard to the West Seattle Bridge using the bored tunnel, their trip would take 15 minutes if no toll is charged and would stay the same if the tunnel is tolled. This is because there would be fewer trips in the tunnel.

Exhibit 28 – 2030 Weekday North-South Traffic Through Downtown (at Seneca Street)

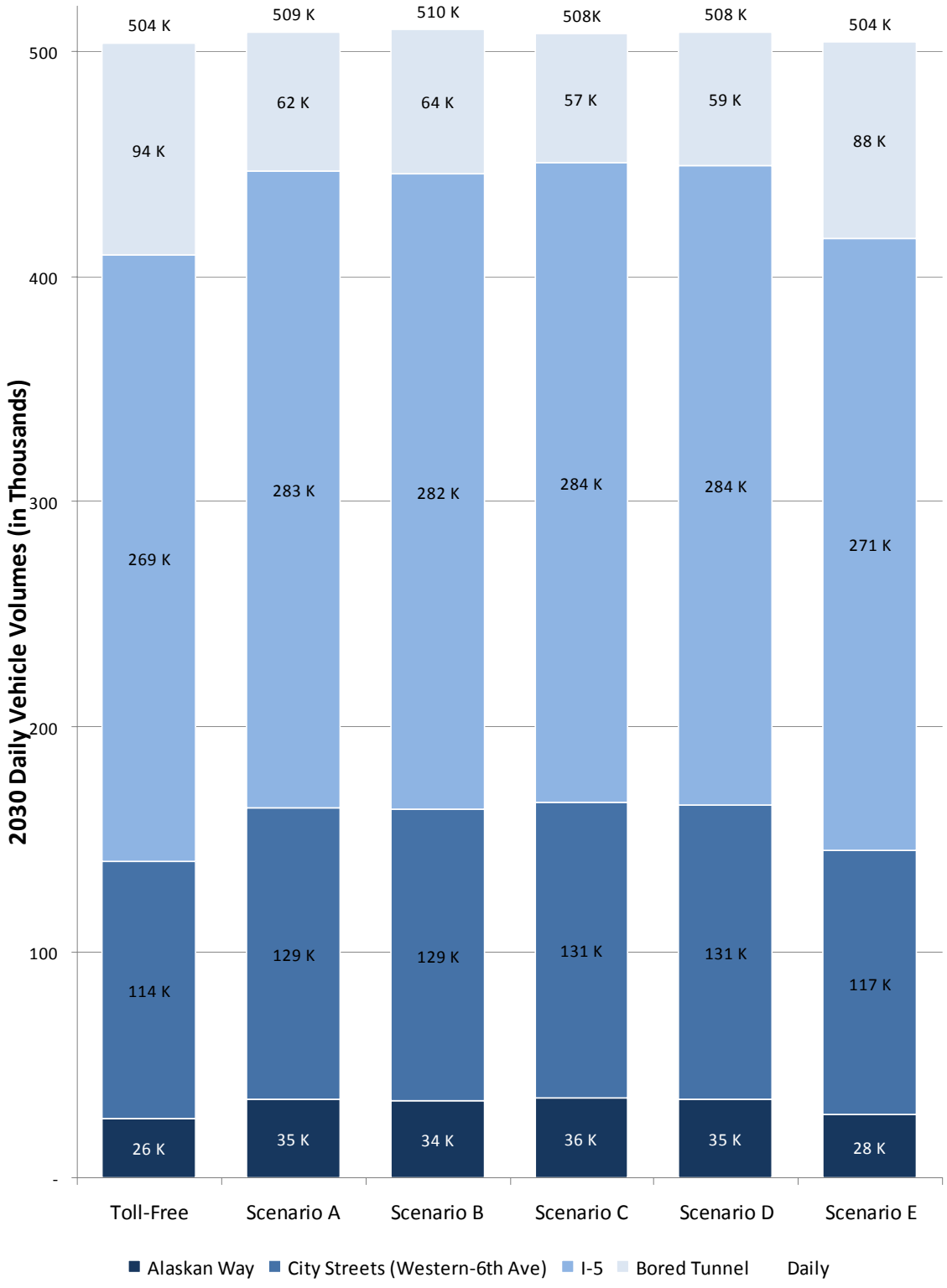
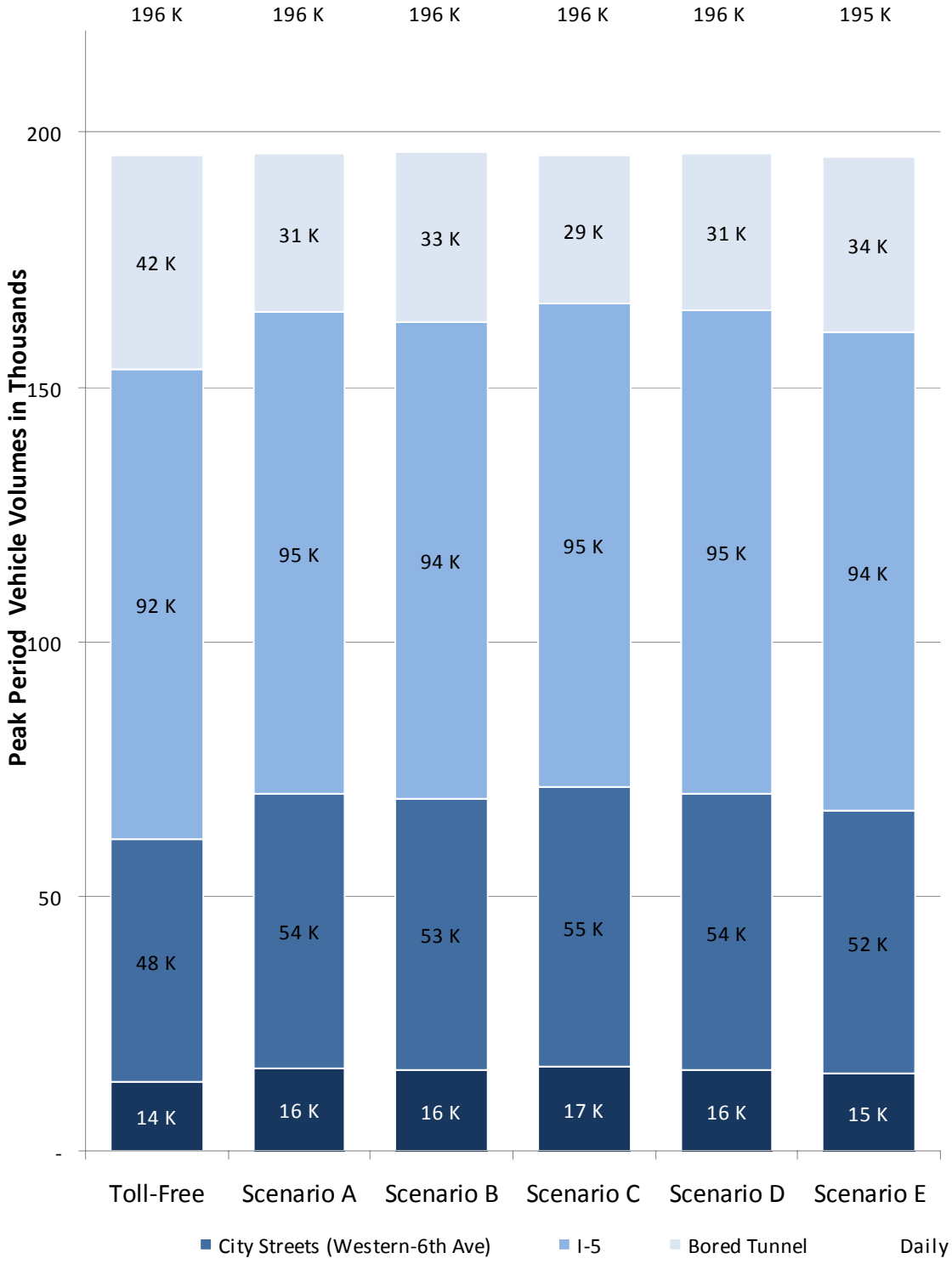


Exhibit 29 – 2030 Peak Period* North-South Traffic Through Downtown (at Seneca Street)



Travel times for longer trips that use the bored tunnel would stay the same or get faster if the tunnel is tolled.

