



520 Tolling Implementation Committee

**Tolling Report Prepared for the
Washington State Legislature
January 28, 2009**



This report is submitted in compliance with ESHB 3096, as approved by the 2008 Washington State Legislature.



Bob Drewel,
Executive Director, Puget Sound Regional Council



Paula Hammond,
Washington State Secretary of Transportation



Richard "Dick" Ford,
Washington State Transportation Commission

Table of Contents

Executive Summary	2
520 Bridge Replacement and HOV Program Background	4
Committee Charge and Legislative Direction	6
Committee Criteria	7
Travel Demand Model Peer Review	8
Committee Work Approach	8
Public Engagement	9
Evaluating and Comparing Toll Scenarios	19
Variables Examined in Toll Scenarios	21
Comparing Scenarios	25
Incentives for Transit and Carpooling	30
Potential Effects on Lower-Income Bridge Users	32
Opportunities to Partner with Businesses	33
Advanced Tolling Technology	34
Active Traffic Management	35
Mitigation Recommendations for Diversion Related to Tolling	36

January 28, 2009

To: Governor Chris Gregoire
Members of the Washington State Legislature

It is our pleasure to submit the 520 Tolling Implementation Committee's report, in accordance with ESHB 3096 as approved by the 2008 Washington State Legislature. The Committee was charged with evaluating tolls as a means of financing a portion of the 520 Bridge Replacement and HOV Program, engaging citizens and local and regional leadership in the evaluation, enhancing understanding of tolling alternatives, and reporting to the Governor and Legislature in 2009. The Committee also was charged with recommending potential mitigation measures for diversion resulting from tolls.

The Committee and its staff developed and evaluated ten scenarios with tolls on 520 or on both 520 and I-90. Four were presented to the public in the summer. Based upon the feedback received, six new scenarios were conceived, analyzed and brought back for public review in the fall.

Extensive efforts were made to reach a broad range of people, through public meetings, online opportunities and face-to-face discussions with local elected leaders from around Lake Washington. 16,000 people visited our website, build520.org, hundreds attended our open houses and thousands submitted written comments and petition signatures. More than 7,800 people took our web survey and another 1,200 participated in a random sample telephone survey. We also conferred with more than 20 local jurisdictions and spoke to civic and citizen groups.

We found great interest in the subject of funding the 520 project with tolls. Major findings include:

- Support for tolling as a way to help fund the bridge replacement.
- Support for the idea of variable tolling in which tolls vary by time of day.
- Support for full electronic tolling with transponders and no toll booths.
- Support for tolling the existing 520 bridge in 2010 when construction begins.
- Majority support for tolling I-90 in addition to 520, but strong opposition from I-90 users.

Overall findings from the scenario analysis include:

- Toll scenarios raised between \$522 million and \$2,457 million in bridge funding.
- Tolling 520 in 2010 raises more funds and reduces the cost of borrowing compared to tolling in 2016.
- When tolls are in place, traffic volumes decrease and speeds improve on tolled facilities.
- When tolls are in place, some people choose a new route, change the time of their trip, take transit or carpool or change their destination to not cross Lake Washington.

The Committee also was asked to evaluate traffic diversion and make mitigation recommendations, evaluate tolling technologies and new applications of advanced traffic technologies, and explore opportunities to partner with the business community. These and all other findings are included in this report or in the detailed appendices that can be found on the build520.org website. For questions about the report, please contact David Hopkins at WSDOT by calling 206-464-1194 or e-mailing him at hopkida@wsdot.wa.gov.

We especially would like to thank the thousands of people who participated in the process and the local jurisdiction leaders and staff who were instrumental in the success of this effort. We also thank you for giving us this task and stand ready to assist you in any way in your discussions regarding tolling.

Bob Drewel, Executive Director, Puget Sound Regional Council
Paula Hammond, Washington State Secretary of Transportation
Richard "Dick" Ford, Washington State Transportation Commission

executive summary



Lake Washington and surrounding highways

The 520 Tolling Implementation Committee was created by the Washington State Legislature in 2008 to evaluate tolls as a means of financing a portion of the 520 Bridge Replacement and HOV Program, engage citizens and regional leadership in the evaluation, enhance understanding of tolling alternatives, and report to the Governor and Legislature in 2009.

The existing State Route 520 bridge structures across Lake Washington and Portage Bay are vulnerable to earthquakes and windstorms and need to be replaced. In 2008, the Legislature asked for an evaluation of toll scenarios that could produce \$1.5 to \$2.0 billion in financing.

The Committee and its staff developed and evaluated ten scenarios with tolls on 520 or tolls on both 520 and I-90. The Committee initially evaluated four scenarios, and collected extensive public and local jurisdictional input on those results. That input helped staff develop an additional six scenarios for evaluation. The Committee then re-engaged the public and local jurisdictions with results for all ten scenarios. It now reports all findings to the Governor and Legislature.

Overall Findings From Public Engagement

As requested by the Legislature, the Committee and its staff led a public outreach and input-gathering effort in conjunction with the tolling analysis and evaluation process. Thousands of people participated directly by attending Committee meetings or public open houses, visiting the website, taking part in a web survey or writing to the Committee. A random sample, statistically-valid telephone survey was also conducted. Committee members and staff met regularly with jurisdictions, technical staff and other stakeholder groups to understand their concerns and aspirations related to tolling. The Committee found the following:

- Generally, people support tolling, and support tolling the existing 520 bridge in 2010 (59 percent in web survey and 64 percent in phone survey).
- The phone survey showed that most people support the idea of tolling I-90 in addition to 520, although most users of I-90—in particular Mercer Island residents—are opposed to this concept. Support increases among I-90 users if toll revenue is used for I-90 improvements.
- Among those who support tolling, variable tolling is also supported as a way to reduce congestion and improve traffic conditions. Those who oppose the overall concept of tolling also oppose variable tolling.
- Electronic tolling is also supported. Most people appear to understand the connection between electronic tolling (no toll booths needed) and improving traffic flow. Some did ask questions about logistics associated with electronic tolling.



The Committee aimed to provide guidance on a key question: *“How can funding be secured for the new 520 bridge under the best terms for taxpayers, bridge users and adjacent communities?”*

Overall Findings from Scenario Analysis

Financial capacity

- The toll scenarios examined raise between \$522 million and \$2,457 million in corridor funding from tolls. The most a 520-only scenario raised was \$1.5 billion. Most scenarios that toll both 520 and I-90 raised more than \$2.0 billion.
- Only one 520-only scenario met the low end of the Legislative target (\$1.5 billion).
- All two-bridge scenarios (520 and I-90) met the Legislative target and four of five scenarios exceeded the high end (\$2.0 billion).

Begin tolling in 2010 vs. 2016

- Tolling 520 in 2010 raises more funds and may reduce the cost of borrowing compared to tolling 520 in 2016.
- Tolling starting in 2010 enables use of \$154 million in federal funds from the USDOT Urban Partnership Agreement. There would be \$86 million available for tolling and active traffic management infrastructure. An additional \$41 million would be used to buy transit coaches in the corridor. \$27 million would be available in funds for ferries.

Traffic conditions with tolling

- When tolls are in place, volumes go down and speeds improve on the tolled facility.
- If tolls are placed on both bridges, traffic volumes go down and speeds improve on both bridges.
- Speeds decrease on alternate routes. This decrease, however, is less than the speed improvements on the tolled routes.

Diversion due to tolls

- People may change their travel choices to take transit, carpool, or vanpool; shift the time of day of their trip; or change their destination.
- Some people do change their route, but the overall effect of those route changes tends to be distributed across the transportation system.
- Diversion is reduced by existing congestion levels, limited alternate routes and resulting lack of time savings from using another route.

In addition to these findings, the Committee is also providing the Legislature with requested research into advanced tolling technologies; new technologies

for managing traffic; opportunities to partner with businesses; and potential traffic mitigation opportunities. Appendices listed below contain additional details and analysis for all topics and are available on disk and on the Committee's website (build520.org).

Mitigation Recommendations

ESHB 3096 requested the Committee recommend mitigation measures associated with potential diversion resulting from tolling. The Committee is recommending a two-part approach.

In Part 1, keeping traffic on 520 is the priority. The intent is to manage toll levels to keep people on the 520 bridge while also meeting revenue expectations. This can be accomplished through variable tolling, identifying funds to provide transit service and working with employers to reduce congestion. Ultimately, the new 520 bridge, with its expanded capacity, will keep traffic on 520.

Part 2 includes recommendations targeted to the five locations most likely affected by potential diversion (522, I-90, I-405, I-5 and the University area) as found in traffic diversion analysis. Mitigation measures could include system-wide instrumentation and traffic monitoring, electronic driver information signs (particularly for the 522 corridor), advanced traffic technology, transit expansion and coordination for new service, and related projects such as new or expanded park-and-rides.



Appendices available on disk and on the website:

Volume 1:

A: Legislation - ESHB 3096

B: Outreach Events and Materials

C: Travel Demand Modeling and Financial Analysis

D: Travel Demand Model Peer Review

E: Active Traffic Management

F: Toll Collection Technology

G: Mitigation Recommendations for Diversion

H: Discussions on I-90

Volume 2:

I: Public Comments

- Letters from jurisdictions
- Summaries of public comment
- All public comments received

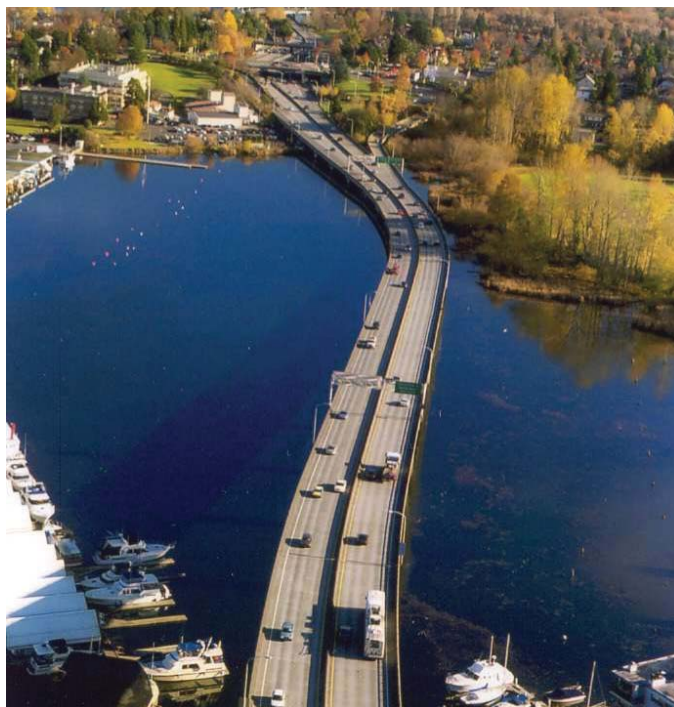
520 bridge replacement and HOV program background

State Route 520 is one of two east-west highways across Lake Washington. Approximately 158,000 people cross the 520 floating bridge (Evergreen Point Bridge) each day, traveling in some 115,000 vehicles.

Built in 1963, the Evergreen Point Bridge and the Portage Bay Bridge are vulnerable to windstorms and earthquakes. A collapse of these bridges or their approach structures could cause serious injury or loss of life, and would overwhelm all major regional highways with re-routed traffic. 520 is also a crucial and often congested corridor between job centers and growing communities around Lake Washington. The existing corridor is heavily congested during morning and afternoon commute times.

The 520 Bridge Replacement and HOV Program will replace all existing bridges, including the Portage Bay Bridge and Evergreen Point floating bridge, with new, safer bridges that are designed to withstand earthquakes and windstorms. Commuters will benefit from better transit reliability and improved travel times between Seattle and the Eastside.

Construction of bridge pontoons will begin in 2009. The new 520 bridge is scheduled to open in 2014 with four lanes. When the bridge and corridor are complete in 2016, there will be six lanes; four general purpose, two HOV, a bike/pedestrian path, and shoulders.



Top: 520 bridge mid-span during windstorm

Top right: 520 bridge approach to west high-rise

Bottom right: Portage Bay Bridge



For more information: www.wsdot.wa.gov/projects/sr520bridge

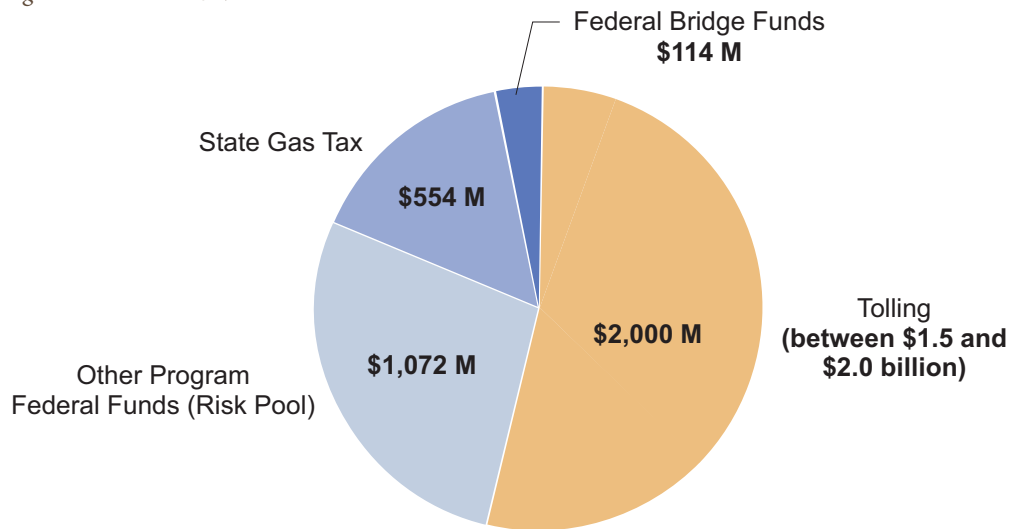


Funding a New 520 Bridge

The project cost was estimated in April 2008 at between \$3.7 and \$3.9 billion. A combination of federal funds, state gas tax funds and tolls were expected to pay for the project.

In November 2008, WSDOT released updated cost estimates that show the overall program costs have increased. These revised costs include estimates for each of the three alternatives currently being considered by the 520 mediation group. Once agreement is reached on a preferred alternative for the project, WSDOT will update the cost estimate and finance plan. The Committee's work was based on the project estimates of costs and funding sources as of April 2008, and the Legislative target established in ESHB 3096. The results are reported against that baseline estimate.

Figure 1. Anticipated funding sources identified by Legislature in ESHB 3096



Project estimate as of April 2008 was \$3.7 billion – \$3.9 billion
(Low end of range reflects \$180 million in sales tax deferral)

Previous and Future Finance Plan Work

In January 2008, WSDOT presented the 2007 SR 520 Finance Plan to the Governor and Legislature. The finance plan examined the funding potential from tolls under a number of scenarios looking at tolling 520 only and discussed the financial shortfall facing the project. WSDOT is preparing a new financial plan for the 2009 Legislative session.

The 520 corridor is also part of an USDOT Urban Partnership Agreement. The Urban Partnership Agreement is a federal grant that provides \$154 million for variable tolling infrastructure on 520, the purchase of 45 buses to serve the corridor, and funding for ferries in the Puget Sound region. Funding to operate the buses needs to be identified and secured. Under terms of the Agreement, the State Legislature must authorize variable tolling on 520 in 2009 to secure the remaining \$136 million in pending grant funds.

Funding the Existing 520 Bridge

Tolls paid for the existing 520 bridge. When it opened to drivers in 1963, the popularity of the bridge allowed the bonds to be paid off ahead of schedule.

August 1963:

Car toll \$0.35
2007 dollars \$2.48

4-axle truck toll \$1.00
2007 dollars \$7.08

June 1979:

Car toll \$0.35
2007 dollars \$1.05

Car with 3 or more people
toll \$0.10
2007 dollars \$0.30

4-axle truck toll \$1.00
2007 dollars \$3.01

Note: Historical inflation based upon U.S. Consumer Price Index for all urban consumers.



Urban Partnership Agreement Funds

Tolling and Active Traffic Management \$86 million

Transit/Park-and-Rides \$41 million

Ferry Projects \$27 million

committee charge and legislative direction



520 mid-span and east high-rise

520 Tolling Implementation Committee

The 520 Tolling Implementation Committee was created by the State Legislature in 2008 (ESHB 3096). The Committee is composed of: Bob Drewel, Executive Director of the Puget Sound Regional Council, who served as Chairman, Washington State Transportation Secretary Paula Hammond and Washington State Transportation Commissioner Richard “Dick” Ford.

The Committee was charged with evaluating tolling for financing the 520 Bridge Replacement and HOV Program, engaging citizens and regional leadership in the evaluation, enhancing understanding of tolling alternatives, and reporting to the Governor and the State Legislature in January 2009.

The act recognizes that \$1.5 to \$2.0 billion in funding from toll revenue may be required to secure financing for the project. Different approaches to tolling have implications for state resources already secured for the project, toll payers, adjacent communities and the wider region.

The act charges the Committee with:

- Evaluating the potential diversion of traffic from 520 to other parts of the transportation system, including 522 and local roadways and recommending mitigation measures.
- Evaluating advanced tolling technology.
- Evaluating new applications of emerging technology to better manage traffic.
- Exploring opportunities to partner with the business community to reduce congestion and financially contribute to the project.
- Conferring with mayors and city councils of jurisdictions adjacent to 520, 522 and I-90.
- Conducting public work sessions and open houses.
- Providing a report to the Governor and Legislature by January 2009.

The Committee was specifically charged with engaging citizens on the following topics:

- Funding a portion of the 520 project with tolls on the existing bridge.
- Funding the 520 project and improvements on the I-90 bridge with a toll paid by drivers on both bridges.
- Providing incentives and choices for transit and carpooling.
- Implementing variable tolling as a way to reduce congestion.

committee criteria

Evaluation Criteria for Scenario Analysis

Prior to the first round of analysis, the Committee established a set of evaluation criteria. These criteria, their significance, and relevant data sources are included in Figure 2.

Figure 2. Descriptions of evaluation criteria.

Criteria	Significance	Analysis Applied
How much revenue (financial capacity) is generated and when?	<p>Expected financial capacity from each toll scenario.</p> <p>How revenue generation meshes with cash flow needs of bridge replacement.</p>	The Office of the State Treasurer estimated the finance capacity for each toll scenario.
Are the tolls “reasonable”?	Different toll rates have different effects on diverted traffic, financial capacity, and bridge performance, and may seem more or less reasonable to travelers.	<p>Toll rates were determined for each toll scenario by time of day and weekday or weekend.</p> <p>The average toll for each scenario was estimated based on 24-hour traffic volumes.</p>
What are the diversion effects of a bridge toll?	If people choose not to pay a bridge toll, they may choose a different time of day, mode (i.e. transit or carpool), route, or destination.	The diversion effects were calculated for each scenario and time period (peak and off-peak) for weekday travel on 520, I-90, I-405, and 522, and local arterials around Lake Washington.
How do tolls affect the performance of the bridge(s)?	Tolling, especially variable tolling that is based on time of day, can improve traffic flow.	For each scenario, performance was expressed as the increase or decrease in average speeds for selected facilities at peak and off-peak times.
What effects might a toll have on lower-income bridge users?	Lower-income bridge users may be disproportionately impacted by tolls.	<p>A survey by the 520 project team examined the attitudes of lower-income bridge users about tolling 520.</p> <p>Social service and educational institutions were contacted for their views on how tolling might affect their clients/students.</p>

travel demand model peer review

At its first public meeting in June 2008, the Committee requested an independent peer review of the Puget Sound Regional Council’s regional travel demand model used to analyze the toll scenarios. The peer review team was led by Dr. Yoram Shiftan, a University of Michigan visiting professor with extensive experience in travel demand modeling.

The peer review team recommended slightly modifying the model to address high destination diversion (trips not crossing Lake Washington), improve model consistency, and look at results in more detail and with additional model runs using different assumptions. Detailed recommendations are included in Appendix D. Several suggestions were incorporated in the model and were applied to all toll scenarios in September 2008.

The peer review team concluded that the travel demand model used is comparable to the best in the nation, and noted that new elements incorporated in recent years have significantly improved the model’s ability to analyze variable tolling.

committee work approach

The Committee used the schedule and work program shown in Figure 3, aiming to evaluate scenarios, engage the public, re-evaluate scenarios, engage the public again, and report all findings to the Legislature.

In September 2008, the Committee selected six new scenarios and directed staff to present results in November and launch the second round of public outreach including telephone and web surveys.

The Committee had a two-part approach to public outreach. The four initial scenarios were selected by the Committee in June 2008. Based on the public outreach and comment on the first four scenarios, a number of other possible new scenarios or variations were suggested to the Committee.

The Committee also directed staff to rerun the first four scenarios so that refinements to the regional travel demand model suggested by the independent peer review panel would be applied to all the scenarios. All the scenarios were updated and assessed for financial capacity by the Office of the State Treasurer.

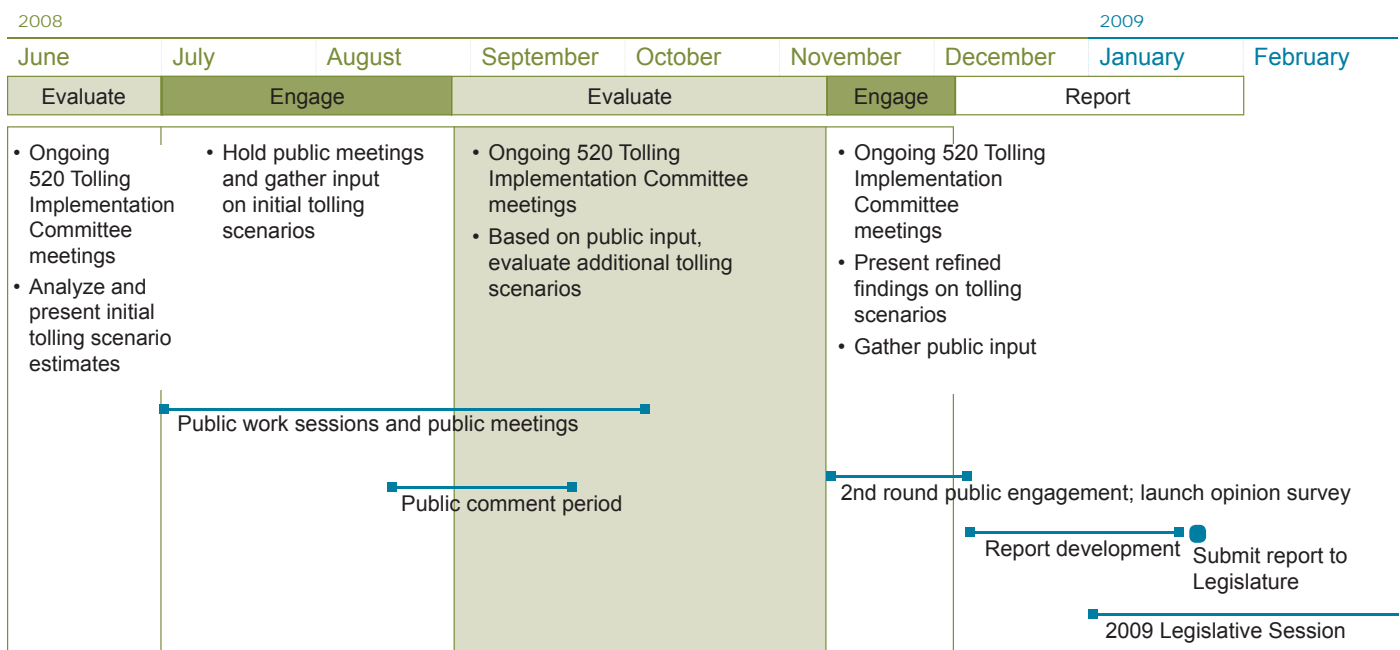


Figure 3. 520 Tolling Implementation Committee work program and schedule.

public engagement

The Committee's goal was to engage the public in open and transparent discussion of tolling, based upon the data related to the various scenarios studied. There were two rounds of engagement. Four tolling scenarios were presented in July. Based upon the input received, revisions to the initial four scenarios were made, five new scenarios were analyzed, and results of the revisions and new scenarios were introduced to the public in November. Analysis of the tenth scenario (high-occupancy toll lanes on I-90) was completed in December.

The Committee was specifically charged with engaging citizens on the following topics:

- Funding a portion of the 520 project with tolls on the existing bridge.
- Funding the 520 project and improvements on the I-90 bridge with a toll paid by drivers on both bridges.
- Providing incentives and choices for transit and carpooling.
- Implementing variable tolling as a way to reduce congestion.

The Committee's meetings and open houses were well publicized on radio, television, and major daily and local newspapers. More than forty news stories were generated by the Committee's work. Paid advertising in newsprint and media websites promoted the Committee's open houses and public engagement opportunities. King County Metro announced both rounds of open houses with flyers on all 1,300 of its buses. The Committee also sent e-mail or postcard notices to more than 19,000 people on lists maintained by WSDOT for the 520 project.

Between June and December 2008, thousands of people participated in the discussion of these topics using a variety of outreach methods. Public outreach events and activities are outlined here and a complete list is included in Appendix B.



By the Numbers

- 16,000 visited the build520.org website
- 7,800 participated in the web survey
- More than 8,000 wrote comments
- More than 700 people attended at least one of the nine open houses
- More than 1,000 participated in a Sierra Club postcard campaign
- More than 3,300 signed a petition from "No Toll on I-90" expressing opposition to tolling I-90



The 520 Tolling Implementation Committee at their July 10 meeting

key findings from public comment

The entire body of comments and survey results has been summarized by issues the Legislature directed the Committee to research and by the Committee's evaluation criteria for toll scenarios. Survey results referenced below can be found on page 17.