- Trips from the West Seattle Bridge to Woodland Park in the a.m. peak would take 12 minutes if the tunnel is not tolled, but would take 11 minutes if the tunnel is tolled.
- A trip from the West Seattle Bridge to the Aurora Bridge in the a.m. peak would take nine minutes if the tunnel is not tolled, but between seven and eight minutes if the tunnel is tolled.

How would volumes and travel times on downtown streets change if the tunnel is tolled?

Some drivers choosing to avoid paying a toll on the bored tunnel would choose to take city streets through downtown Seattle. Traffic analysis shows that few would choose to take city streets during peak travel times, when those streets are already at capacity. If the bored tunnel is toll free, approximately 48,000 vehicles would use downtown city streets between Western Avenue and Sixth Avenue during peak travel times. These volumes would increase by eight to 14 percent during the peak period if a toll is charged in the proposed bored tunnel.

Daily vehicle volumes on downtown city streets would be approximately 114,000 if the tunnel is not tolled. These daily volumes would increase by 11 to 13 percent if a medium or high toll rate is charged and would increase by three percent if a low toll rate is charged.

Exhibit 30 – 2030 Peak Hour Representative Trips and Travel Times for Selected Toll Scenarios

Travel Time in Minutes	Year 2030					
	AM Peak Hour			PM Peak Hour		
	Scenario A	Scenario E	Toll-Free	Scenario A	Scenario E	Toll-Free
Woodland Park to West Seattle Bridge (via SR 99 Bored Tunnel)						
Southbound	14	14	14	12	13	13
Northbound	11	11	12	13	14	14
South of Aurora Bridge to West Seattle Bridge (via SR 99 Bored Tunnel)						
Southbound	8	8	8	7	8	8
Northbound	7	8	9	8	8	10
Ballard to West Seattle Bridge (via Mercer Street, Bored Tunnel)						
Southbound	15	15	15	25	26	26
Northbound	17	18	19	24	24	25
Ballard to West Seattle Bridge (via Alaskan Way)						
Southbound	18	17	16	28	26	24
Northbound	21	19	18	31	30	28
West Seattle to Downtown Seattle						
Inbound	25	24	23	21	20	19
Outbound	18	19	16	32	30	29

How would volumes and travel times on I-5 change if the tunnel is tolled?

Volumes on I-5 would increase slightly if a medium or high toll is charged to use the proposed SR 99 bored tunnel. Most of the shift would occur during non-peak travel times when there is some capacity left for the trips to be absorbed on I-5. If the bored tunnel is not tolled, I-5 daily vehicle volumes in 2030 would be 269,350, with 177,150 occurring during non-peak travel times and 92,250 occurring during the morning and afternoon commute periods.

If either Toll Scenarios A, B, C, or D were implemented, daily volumes on I-5 would increase five percent; non-peak volumes would increase by six or seven percent; and peak volumes would increase by two or three percent. If a low toll is charged to drivers, daily vehicle volumes would increase by one percent; non-peak volumes would stay the same as if the tunnel is not tolled; and peak volumes would increase by one percent.

This increase in volumes on I-5 is not expected to significantly change travel times in 2030.

How would transit ridership change if the tunnel is tolled?

The number of transit trips to, through, and from the central downtown area would not substantially change if the proposed bored tunnel is tolled, partly because no transit routes are assumed to operate in the tunnel. The most likely category of travelers to shift

to transit would be those who travel to and from downtown Seattle, but these transit trips would not use the tunnel.

How would the length of trips on SR 99 change if the tunnel is tolled?

Tolling the proposed bored tunnel would encourage longer through trips and discourage shorter, more localized trips on SR 99. The traffic analysis showed that the largest number of trips that would choose to take other north-south routes, rather than pay a toll to use the tunnel, would be short trips such as those between West Seattle and South Lake Union or from SODO to Queen Anne.

Longer trips, such as trips through the City of Seattle, would be less likely to divert from the tunnel. In Toll Scenario A, which would charge a medium toll rate, the number of longer trips would increase by 1,800 compared to a toll-free tunnel. The average trip lengths for Scenario A would be seven to 24 percent longer than if no toll is charged.