Input Sought by the Legislation

- **Funding a portion of the 520 replacement project with tolls on the existing bridge**
The majority (58 percent) of respondents to a statistically-valid phone survey conducted in November 2008 supported tolling the existing bridge in 2010 if it results in lower tolls and financing costs. Many public comments supported tolling on the existing bridge (in 2010), particularly if tolling reduces out-of-pocket costs to drivers and improves traffic. In the phone survey, support was less if tolling causes speeds on I-90 to decrease. Among written comments, support for tolling in general was a common response, but so was opposition to any tolling, or concerns about costs to the public.
- **Funding the 520 replacement project and improvements on the I-90 Bridge with a toll paid by drivers on both bridges**
The majority (65 percent) of phone survey respondents supported tolling I-90, though less than half of I-90 users were supportive of the idea. Tolling both bridges was supported by many comments, but was largely opposed by I-90 users. There is also strong opposition to tolling I-90 from many Mercer Island residents, and a "No Toll on I-90" group organized a petition opposing the idea. Among I-90 users, slightly more than half were supportive of the idea of tolling I-90 when they learned that toll revenue would also be used to support improvements on I-90.
- **Providing incentives and choices for transit and carpooling**
Nine percent of statistically-valid phone survey respondents said they would take transit if there was a toll on 520. Many respondents felt providing improved transit service was important if tolling is implemented, and some suggested transit as a mitigation for lower-income bridge users. A postcard campaign organized by the Sierra Club identified transportation choices as a priority use for toll revenue.
- **Implementation of variable tolling as a way to reduce congestion**
Variable tolling is supported as a way to reduce congestion and improve traffic conditions, with more than two-thirds of phone survey respondents supporting it. Electronic tolling (no toll booths) increases support for tolling on the bridge.

Evaluation Criteria

- **How much revenue is generated and when**
Public comments show a general trend toward generating revenue sooner, in 2010, rather than later, in 2016, particularly if this results in lower toll rates for travelers.
- **The "reasonableness" of the toll**
Few directly commented on the "reasonableness" of toll rates. Some said that toll rates of \$3 or more were too high, others recommended rates ranging from \$0.50 to \$2. Among those who opposed tolling, some said that the annual cost to their family would be too high given the proposed rates.
- **The diversion effects of a bridge toll**
Many respondents and jurisdictions were concerned with the diversion effects of a bridge toll. Communities north and south of Lake Washington were concerned about diversion around the lake, while those on the east and west sides were concerned about diversion to neighborhood streets as a result of segment tolling.



Definitions for Tolling

Variable Tolling: Toll rates that vary by time of day.

Segment Tolling: Drivers pay a partial toll for using just a portion of a tolled route (such as trips between I-5 and Montlake in Seattle).

Electronic Tolling: Collecting tolls without the use of toll booths, generally with an electronic transponder, so drivers do not need to slow down or stop.

HOT (high-occupancy toll) Lanes: Offer an option for non-HOV drivers to use the HOV (high-occupancy vehicle) lanes for a fee. Toll rates change with traffic levels to ensure that cars in the lane move at or above a set speed.

Dynamic Tolling: Toll rates change with traffic levels to ensure that traffic moves at or above a set speed. HOT lanes use dynamic tolling.



- **The performance of the bridge**
Most respondents appear to understand the connection between variable tolling and improved traffic flow; however, the need for bridge replacement and concerns about traffic on roadways approaching the bridge were mentioned more often than bridge performance.
- **The effects a toll may have on lower-income bridge users**
Many respondents were concerned with potential impacts to lower-income bridge users, with some suggestions that lower-income bridge users be exempt from tolls. Many respondents suggested that increased transit options should be provided for those unable to pay the toll or that a free alternate route should always be available.

2010 or 2016— How We Chose These Years

2010 was selected because that is when 520 construction begins. 2016 was selected because that is the year construction is expected to be completed.

outreach events & activities

Outreach to Mayors and Councils

The Committee was charged with conferring with leadership from adjacent jurisdictions and conducting extensive outreach with local and regional elected officials from around Lake Washington. An overview is below, and a detailed list is in Appendix B.

Several jurisdictions provided letters, touching on the following general issues:

- Diversion and traffic congestion
- Toll exemptions and effects on bridge users
- Transit service and capacity
- Use of toll revenue
- Timing of tolling implementation

An overview of comments from each jurisdiction is included in Figure 4 on pages 13-15. Many jurisdictions in similar areas shared concerns. Grouped by geography, major themes include:

- North – concerns about diversion to 522 and the further deterioration of traffic conditions.
- East – concerns about diversion to local arterials and streets; lack of park-and-rides; lack of adequate transit service.
- South – need to see I-405 improvements completed to keep traffic moving.
- West – diversion to local routes.
- Mercer Island – concerns about charging tolls to Mercer Island residents who travel off-island for many services.

Outreach to Legislators

As part of the Committee’s efforts, Legislators from districts in and near the 520 and I-90 bridges received the media updates from the Committee, as did all the members of the House and Senate Transportation Committees. Members of House and Senate leadership were also invited to Committee briefings. Various Legislators attended open houses or other community meetings.



Local Elected Leaders Conferred With:

Puget Sound Regional
Council Boards and
Committees

Subarea Transportation Forums

- Eastside Transportation Partnership
- South King County Area Transportation Board (SCATBd)
- SeaShore Transportation Forum

Cities and Counties:

- Bellevue
- Bothell
- Clyde Hill
- Hunts Point
- Issaquah
- Kenmore
- King County
- Kirkland
- Lake Forest Park
- Mercer Island
- Medina
- Newcastle
- Redmond
- Renton
- Sammamish
- Seattle
- Yarrow Point

Before the release of results from the first four scenarios in July and the nine scenarios in November, Legislators were invited to a briefing on the results. An e-mail notification of the findings was also distributed to the Legislators noted above and staff was available to provide briefings or answer questions.

Committee staff also made a formal presentation to the House Transportation Committee in Olympia on September 11, 2008 and on August 12, 2008 the Committee members presented the results of the initial scenario analysis to the Joint Transportation Committee.

Washington State Transportation Commission

Committee staff made presentations to the Washington State Transportation Commission. Staff presented the results of the initial scenarios to the Commission at its October 22, 2008 meeting. Results of public outreach, including the statistically-valid telephone survey and the web survey were presented on December 17, 2008.

Business and Civic Outreach

The Committee was charged with outreach to the business community as one of the key stakeholders. 520 connects some of the region's most vibrant and important job centers, including downtown Redmond, the Overlake area in Redmond that is home to Microsoft, the University of Washington and downtown Seattle. It also provides vital access to downtown Bellevue and to businesses in the city of Kirkland.

Committee members spoke before a number of business groups to inform them of the work of the Committee and to ask for their input. These included the board of the Bellevue Chamber of Commerce, the Transportation Committee of the Greater Seattle Chamber of Commerce, the Freight Mobility Roundtable, and the Mercer Island Chamber of Commerce. The Bellevue Chamber submitted a formal comment letter to the Committee that is included in Appendix I.

Staff for the Committee spoke to both the Redmond and Mercer Island Rotary Clubs about tolling on 520 and I-90. Committee members Paula Hammond and Dick Ford conferred with Mark Emmert, President of the University of Washington.

Website

The Committee used a website, www.build520.org, as one way to communicate with citizens. The website included up-to-date information about toll scenarios and analysis, as well as all Committee materials, and an online comment form, e-mail and mail addresses. The website received more than 16,000 unique visitors and more than 85,000 page views between June and December 2008.

Open Houses

Nine open houses were held throughout the corridor communities to present results of tolling scenarios and ask for public views, questions, and opinions. Six open houses were held in July and August and three in November. More than 700 people attended the open houses. The Committee received more than 400 comments from people attending the open houses.



As a result of meeting with local jurisdictions, the Committee received letters from:

- City of Bellevue
- City of Bothell (2)
- City of Clyde Hill
- City of Issaquah
- City of Kirkland
- Cities of Lake Forest Park, Kenmore, Woodinville and King County Councilmember Bob Ferguson (2)
- City of Lake Forest Park
- City of Medina
- City of Mercer Island (5)
- City of Newcastle
- City of Redmond (2)
- City of Renton (3)
- City of Seattle
- City of Shoreline
- King County Department of Transportation (2)
- Mercer Island School District (2)
- Mercer Island Mayor
- Seashore Transportation Forum
- South County Area Transportation Board
- Town of Hunts Point
- Town of Yarrow Point
- Town of Beaux Arts
- Washington State Treasurer

See Appendix I.



Comments from Local Jurisdictions

This chart highlights city and county comments regarding tolling 520 and/or I-90, as well as their concerns about potential diversion. It should be noted that nearly all cities had comments beyond diversion and mitigation issues, which provided meaningful comments and input. Among the common issues was opposition to “segment” tolls – tolls collected on the highways leading to the bridge – because of the potential for greater diversion to local streets and arterials. All letters are included in Appendix I.

Figure 4. Local jurisdictional comments

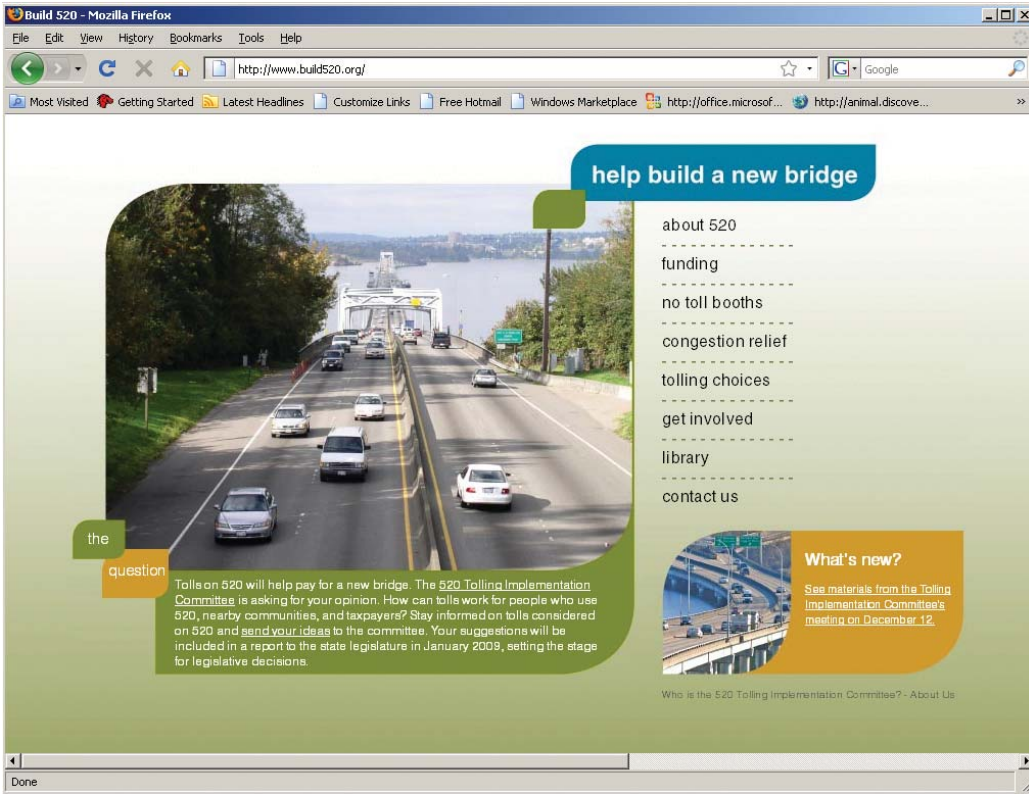
Jurisdiction/ Agency	Toll 520 in 2010	Toll I-90	Diversion	Mitigation ideas and other comments
Town of Beaux Arts Village (Town Council)				Toll 520 and I-90 at the same time; toll revenue should be used for capital improvements in the corridor, operations and maintenance and for early mitigation of impacts to local roadways; don't use toll revenues for transit
City of Bellevue (Mayor)	Support only if it allows early completion of project, and provides a lower toll for users	Prefer tolling only 520; if more funds needed, seek other state or federal sources; toll I-90 only when R-8A improvements are in place, and at a lower rate than 520	Minimize diversion to local roadways	
City of Bothell (Council and Mayor)			Concern about 522 and neighborhood streets	Improve transit service and capacity; improve park-and-ride facilities; add capacity to 522; use toll revenues for mitigation; concern about potential for hazardous materials to move through city streets; seek \$20 million commitment to assist with 522 corridor improvements; want 100th Ave and Juanita Drive added to traffic monitoring; want variable message signs and EIS for tolling
City of Clyde Hill; Town of Hunts Point; City of Medina; Town of Yarrow Point (Mayors)	Support	Support	Concern about diversion to local roadways	Toll revenue should be used for capital improvements in the corridor, operations and maintenance and for early mitigation of impacts to local roadways; don't use toll revenues for transit