How would vehicle miles traveled change if the bored tunnel is tolled?

The traffic analysis did not show a significant shift to alternate modes of travel when the proposed SR 99 bored tunnel is tolled. Most travelers would choose to make their trips to or through downtown Seattle in cars. Of those trips, the shorter trips would be more likely to divert to other routes, which in most cases would be slightly longer routes. This diversion would cause vehicle miles traveled to increase by one or two percent, because shorter trips that divert would take slightly longer routes.

How would the transportation system function in 2015 when the bored tunnel would open to drivers?

This study assumed that the proposed bored tunnel would open to traffic in 2015. At that time, several of the street and transit investments that are part of the overall program to replace the Alaskan Way Viaduct would not yet be in place. The most significant project is the new Alaskan Way and its connection to Elliott and Western avenues. That project would be completed by 2017 after the viaduct is taken down, since construction of the street and connection would occur in the viaduct's current location.

During the two years required to construct the Alaskan Way surface street, daily vehicle volumes in the proposed bored tunnel would be approximately three percent higher than the vehicle volumes forecast in 2030.

How would transportation system performance compare between a tolled bored tunnel and the I-5/Surface/Transit scenario?

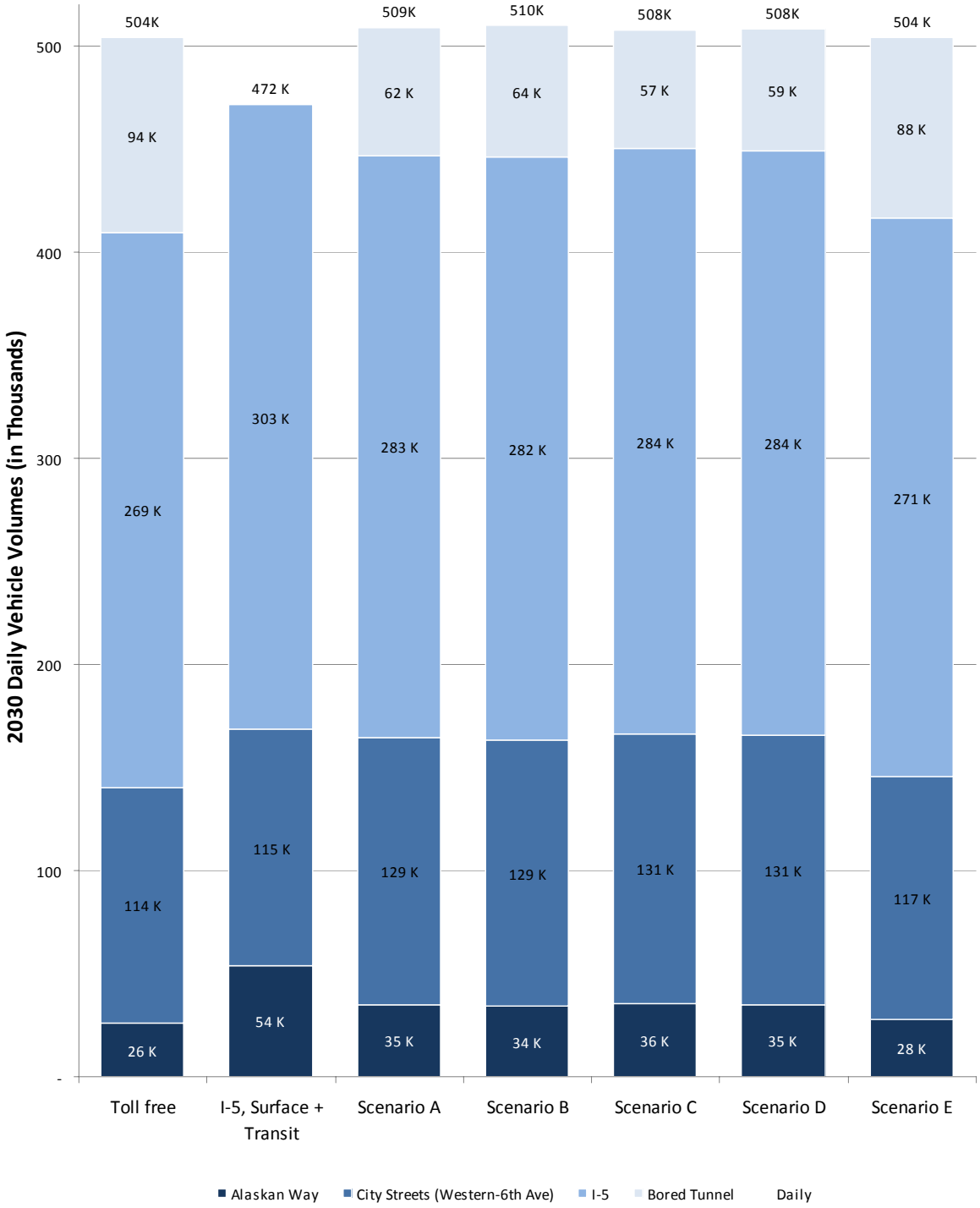
One of the options previously under consideration to replace the central waterfront section of the Alaskan Way Viaduct was the I-5/Surface/Transit scenario. That scenario included a one-way couplet along the waterfront with southbound traffic using Alaskan Way and northbound traffic using Western Avenue. Improvements on I-5 included an