Figure 4. Local jurisdictional comments

Jurisdiction/ Agency	Toll 520 in 2010	Toll I-90	Diversion	Mitigation ideas and other comments
City of Issaquah (Council)	Support	Maintain a free or low cost option on I-90; consider HOT lane; toll only after diversion to I-405 is mitigated	Concerns about I-405 diversion	Want transit improvements at I-90/18; efficient toll collection system and good public education are important
City of Kirkland (Council)	Support	Support		Reasonable uses of toll revenue include: construction and transit service on tolled route or parallel facilities; mitigation of diversion; operations and maintenance of tolled facilities; tolls should not replace current revenue sources; concern about needs of lower-income drivers
Mercer Island School District (Superintendent)		Oppose; or provide a free option		53 percent of employees commute eastbound; 47 percent commute westbound on I-90
City of Mercer Island (Council and Mayor)	Support tolls at a low rate to discourage diversion to I-90	Oppose tolls on travel to and from Mercer Island on I-90, the only access route to and from Mercer Island		Highlights city's rights according to I-90 Memorandum of Agreement; does not want traffic to or from Mercer Island to be tolled; desires mitigation if access is decreased; wants tolls to be used on facility where collected; analyze tolling I-405 and I-5; wants financial information on revenues collected if Mercer Island traffic is not tolled; says exempting Mercer Island traffic from tolls does not diminish capacity to fund 520
Mayors of Cities of Lake Forest Park; Kenmore; Woodinville and King County Councilmember Bob Ferguson			Concern about diversion to 522	Improve transit capacity and transit service; add park-and-rides; add capacity to 522, 202, and Woodinville-Duvall Road; use toll revenues to fund transit

Figure 4. Local jurisdictional comments

Jurisdiction/ Agency	Toll 520 in 2010	Toll I-90	Diversion	Mitigation ideas and other comments
City of Lake Forest Park (Mayor and Council)	Only with monitoring of real time changes to 522		Concern about diversion to 522	Add transit capacity; increase transit service; add park-and-ride capacity; add community circulator vans; implement a traffic monitoring and reporting program to measure real-time changes
City of Newcastle (Mayor and Councilmember)		Oppose		Cover 520 costs at least expense to users; concern about potential delays to I-405 and R-8A projects
City of Redmond (Council and Staff)	Yes	Best scenario to fully fund 520 and related improvements		Mitigation recommendation is reasonable; concerns about lower-income households and tolls; want freight impacts analyzed; use revenues for 520 and I-90 capital and maintenance expenses only
City of Renton (Mayor and Council)			Concern about diversion to city arterials	Complete I-405 improvements; support basic concepts of mitigation recommendations as applied to I-405 and parallel north-south corridors; consider transit improvements on all impacted corridors
City of Seattle (Council)	Support	Support		Toll revenues should be used for transit; consider reducing vehicle miles traveled; tolling should be systematic to reduce congestion throughout the region
City of Shoreline (Council)				Improve 523 (145th) in Shoreline to mitigate transit and traffic impacts; improve I-5 near 523; improve pedestrian connections at I-5 and 523; use toll revenue to fund transit service
King County DOT (Director)	Support	Support		Support using toll revenues for transit, including funds for operating UPA service; seek \$6 to \$8 million in mitigation funds for increased operational costs due to loss of Montlake flyer stop; mitigation account should be available to fund transit operations and capital costs



Left: Screenshot of the homepage for build520.org

Above: Open house attendees review tolling scenarios

Web Survey

After the release of the second round of tolling scenarios, the Committee also hosted an online survey November 10-30, 2008. The purpose was to provide a formal way for people to provide input, whether or not they could attend a meeting. The web survey also served as the primary comment tool for the second round of open houses. Through web banner ads in select media outlets and e-mail distribution lists, more than 7,800 individuals filled out some or all of the web survey. The web survey was also sent to more than 700 workplaces in King County with more than 100 employees. This tool should not be considered statistically-valid, as respondents are self-selected. Highlights are included in Figure 5.

Phone Survey

In November 2008, the Committee also conducted a random sample statistically-valid telephone survey of 1,200 people that included four groups of participants: people who use I-90, people who use 520, people who use both bridges and people who use neither bridge. The intent was to evaluate the validity of input the Committee was receiving, and to compare the web survey and statistically-valid phone survey.

The results of the web and phone surveys were similar in most cases. They show support for:

- Using tolls to help fund the new 520 bridge
- Electronic tolling
- Variable tolling

Both surveys show that people are supportive of tolling in 2010 if it reduces out-of-pocket costs and if it improves traffic. Highlights are included in Figure 5.



Committee Open Houses

- July 29, Bothell
- July 31, Renton
- Aug 5, Seattle
- Aug 6, Bellevue
- Aug 7, Kirkland
- Aug 13, Mercer Island
- Nov 12, Bellevue
- Nov 13, Seattle
- Nov 17, Mercer Island



Tolling Implementation Committee Meetings

- June 17, Seattle
- July 10, Seattle
- July 23, Bellevue
- Aug 12, Seattle
- Sept 11, Lake Forest Park
- Sept 30, Kirkland
- Nov 10, Redmond
- Dec 12, Mercer Island
- Jan 8, Seattle
- Jan 28, Seattle



Web and Phone Survey Highlights

The phone survey was a random sample, statistically-valid survey of 1,204 participants with a three percent margin of error. The survey was conducted during November 2008, and included four sub-groups of respondents: 520 users, I-90 users, users of both bridges and people who don't use either bridge.

The web survey was also conducted in November 2008. The 7,800 respondents were self-selected and results should not be considered statistically valid even though the findings are similar to the random sample phone survey.

Figure 5. *Web and phone survey highlights.*

Respondents support	Web survey	Phone Survey
Support tolling to help fund new 520 bridge.	Nearly 2:1 margin (59% to 30%)	More than 2:1 margin (64% to 30%) <ul style="list-style-type: none"> Highest support from non-bridge users at 67%. Lowest support from I-90 users at 60%.
Support for tolling 520 increases when respondents learn about electronic tolling and “no toll booths.”	69%	73% <ul style="list-style-type: none"> Highest support from 520 users at 78%. Lowest support from non-bridge users at 69%.
Respondents support variable tolling.	More than 2:1 margin (65% to 31%)	More than 2:1 margin (70% to 27%) <ul style="list-style-type: none"> Highest support from 520 users at 73%. Lowest support from I-90 users at 66%.
Respondents support tolling in 2010 if it results in lower tolls and financing costs.	Nearly 3:1 margin (60% to 23%)	Less than 2:1 margin (58% to 36%) <ul style="list-style-type: none"> Highest support from non-bridge users at 59%. Lowest support from users of both bridges at 55%.
Support goes down for tolling in 2010 if it makes 520 faster, but slows down I-90.	55%	51% <ul style="list-style-type: none"> Highest support from 520 users at 56%. Lowest support from I-90 users at 47%.
Support for tolling both bridges goes up (but not among I-90 users) if it makes speeds go up on both bridges.	61%	61% <ul style="list-style-type: none"> Highest support from 520 users at 75%. Lowest support from I-90 users at 47%.
Support for tolling both bridges goes up (but not among I-90 users) if toll rates are lower than just tolling 520.	61%	61% <ul style="list-style-type: none"> Highest support from 520 users at 73%. Lowest support from I-90 users at 47%.
Support for tolling both bridges goes up among I-90 users when they know improvements will be made to I-90.	64%	65% <ul style="list-style-type: none"> Highest support from 520 users at 75%. Lowest support from I-90 users at 53%.

Written Comments

In addition to the surveys, more than 8,000 written comments were received, including more than 1,000 comments from a Sierra Club postcard campaign and more than 3,300 signatures from “No Toll on I-90” petitions.

Comments from the “No Toll on I-90” petitions opposed a toll on I-90, advocated toll exemptions for residents and workers coming to and from Mercer Island, and opposed using funds from I-90 to support 520.

The Sierra Club effort supported variable tolling as a way to reduce traffic congestion, reduce climate change, and fund transportation choices.

In addition to comments from these organized sources, the most common themes in general public comments were:

• **Generally supports tolling**

Comments were in favor of the idea of tolling to fund the 520 bridge and improve the flow of traffic.

“I strongly support tolls being added to 520 between Seattle and Bellevue. I think this is a responsible solution to pay for the roadway by those who use it.”

• **Generally opposes tolling**

Some comments said tolling is a “tax” and others saw it as a “double tax.” Many said other funding should be used, and some said tolling was not affordable, either for themselves or for other drivers.

“No tolls, of any kind, not on any state highway... No tolls in Washington State!”

• **Decision-making process**

Many respondents were interested in or concerned about how tolling decisions are being made.

“Make a decision and move forward.”

• **Concerns about the tax burden on residents**

The majority of these respondents said that taxes in this region are already high, and felt that tolling would add to this burden.

“I don’t think a toll should be required considering the amount of gas tax we are already paying that supports roads.”

• **Opposes tolling both bridges**

Some opposed a toll on I-90 as a way to fund improvements to a different corridor, while others said it was important to have a non-tolled alternative route across Lake Washington, and still others felt it would hurt Mercer Island residents.

“People that use 520 should be responsible for paying for the new bridge.”

“Mercer Island residents don’t have a choice about rerouting and avoiding tolls, we live here and use the bridge for basic services.”

• **Supports increased transit service**

Comments often said that increased transit service would be a necessary complement to tolling on 520.

“I strongly support increased transit and bicycle facilities across the 520 bridge.”

• **Supports tolling both bridges**

Comments suggested that both the 520 and I-90 bridges be tolled, and many said tolling should begin on the two bridges at the same time and in 2010. Some were concerned about diversion effects or lower revenues if only the 520 bridge is tolled.

“We all paid for the I-90 bridge to be rebuilt, we all should pay for the 520 to be expanded. I am for both bridges to be tolled.”

Complete comment summaries and full text of all comments are available in Appendix I.

evaluating and comparing toll scenarios



The Legislature directed the Committee to study three basic scenarios:

- Toll 520 when the new bridge opens
- Toll the existing 520 bridge
- Toll both the 520 and I-90 bridges and fund improvements on both

Committee staff developed scenarios intended to demonstrate the effects of tolling 520 or tolling both 520 and I-90. For the summer 2008 outreach effort, four scenarios were developed and presented to the public. Based on outreach and public input, the Committee selected six additional scenarios for the fall 2008 outreach effort. Detailed results of each of these scenarios are included in Appendix C.

The basic scenarios were expanded to ten by the Committee to provide the public with examples of tolling effects. Analysis of the tenth scenario (HOT lanes on I-90) was completed after the other scenarios. A more detailed traffic model was used—one that addresses lane configuration, on and off ramps, and other bridge design elements. The model also allowed toll prices in the HOT lane to change with traffic conditions, rather than by time of day.

The Committee used a three-step approach to evaluating toll scenarios. These steps were:

- **Travel Demand Modeling**—Forecasts the number of vehicles and people, the routes they take and the modes (single occupant, carpool, transit) they use.
- **Revenue Analysis**—Projects gross revenue, deductions for toll collection and maintenance, and net revenue available for bridge funding.
- **Financial Capacity Analysis**—Assesses how much project funding can be supported by tolls, including bonds and pay-as-you-go construction spending. Financial capacity is the bottom line for how much funding is needed and available to pay for the bridge through tolls.

520-Only Toll Scenarios

1. **Toll 520 in 2016, when project is complete**—This is the traditional approach to tolling, one that was used on the Tacoma Narrows Bridge. However, unlike the Tacoma Narrows Bridge, variable tolling was used in this scenario.
2. **Toll 520 in 2010, when construction begins**—By tolling sooner rather than later, lower overall toll rates can yield the same level of funding with less borrowing. Traffic on the bridge will also flow better when variable tolls are in place.
5. **Toll 520 at a flat rate in 2016**—This approach is the most similar to the Tacoma Narrows Bridge. A flat rate toll that does not change by time of day would begin when the new bridge opens in 2016.
6. **Toll 520 in 2010 at a rate that attempts to maximize funding by tolling only 520**—This approach was intended to find a toll rate at which the funding gap for the project could be closed by tolling only 520. The toll rates studied are the highest of the ten scenarios.

7. **Toll 520 in 2010; increase rate in 2016**—Some have suggested that while tolling early makes sense from a financial perspective (enabling a significant reduction in financing costs), the corridor will still be under construction during these early years and drivers will not have the full benefit of the six-lane facility. Others have suggested that a lower toll initially would provide an opportunity to test congestion benefits associated with tolling and enable a tolling rate to be established later when the corridor is complete. This may provide a balance between improving corridor performance, raising revenue for the project and managing diversion impacts.

Two-Bridge (520 and I-90) Scenarios

3. **Toll both bridges (520 and I-90) in 2016**—Tolls I-90 and 520 bridges in 2016, when the 520 bridge opens.
4. **Toll 520 bridge in 2010 and I-90 in 2016**—Tolls 520 in 2010 when construction begins on the bridge, but tolls on I-90 would not begin until 2016 when the new capacity is in place on 520.
8. **Toll 520 at a higher rate than I-90 in 2016**—At the public meetings, residents in the I-90 corridor were concerned that the bulk of the tolling revenue from the two bridges would go toward improvements on 520. Also, it was noted that when both bridges are tolled equally, more traffic is attracted to the 520 corridor. Having a higher toll on 520 than on I-90 could balance, from a traffic management standpoint, the use of both bridges. This scenario would have drivers on 520, where the bulk of the improvements are planned, paying more toward the cost of replacing the bridge.
9. **Toll both bridges in 2010**—This scenario provided the Committee with information about traffic effects and the amount of early funding raised from lower toll rates.
10. **Full bridge toll on 520; HOT lanes on I-90**—In this scenario, 520 would be tolled starting in 2010. To provide a congestion relief benefit to those using I-90, a HOT (high-occupancy toll) lane system could be implemented on I-90. This scenario continues to provide a free travel alternative in the I-90 corridor and meets the intent of the multi-jurisdiction Memorandum of Agreement regarding the corridor. The Memorandum of Agreement is available in Appendix H.

variables examined in toll scenarios

Toll scenarios differed in their use of key variables that might or might not be part of a final tolling plan for 520 and/or I-90. Some important variables include:

- **Toll collection locations (single-point or segment)**—A tolling location could be at a single point, such as the eastern end of the 520 bridge. There could also be several tolling locations, so that drivers would pay a partial toll for using just a portion of the 520 corridor, such as for trips between I-5 and the Montlake interchange in Seattle. Some toll scenarios were modeled with single-point tolls and some with segment tolls.

Single-point toll on both existing and new 520 bridges

- Beginning in 2010 for Scenarios 2, 4, 6, 7, 9
- Beginning or continuing in 2016 for Scenarios 5, 7, 8, 9



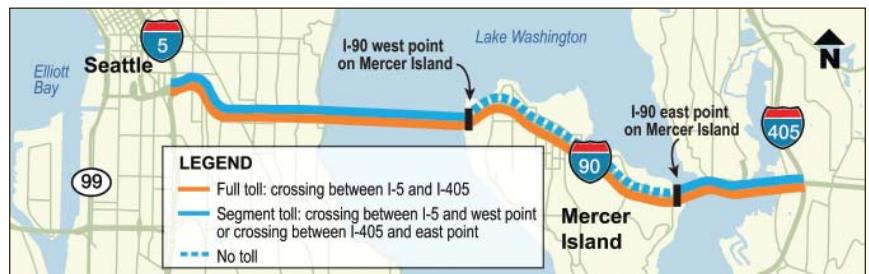
Segment tolls on new 520 bridge

- Beginning in 2016 for Scenarios 1, 2, 3, 4, 6



Segment tolls on I-90

- Beginning in 2016 for Scenarios 3, 4



Single-point toll on I-90

- Beginning in 2010 for Scenario 9
- Beginning in 2016 for Scenario 8



Figure 6. Options for toll collection locations.

- **Toll exemptions**—For the purposes of the scenario analysis, some scenarios assumed all vehicles would pay the toll. Others assumed that only transit vehicles would be exempt and still others exempted carpools with three or more people from toll payment. By looking at a variety of exemption types, the Committee could assess the revenue implications of exemptions.
- **Variable tolls or flat tolls**—All but two of the scenarios assume variable tolls, set by time of day, that are higher in the peak travel periods and lower at all other times. Variable toll rates would not change automatically according to traffic conditions. One scenario examined a flat rate toll that stays the same twenty-four hours a day, and another (the HOT lane scenario) examined a toll on I-90 that increases or decreases according to actual traffic conditions.
- **Toll rate ranges**—For the purposes of this analysis, the Committee presented tolls in the following time frames:

Time of Day	Range of Tolls Evaluated (2007\$)
Morning Commute (5 am - 9 am)	\$2.15 - \$4.25
Mid-day (9 am - 3 pm)	\$1.05 - \$2.75
Afternoon Commute (3 pm - 7 pm)	\$2.80 - \$5.35
Evening (7 pm - 10 pm)	\$1.00 - \$2.55
Overnight* (10 pm - 5 am)	\$0.00 - \$0.95
Weekend	\$0.80 - \$1.60

*Tolls would be in effect 24 hours a day after bridge completion in 2016.

Figure 7.
Chart shows the range of one-way toll rates that were assumed across nine of the ten scenarios (I-90 HOT lanes since they would be dynamically priced, are not included). Actual toll rates would vary within these time periods.

Toll rates for 520-only scenarios are shown in Figure 8 on the opposite page. Toll rates for two-bridge (520 and I-90) toll scenarios are in Figure 9 on page 24. For the purposes of the analysis and report, all toll rates are reported in 2007 dollars. The tolls are then assumed to increase yearly at the assumed rate of inflation of 2.5 percent. The 2010 scenarios do not include an overnight toll.

The average toll paid under each of the ten scenarios is for a one-way trip. The average round trip toll would be double that amount. This rate is useful for comparison purposes among the scenarios. The actual rates paid would depend on the time of day that a person made the trip across the bridge.

For the purpose of this analysis, trucks are broken into three categories, including light, medium and heavy. Light trucks pay the same toll as a passenger vehicle while medium trucks pay twice that rate and heavy trucks pay three times the passenger rate.

For Scenario 10, the HOT lanes on I-90 were priced between 10 cents and 70 cents per mile, depending on the time of day and the direction of travel. These rates for the HOT lanes were then combined with Scenario 6 (Toll 520 in 2010 at a rate that attempts to maximize funding by tolling only 520).

Figure 8. 520-only toll scenario rates, one-way, expressed in 2007 dollars.

Chart shows minimum toll, maximum toll and average toll paid in each 520-only toll scenario.

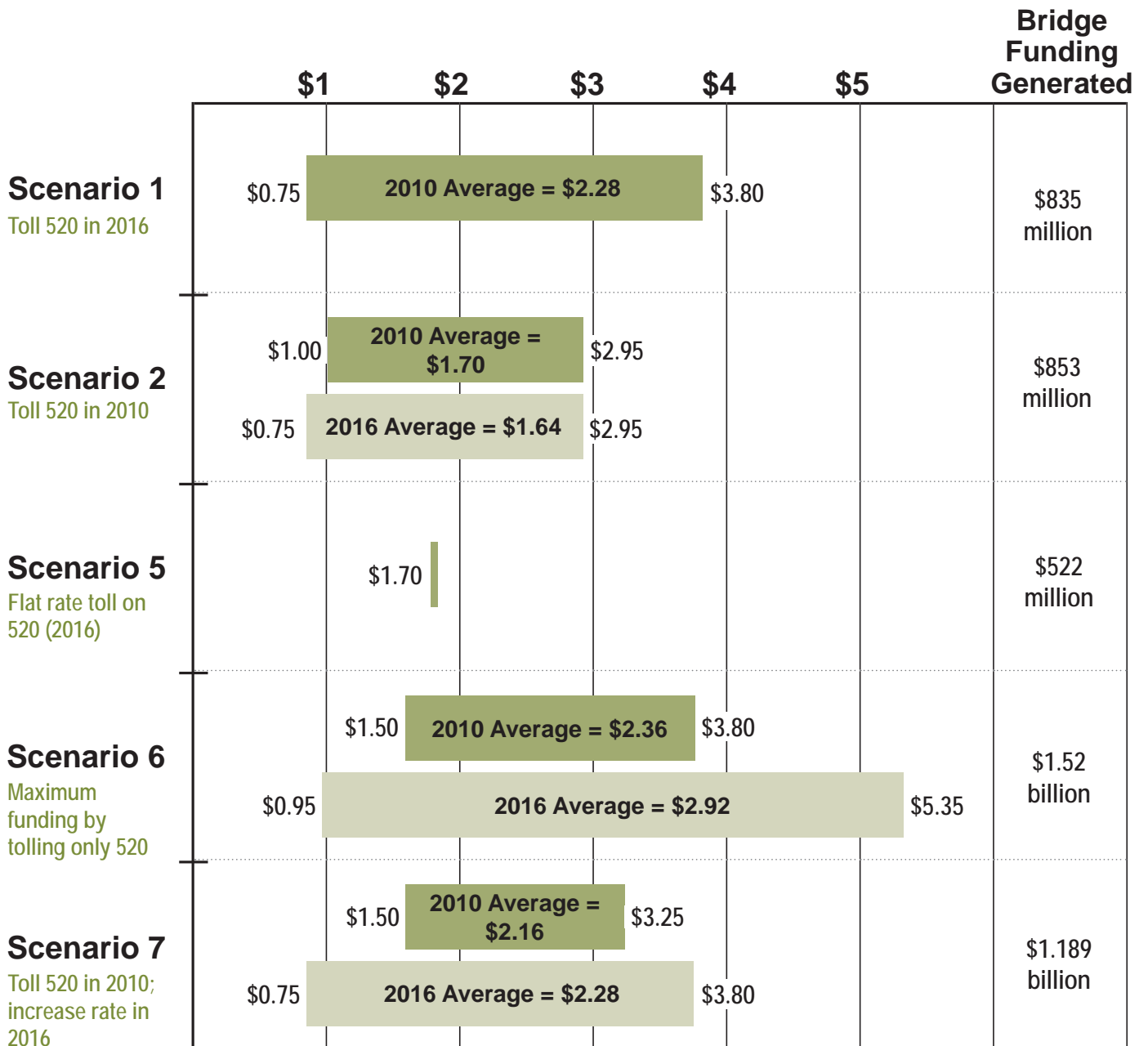
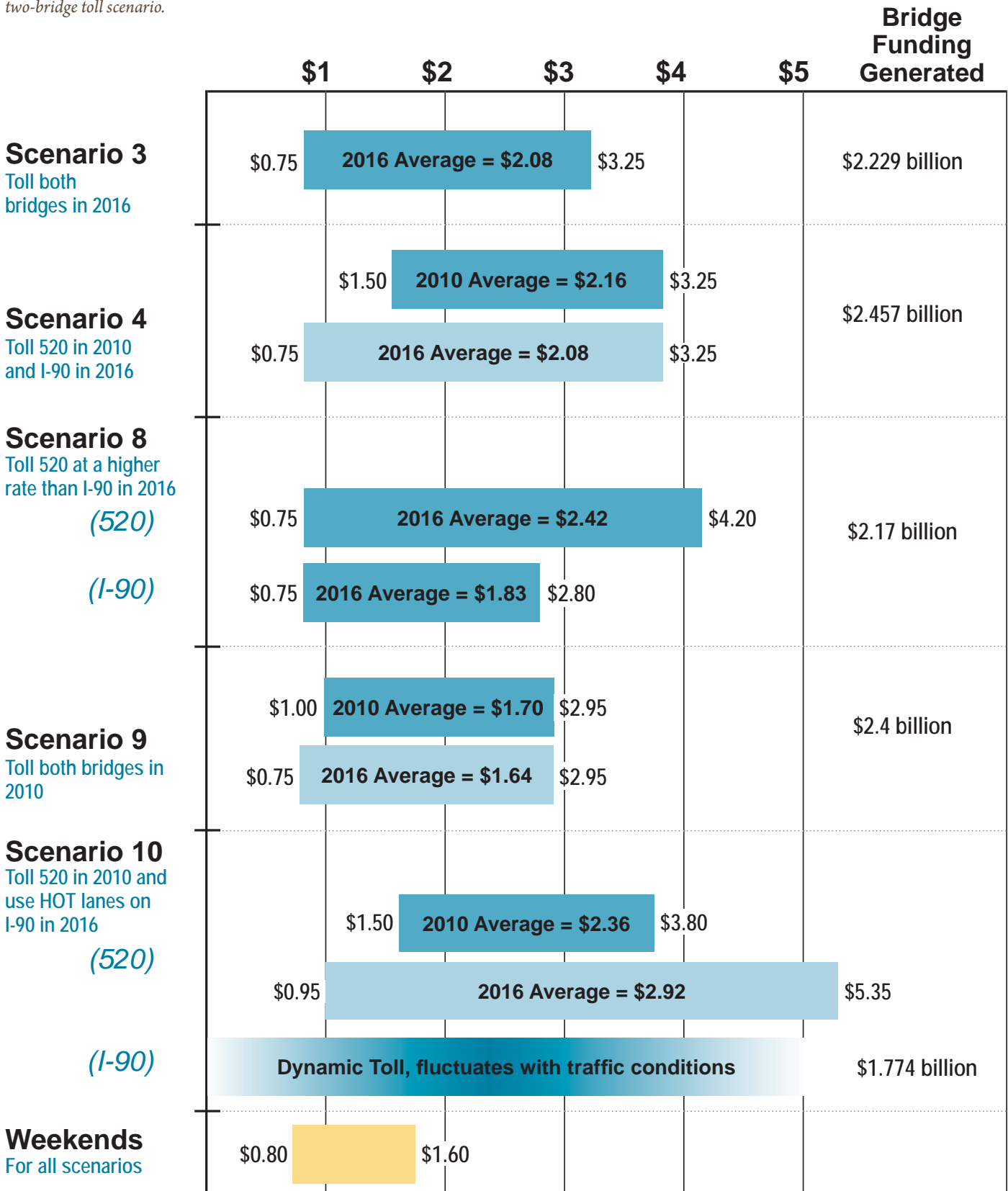


Figure 9. Two-bridge (520 and I-90) toll scenario rates, one-way, expressed in 2007 dollars.