additional northbound lane between Seneca Street and SR 520, and converting the southbound HOV lane at Mercer Street to a managed lane. Transit improvements included transit lanes on downtown city streets.

If the proposed bored tunnel is not implemented and the I-5/Surface/Transit scenario or similar scenario was selected, traffic analysis shows that the daily volumes of vehicle traffic on Alaskan Way could be up to 54,000. This compares to 28,000 to 36,000 daily vehicles in the bored tunnel toll scenarios.

Volumes on I-5 would be significantly higher in the I-5/Surface/Transit scenario compared to the proposed bored tunnel if it is toll free or if a low, medium, or high toll rate is charged. Daily vehicle volumes on I-5 would range between 269,000 if no toll is charged and 281,000 if a high toll rate is charged. There would be more than 303,000 daily vehicles on I-5 in the I-5/Surface/Transit scenario.

Exhibit 31 – 2030 North-South Weekday Traffic Through Downtown by Scenario including Surface Scenario (at Seneca Street)



Chapter 6.
How can the effects of tolling SR 99 be addressed?

In addition to the proposed bored tunnel, replacing the viaduct would be achieved through a program of state, local and federal investments. These include investments in Alaskan Way and other surface streets, additional transit service, and improvements to freight, bike and pedestrian pathways. ESSB 5768 requested that WSDOT include an analysis of mitigation to offset diversion, if tolls are charged in the proposed bored tunnel. The traffic analysis in the previous section factored the full program of investments into the transportation network. It showed that while drivers would choose to take other routes if a toll were charged, the overall effect to travel times would be minimal. Based on the traffic analysis completed, no significant investments in mitigation are recommended as part of this report. Additional analysis will be completed through the environmental process.

Would tolling I-5 reduce diversion from the proposed bored tunnel?

A traffic analysis sensitivity test was performed to determine if charging a toll to use I-5 between the Ship Canal and Spokane Street would reduce the number of trips diverting from the proposed bored tunnel. Vehicle volumes in the tunnel would increase by about three percent if tolls are added to I-5, since this would discourage diversion from a tolled SR 99 to a formerly toll-free I-5. Tolling I-5 may also divert some shorter distance trips from I-5 to other north-south arterials, the impact of which could also improve the travel time savings of the tunnel, thereby attracting a few more vehicles.

The toll rate tested was $1.20 during the morning and afternoon commute times, $0.60 during the midday and evening, and $0.50 during the night (2015 dollars). A higher toll rate was not tested because the objective was not to raise revenue by tolling I-5, but rather to analyze providing a deterrent to travelers diverting to I-5 in order to avoid the SR 99 toll.

Would tolling the north and south segments of the SR 99 corridor reduce diversion from the proposed bored tunnel?