Chart shows minimum toll, maximum toll and average toll paid in each two-bridge toll scenario.



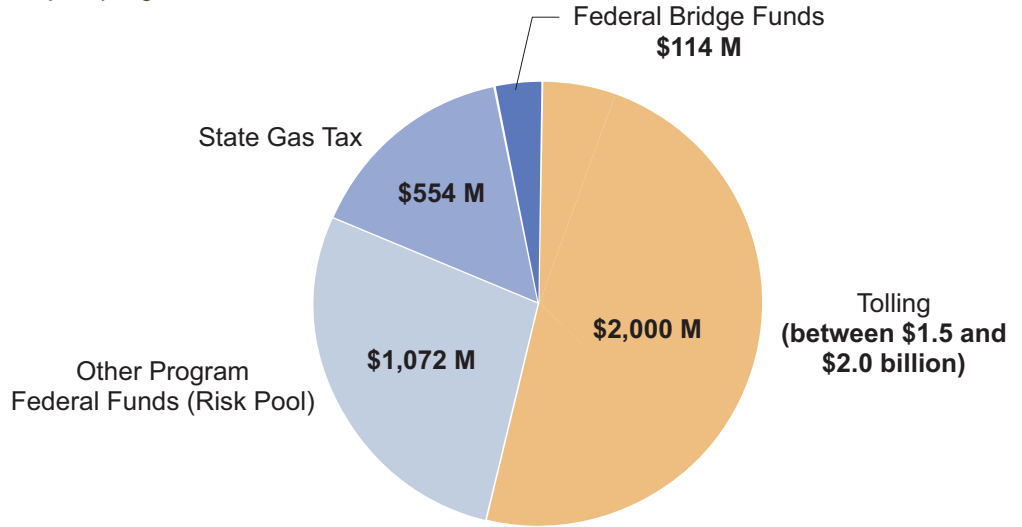
comparing scenarios

The Legislature's Funding Target

Section 3 of ESHB 3096, calls for "recognition of revenue sources that include...one billion five hundred million dollars to two billion dollars in toll revenue..."

This funding target was based on the project budget as it stood in April 2008. The pie chart in Figure 10 shows the funding sources identified by the Legislature.

Figure 10. Anticipated funding sources identified by Legislature in ESHB 3096

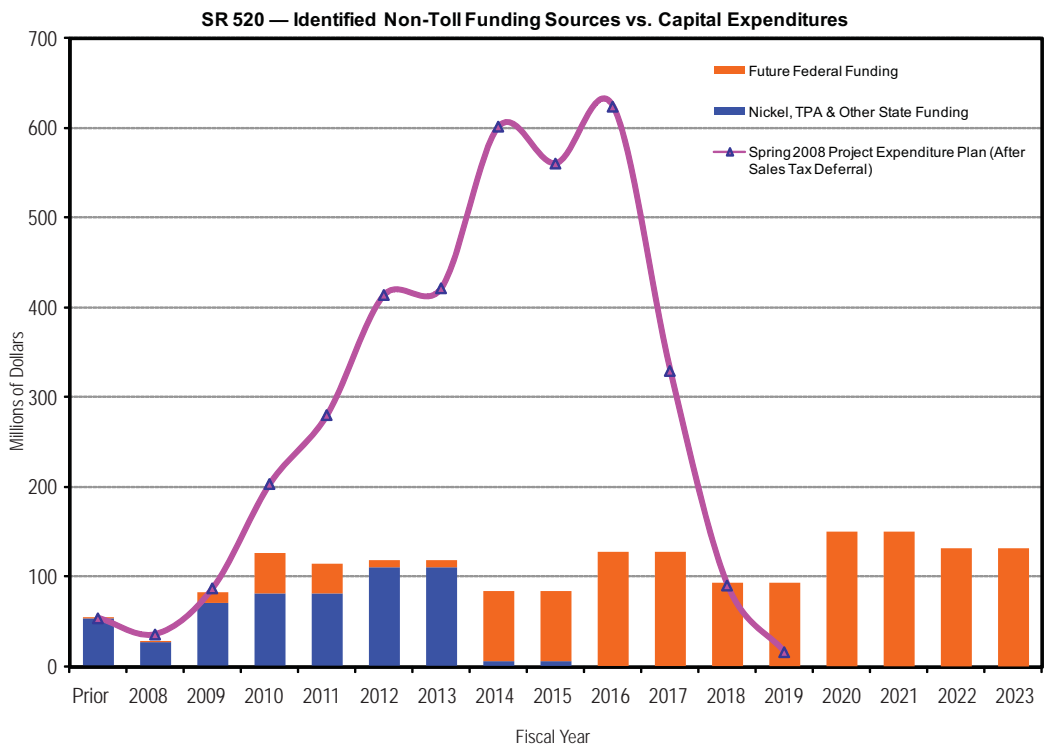


Project estimate as of April 2008 was \$3.7 billion – \$3.9 billion (Low end of range reflects \$180 million in sales tax deferral)

Cash Flow Required

The funding target established by the Legislature did not account for the fact that some of the funds allocated to the project would not be available until after project completion. This will require bonds to be issued in anticipation of that future revenue and will raise the project finance costs. Figure 11 shows the cash flow needs for the project against the current identified state and federal funding sources, as of April 2008.

Figure 11. Project cash flow needs and identified funding sources



Financial Capacity Results

Figure 12 below illustrates how scenarios relate to the 2008 Legislative funding target.

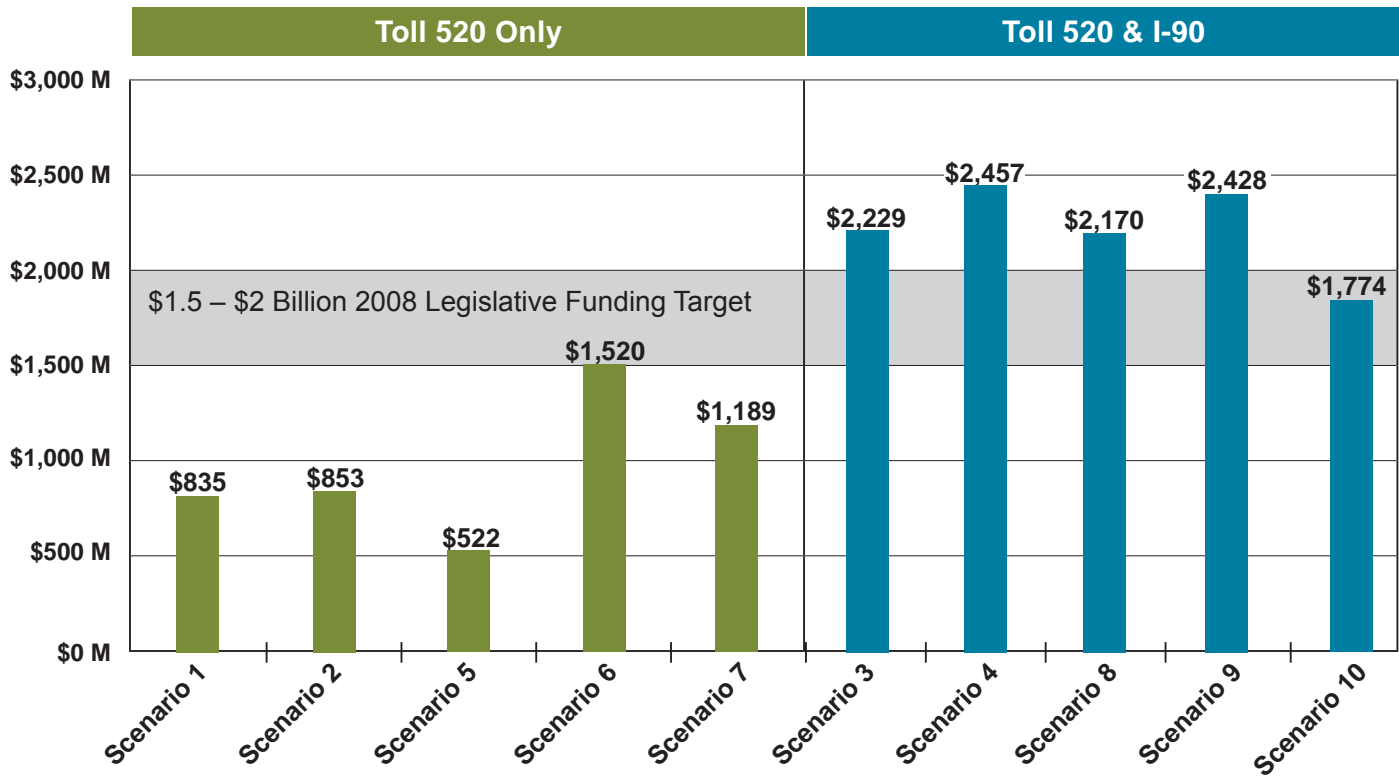


Figure 12.
Financial capacity of ten toll scenarios.

Given the cost of the project, the cash flow needs for construction as of April 2008, and the timing and availability of funds, more than \$2.0 billion from tolls would be needed to fully fund the project if no additional revenue sources are found. It should be noted, however, that the final project budget and the exact cash flow needs have yet to be determined.

For these estimates, interest rates were assumed to be 6.0 percent for current interest bonds and 6.5 percent for capital appreciation bonds to reflect changing market conditions. Peak years for cash flow will be 2014 through 2016, and for purposes of the Committee’s work, the project cost was assumed to be \$3.7 to \$3.9 billion. Detailed information about the finance assumptions is included in Appendix C.

the “reasonableness” of the toll

Flat Rate Toll vs. Variable Toll

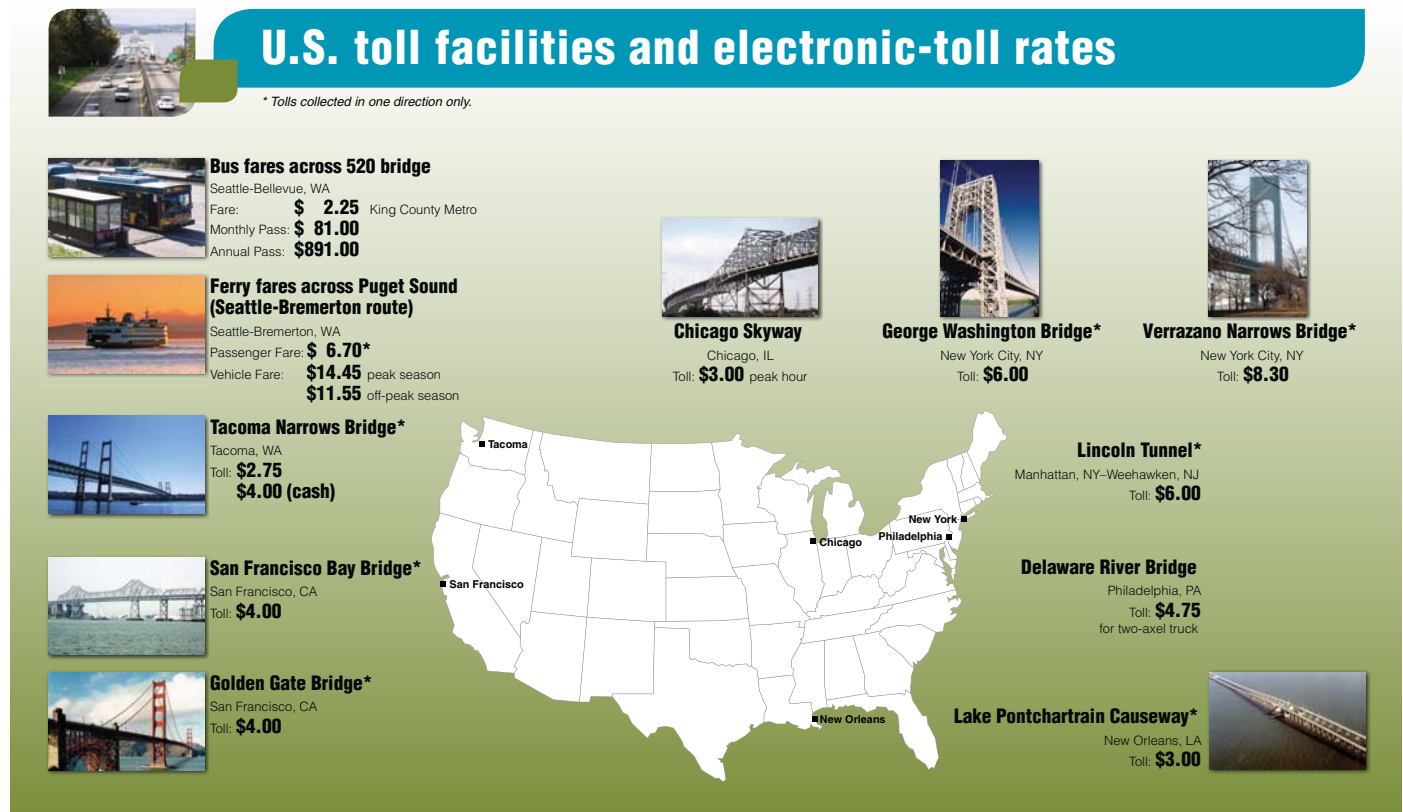
Results from the analysis suggest that the bridge performs better with variable tolls than with flat rate tolls and that variable tolls provide greater financial capacity. A flat rate toll is relatively low during rush hour compared to a variable toll, encouraging more people to use the bridge at peak times, and limiting speeds. During the mid-day or at night when there is little or no congestion on other facilities, such as I-90, more people will divert to those routes to avoid paying the flat rate toll, which is higher than the variable toll would be at the same time of day.

Average Toll Paid

The average toll paid is also useful for a comparison of toll rates against other facilities. Figure 13 shows the tolls charged on a number of other tolled facilities across the nation. In our region, the best example is the Tacoma Narrows Bridge that opened in July 2007. The current toll on the Tacoma Narrows is \$4.00 if using a toll booth and \$2.75 with a *Good to Go!* transponder. That toll is only collected in one direction. The graphic also compares toll rates to bus fares and ferry fares.

Figure 13.

Toll rate and transit fares shown are one-way.



how bridge tolling affects diversion

Diversion can be defined in four ways: take another route, shift to transit, change destination or travel at a different time of day. Diversion rates are sensitive to several factors. The major factor is toll rate, followed by availability of alternate routes. If no good alternate route is available, many people will continue to take trips on the corridor rather than divert. This seems to have been the case with the Tacoma Narrows Bridge, where the traffic levels have been higher than projected. If there is a nearby alternate route (for example I-90), diversion may be more significant.

The situation changes if two bridges are tolled. Bridge users would face the choice of diverting to the north or south ends of Lake Washington should they want a non-tolled route. Traffic levels, and thus diversion rates, may change as a result of economic conditions. Mitigation measures for toll-related diversion are discussed on page 36 and in Appendix G.

Diversion to Specific Routes

In all scenarios, most traffic will stay on 520. Those who change routes can choose between 522, I-90 or I-405.

In general, analysis found that most people continue to use the tolled bridge, either by paying the toll, carpooling, taking transit or changing the time of their trip. Some people do change their route, but the overall effect of those route changes tends to be distributed across the transportation system.

The diversion data in Appendix C are presented for 520-only and two-bridge scenarios and for 2010 and 2016. Data is also broken down by peak and off-peak periods and for vehicle volumes and person trips. This data is generated by the regional travel demand model.

For the 520-only scenarios:

- Transit ridership increases 15 to 30 percent, provided service is in place in 2010. This represents about three percent of all 520 users.
- Peak period traffic on 520 decreases, because some people choose other routes. The higher the toll rate, the higher the diversion rate.
- Peak period traffic on I-90 increases less than 5 percent, except in the highest toll 520-only scenario where it increases 8 percent.

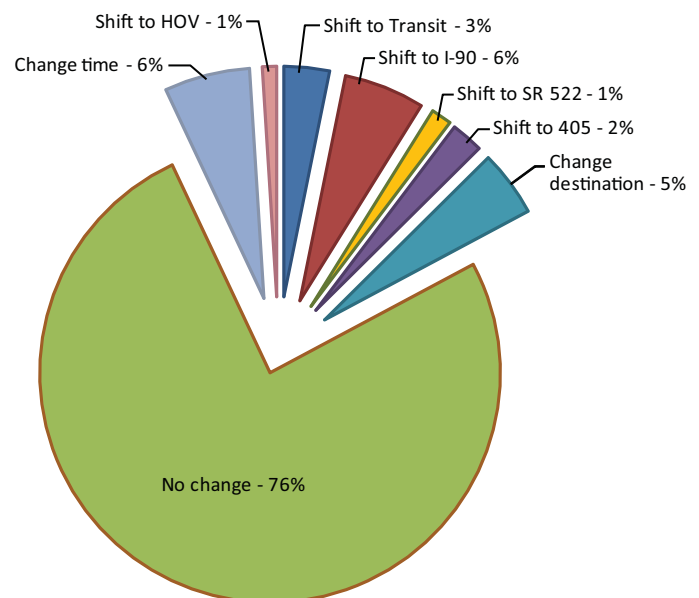
- Peak period traffic on 522 (at 61st Avenue in Kenmore) increases by no more than 5 percent.
- Peak period traffic on I-405 (at 167 in Renton) increases by no more than 3 percent.
- Between 3 and 11 percent choose to travel at a different time of day in 2010.

For the two-bridge (520 and I-90) scenarios:

- There is a decrease in volumes on both 520 and I-90 as some people choose other routes, modes, or destinations.
- Peak period traffic on 522 (at 61st Avenue in Kenmore) increases by no more than 5 percent.
- Peak period diversion to I-405 (at 167 in Renton) is greater in two-bridge scenarios, with volume increases reaching 8 percent.

Figure 14. Diversion from 520.

The pie chart below illustrates diversion findings from one scenario and is not meant to represent all findings. It is from Scenario 6 and shows the travel decisions people make during peak periods in 2010. Text in the left-hand column describes general changes in vehicle traffic.



Diversion effects on arterials

Local roadways leading to tolled bridges have less traffic when tolls are in place, while access routes leading to alternate routes would see an increase in volumes. The regional travel demand model does a good job of showing how regional traffic is projected to shift routes or modes when tolls are placed on one of these major routes. Data has been generated for major roadways; however, additional traffic modeling is needed to see specific arterial effects. (See 520 Tolling Screenline and Location Traffic Estimates in Appendix B.)

Diversion in 520-only vs. two-bridge scenarios

When only 520 is tolled, the greatest route diversion effects are seen on I-90. When both bridges are tolled more traffic moves to the north and south ends of Lake Washington. I-405 south of I-90 is affected more than 522, because much of the diversion to 522 comes from tolling 520. I-405 only becomes a viable option for many people if I-90 is tolled.

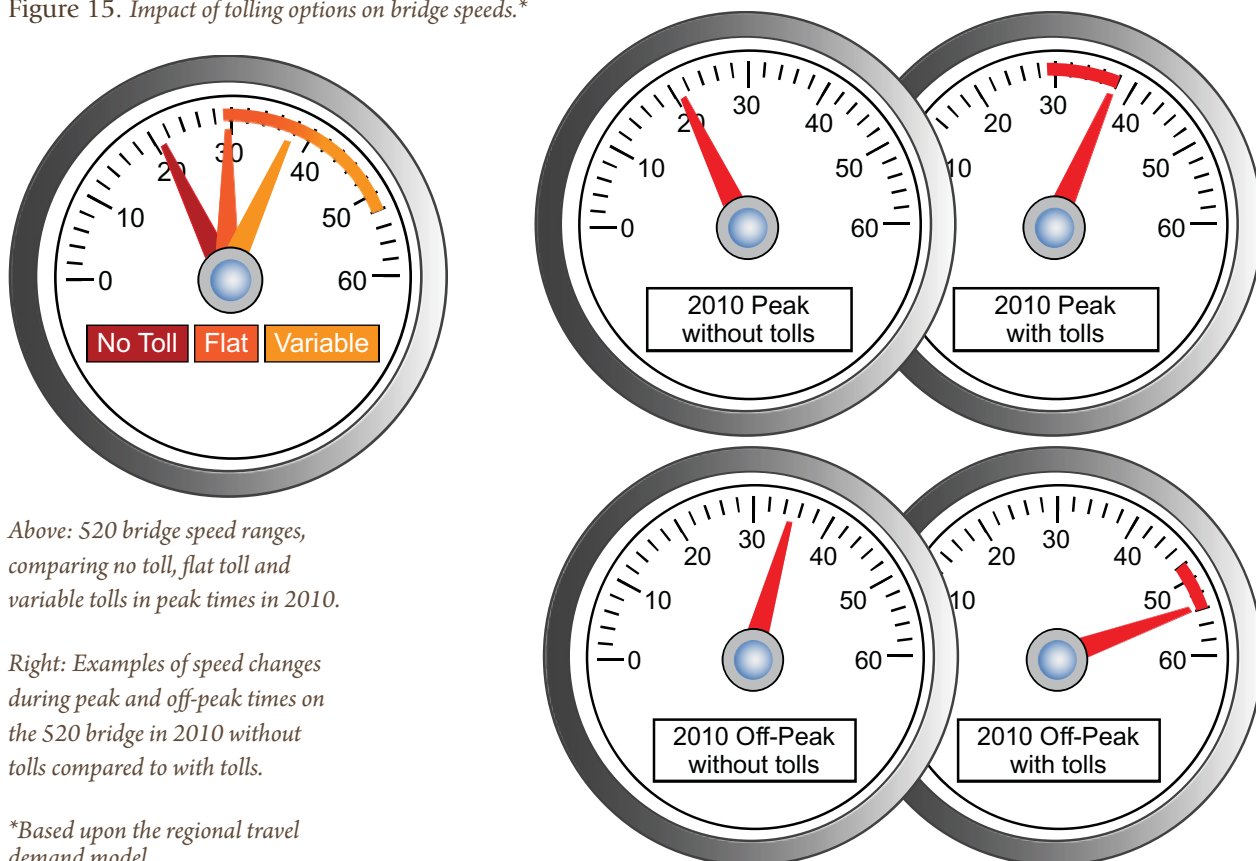
bridge performance

One of the key evaluation criteria is how tolls affect bridge performance and traffic flow. Toll should provide improved speeds.

Impacts on Bridge Speeds

When tolls are in place traffic volumes go down and speeds improve.* On 520, speeds increase as much as 40 percent (under the highest toll rate scenario). Speeds increase on average from 10 to 30 miles per hour in the corridor between I-5 and I-405. When both 520 and I-90 are tolled, speeds improve on both bridges in peak and off-peak times.

Figure 15. Impact of tolling options on bridge speeds.*



incentives for transit and carpooling

Incentives for transit and carpooling provide an alternative to paying the toll. The 2006 Commute Trip Reduction (CTR) Efficiency Act focused on urban growth areas and congested corridors. There are more than 570 employers participating in CTR program, with more than 337,000 employees.

The program focuses on the Seattle and Bellevue central business districts, as well as the Overlake and Totem Lake areas, making the CTR program central to reducing traffic congestion on 520 and other area highways. The CTR Board estimates that CTR programs save an average of five minutes for a typical commuter from Seattle to Bellevue.

The Urban Partnership Agreement also includes transportation demand management, including shifting trips to transit or carpool travel. Currently, King County Metro and Sound Transit buses carry more than 15,000 riders each day on 520, and the Urban Partnership Agreement would fund purchase of 45 new buses carrying 5,000 additional riders each day. Funding to operate the buses has not been identified.

Almost all major employers in King County use CTR programs, and their programs include:

- University of Washington UPASS
- FlexPass and PugetPass
- Vanpool and Carpool Subsidies
- Emergency Ride Home
- Parking Management
- R-TRIP In Redmond

Transit Need and Availability

Transit ridership is expected to grow 30 percent or more on 520 if the Urban Partnership Agreement service is added. In addition, the recently approved Sound Transit 2 includes 100,000 systemwide hours of additional bus service that could improve transit in this corridor. Bus rapid transit could also be used on 520 in the future to meet transit demand.



Figure 16.
Urban Partnership Agreement service levels and costs.

	Metro	Sound Transit
Buses (\$41 million)	30	15
Annual Service Hours	28,000	10,000
Annual Operating Cost	\$3,500,000	\$1,250,000

(Purchase of buses included in Urban Partnership Agreement; service costs unfunded. Source: Sound Transit and King County Metro.)

Telecommuting

One of the key components of the Urban Partnership Agreement is promoting telecommuting and flextime as options for some employees. By encouraging employees to work from home at least part-time and/or adjusting their work schedules to take advantage of lower toll rates, businesses will contribute to the goal of decreasing traffic in this busy corridor.

Providing Choices

WSDOT plans major outreach efforts to occur in the months leading up to the start of tolling across Lake Washington. All publications and presentations related to tolling will include information on the choices available to drivers, including transit, carpooling, telecommuting, and flextime. A small change in the number of drivers who choose an alternative to driving alone will have a significant effect on traffic flow. By offering a range of choices, drivers can determine what changes work for them.