Toll Scenarios B and D evaluated the potential for charging a toll to drivers using the north and south segments of SR 99 to raise revenue and manage traffic. When segment tolls are added to a medium toll rate, daily vehicle volumes increase by approximately six percent in the proposed bored tunnel. This would be primarily due to lower volumes on the north and south segments of SR 99, which means higher speeds and faster travel times through the proposed bored tunnel. As a result, the tunnel would attract more trips than it would if there were not segment tolls.

Would implementing active traffic management and intelligent transportation systems reduce diversion from the proposed bored tunnel?

An active traffic management system to help improve traffic flow during congestion and reduce collisions on I-5 is currently being developed as part of the Alaskan Way Viaduct and Seawall Replacement Program. This technology includes variable speed limits, individual lane controls, and enhanced traveler information. These investments will be able to accommodate additional vehicles expected to divert to I-5 if the proposed bored tunnel is tolled.

Implementing additional intelligent transportation systems to monitor traffic on city streets would also assist in managing diversion from the proposed bored tunnel. This would alert traffic managers to congestion on a real-time basis, so blocking incidents or other issues can be immediately addressed. This would help the transportation system work more efficiently during peak travel periods.

Chapter 7.
What are the key findings from this report?

During the 2009 session the Washington State Legislature approved Engrossed Substitute Senate Bill (ESSB) 5768, which identified a deep bored tunnel as its preferred option for replacing the SR 99 Alaskan Way Viaduct. The legislature also directed WSDOT to update cost estimates, have those estimates reviewed by independent tunnel engineering experts, and prepare a traffic and revenue study. This report documents the work done by WSDOT in response to the legislative direction.

How much will the SR 99 Alaskan Way Viaduct Replacement cost?

The 2010 cost estimate for the SR 99 Alaskan Way Viaduct replacement, including the proposed bored tunnel, is $3.1 billion. This overall cost matches WSDOT's January 2009 cost estimate for the replacement.

The 2010 cost estimate for the proposed bored tunnel is $1.96 billion. This is an increase of $60 million from WSDOT's January 2009 cost estimate.

What feedback did WSDOT receive from independent tunnel experts and cost estimators?

While risk can never be entirely avoided, the early identification of risks and the development of strategies to minimize or manage risks were seen as prudent approaches for developing cost estimates within which the project can be delivered.

WSDOT's 2010 cost estimate was prepared using a value engineering approach. The 2009 estimate was prepared using standard WSDOT estimating methods for conceptual engineering plans, (i.e., cost per square foot). Numerous national and international experts advised WSDOT on ways to reduce project risk by designing solutions to the risk items in the base cost. This value engineering effort led to the recommendation to move the alignment of the tunnel's south end to Alaskan Way instead of First Avenue through historic Pioneer Square.

The bored tunnel cost estimate increased by $60 million from the 2009 cost estimate. Increases predominantly relate to the additional length of the tunnel based on the new alignment. These increases were offset by changes in the tunnel alignment and schedule streamlining opportunities. Additionally, cost savings realized on the S. Holgate to S. King Street Viaduct Replacement Project maintain the total budget of $3.1 billion budget ($2.8 billion state commitment supplemented by $300 million commitment from the Port of Seattle).

The very thorough cost assessment process, use of independent experts, quantification of risk and initial risk mitigation actions give us a higher level of confidence that project costs and risks can be effectively managed.

Can an additional $400 million in construction funding be raised by tolls?

WSDOT and the Office of the State Treasurer found that it is feasible to toll the proposed bored tunnel at a medium toll rate and generate up to $400 million in funding for the viaduct replacement. The current project schedule assumes that bond authorization would be provided in 2011 and that bonds would be issued starting in mid-2012 (fiscal year 2013).

What would be the impacts from tolling, including diversion and performance of the facility?

Replacing the viaduct would be achieved through a program of state, local and federal investments. These include investments in Alaskan Way and other surface streets, additional transit service, and improvements to freight, bike and pedestrian pathways. If a toll is charged to use the tunnel, traffic model analysis shows that some traffic would divert from the tunnel to local streets and Interstate 5, but travel times would stay the same or increase slightly. Based on the traffic analysis completed, no significant investments in mitigation are recommended as part of this report. Additional analysis will be completed through the environmental process.

SR 99 Alaskan Way Viaduct Replacement
Updated Cost and Tolling Summary Report to the Washington State Legislature

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