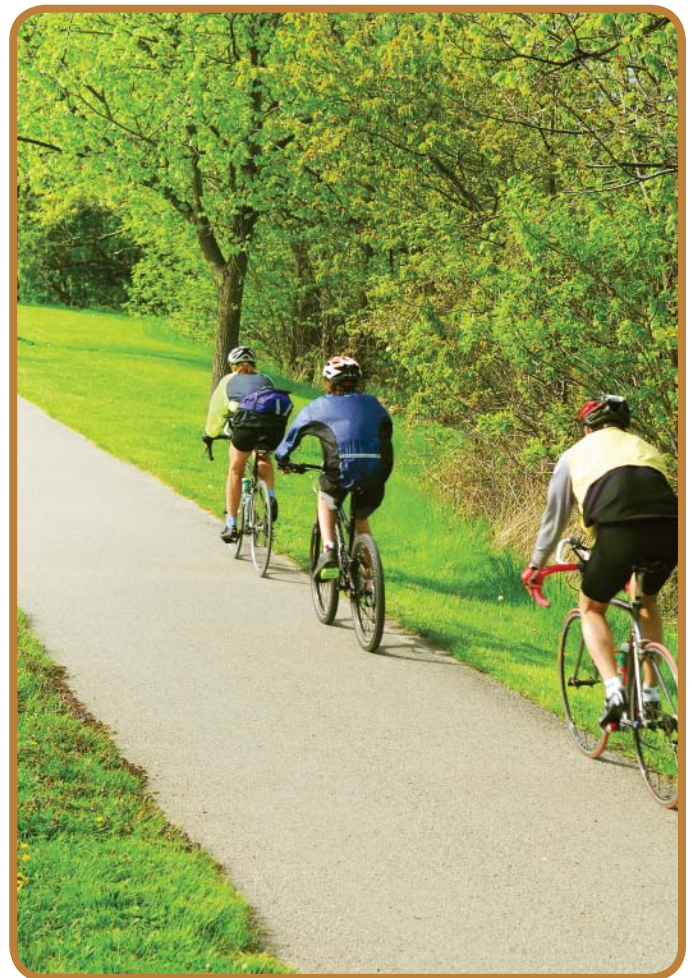
Public Comment on Transit

When asked what they would do if a toll were charged on 520, nine percent of participants in the statistically-valid phone survey said they would take transit. Of web survey respondents, 17 percent said they would take transit if a toll were charged. This compares with 76 percent of phone survey respondents and 78 percent of web survey respondents saying it is important to have transit available as an alternative to paying tolls.

In the written comments received in fall 2008, 13 percent of respondents expressed support for increased transit service. In the written comments received in summer 2008, 21 percent of respondents expressed support

for increased transit service in these corridors. These respondents often said that increased transit service would be a necessary complement to tolling on 520. Others expressed general support for transit service, including both bus and rail service on 520, I-90, and throughout the region.

Most comments that referenced transit mentioned alternatives to paying a toll. Transit improvements were often mentioned as way to reduce effects on lower-income travelers. Some respondents advocated using toll revenue to fund transit improvements, while others were opposed to funding transit with toll revenue. Use of toll revenue for transit service is a legislative policy decision.



potential effects on lower-income bridge users

Committee Outreach Activities

As part of its outreach, the Committee publicized its open houses and website information in minority newspapers, social service newsletters, transit, and at community events. It coordinated with the 520 program on surveys and focus groups, and met with social service agencies to better understand how tolling may affect lower-income commuters.

Current services that meet the needs of lower-income customers:

- Customers can establish *Good To Go!* accounts with cash. There is no need for a credit or debit card.
- Lower-income users can establish and replenish a *Good To Go!* account using their EBT (Quest) card issued by DSHS.
- Full-service *Good To Go!* customer service centers are available for cash customers.
- Mobile *Good To Go!* center is available to set up at events, businesses, and high-traffic areas.

Findings and Input

- A higher proportion of lower-income families' budgets will go toward tolls.
- Putting \$30 in a pre-paid *Good to Go!* account may be difficult for lower-income families. They may not have credit or debit cards to automatically replenish online accounts.
- Most trips across the bridge are for people accessing social services, work or medical appointments.
- Buses don't always work for those with children in day care who must be dropped off before continuing on to work.

Additional options to consider:

- Implement more bus service in the corridor to better meet demand. Forty-five new buses are planned for the corridor under the Urban Partnership Agreement, but funding to operate the buses has not yet been identified.
- Investigate partnering with retail outlets to make purchase and replenishment of cash and *Good to Go!* accounts more widely accessible.
- Translate tolling materials into several languages.

- Educate service providers who can explain the system to those who do not read.
- Explore a transportation allowance for those who use the bridge that will provide additional toll allowances on EBT cards, consistent with existing eligibility requirements.
- Analyze the relationship between toll rates and transit fares.

Puget Sound Data

- In the 2005 census, 10 percent of King County households were below the national poverty line of \$19,971 for a family of four.
- The median household income in King County was \$58,351.
- Transit serves many lower-income residents. According to a 2006 King County Metro Rider / Non-Rider Survey, 25 percent of the riders who participated in the survey had household incomes below \$35,000, compared to only 12 percent of non-riders.

National Research

National research on the effects of tolls on lower-income populations is limited, with most studies focused on HOT (high-occupancy toll) lanes. Definitions of lower-income vary across studies, making clear conclusions difficult. In general, national research indicates:

- The cost of purchasing a transponder and the possible need for a credit card to set up an electronic account can limit accessibility for lower-income people.
- Lower-income drivers are more likely to pay for a toll if it results in time savings or reliability.
- Lower-income populations are more likely to use transit and more likely to carpool.



A recent UCLA study suggested that a toll would adversely affect lower-income users of a highway but would be more equitable than a sales tax that affected all lower-income people regardless of whether or not they drive.

opportunities to partner with businesses

The Committee did not find business interest in providing direct funding assistance for the 520 project. Opportunities do exist to partner with businesses and educate their employees about tolling through the various Commute Trip Reduction (CTR) programs.

Specifically, the Puget Sound Regional Council is working to create CTR zones in employment centers. The current program targets employers with over 100 employees in one location who commute during peak times. Changing the focus to employment centers will expand CTR services and funding to smaller businesses.

Businesses will play a primary role in future outreach activities focused on educating drivers about electronic tolling and how the *Good To Go!* system will work in the 520 corridor. Marketing activities will include presentations to employees, e-newsletters, breakroom posters, news articles, employee and client handouts, and on-site *Good To Go!* account sign-ups. The business community has responded positively to this role on the Tacoma Narrows Bridge project and is expected to be an important partner in sharing information and encouraging employees to participate in the electronic tolling program. In return, businesses recognize the benefits of improved traffic conditions, potential added transit service, and variable toll rates for their employees and clients.



advanced tolling technology

Toll Collection Technology

When the Tacoma Narrows Bridge opened in 2007, Washington State launched an electronic tolling system called *Good to Go!*. More than 70 percent of traffic using the new bridge travels non-stop at highway speeds without stopping at toll booths. During peak times, the number is 85 percent. Solo drivers on 167 in Southeast King County can now use this same electronic tolling system to pay for a quicker trip on the HOT lanes.

The 520 corridor will use 100 percent electronic tolling – no toll booths at all. This means all traffic on 520 can cross without stopping to pay.



Simulation of toll collection on existing 520 east high-rise

With *Good to Go!* electronic tolls are collected with a transponder, about the size of a credit card. Drivers affix the transponder on the inside of their cars' windshields. When driving on a tolled facility, an overhead antenna links the transponder to account information, and deducts the correct toll from a prepaid account. Automatic replenishment allows drivers to easily manage accounts by authorizing payments from a credit card or bank account.

To use this no toll booth technology, regular users should have pre-paid transponder accounts. However, some people will not have transponders or may be visiting from



out of town. Their vehicles will have their license plate photographed and can prepay (online or by phone) or be invoiced for the toll, which will include an additional administrative fee for processing. Transponder technology and license-plate recognizing cameras are used today as part of the *Good to Go!* program on the new Tacoma Narrows Bridge and at tolling facilities around the world.

All electronic tolling for 520 is important for a number of reasons:

- **High Volume:** The current daily crossings on 520 are approximately 115,000 vehicles per day and 150,000 on I-90. The Tacoma Narrows Bridge averages about 40,000 toll transactions per day.
- **Traffic Flow:** If vehicles on 520 are required to stop and pay tolls, the resulting congestion would negate the benefit of improving the facility.
- **Variable Tolling:** Electronic toll technology supports the use of variable tolling, which provides lower toll rates during non-peak hours and helps keep traffic moving.

Advances in Tolling Technology

As technology continues to develop, additional technologies will become available and could make toll collection easier and more cost efficient. Technologies that may be available for toll collection in the future include:

- Transponders that include a button or switch indicating if the vehicle is currently a high-occupancy vehicle (HOV).
- Global positioning system (GPS)-based tolling technology.
- Stored-value card for transit, ferries and tolled facilities.
- Rental car companies outfitting rental cars with transponders or using license plate images to pay tolls for their rental fleets.

active traffic management

Active traffic management is the use of high-tech traffic tools to make roadways safer and less congested. These tools provide more accurate real-time information about what is on the road ahead and help improve traffic flow.

If given approval to implement tolling on 520, WSDOT will expand current use of these technologies and focus on low-cost projects that have high benefits for drivers.

Today's Tools and Technologies Include:

- **Real-time information for drivers**, such as electronic driver information signs, traffic cameras, traffic centers and online traffic maps. The Puget Sound region already has more than 475 traffic cameras, 169 electronic driver information signs, and seven traffic management hubs.
- **Ramp meters**, or stop-and-go traffic signals, that automatically space vehicles entering the flow of traffic on the highway. Today, 135 ramp meters help keep traffic moving on some of Washington's busiest routes.
- **Incident response teams** that clear roads and help drivers. WSDOT used more than 55 trucks and responded to more than 52,000 incidents in 2007.
- **Using HOV lanes more efficiently**, with projects including a four-year high-occupancy toll (HOT) lane pilot project on 167 between Auburn and Renton that converted a HOV lane to a HOT lane.

Smarter Roadways Tomorrow

Building upon the successes already seen, new techniques are available and can be used in the Puget Sound region, including:

- Installing overhead signs, which convey variable speed limits; lane closures and warning signs, to alert drivers to slow down or change lanes because of collisions and backups.
- Where possible, building additional emergency pull off areas for vehicle breakdowns or collisions.



Future variable speed limit and driver information signs will improve traffic flow and safety on northbound I-5 between Boeing Access Road and I-90. Similar signs will also be used in the 520 corridor.

mitigation recommendations for diversion related to tolling

The Committee was tasked by the Legislature with evaluating potential tolling diversion from 520 to other roadways and recommending mitigation to address diversion. All the tolling scenarios had similar effects on traffic diversion, although specific amounts and locations varied based on toll rates and facilities tolled.

What Happens on Local Roads?

Generally, in the 520-only toll scenarios, traffic drops on direct access routes to 520 (such as Montlake Boulevard and Lake Washington Boulevard) and increases somewhat on direct access routes to I-90 (such as Rainier Avenue and Bellevue Way). In two-bridge scenarios, traffic on all direct access routes drops somewhat. Local access routes to 522 have increases in traffic in all toll scenarios. Complete diversion data can be found in Appendix C.

A Proposed Two-Part Approach to Mitigation

The Committee is recommending an approach that attempts to keep traffic on the tolled 520, and takes actions to mitigate the effects of diversion off of 520. Additional detail on this approach is in Appendix G.

Part 1: Approaches to keep traffic on the tolled 520

- Use variable tolls to improve performance during peak periods and encourage traffic to stay on the bridge in the off-peak when tolls are lower.
- In addition to meeting debt requirements, manage toll levels to keep traffic on the bridge; higher tolls will divert more traffic off 520.
- Segment tolls are opposed by jurisdictions throughout the region. Segment tolls may cause traffic to divert to local arterials to avoid a toll; however, segment tolls also lower traffic on bridge approaches and improve traffic flow.
- Identify funding to operate Urban Partnership Agreement transit service, and continue working with employers to reduce solo commutes in these corridors.
- Replace the 520 bridge. An expanded bridge will improve traffic flow and bring traffic that currently diverts because of congestion back to the 520 corridor.

Part 2: Mitigation recommendations

Based on discussions with jurisdictions, the Committee identified five areas of concern related to traffic diversion:

- 522, Bellevue/Points communities arterials, I-90, I-405 South, Seattle/University of Washington.

Committee mitigation recommendations related to tolling include:

- System-wide instrumentation and traffic monitoring
 - Additional coverage would be needed on 522.
 - Local access roads may need to be added such as Ballinger Way, NE 145th Street, and Juanita Drive.
- 522 mitigation
 - Traffic reporting with electronic driver information signs at decision points on I-5, I-405, and along 522.
 - Traffic signal reliability and coordination.
- A toll mitigation account to respond to traffic diversion effects would be set up to fund the noted mitigation strategies and to fund other mitigation as necessary. A joint state/local process would be developed to decide which projects should be implemented to mitigate the actual effects of diverted traffic once tolling begins. Funds from the account would be focused on the six-year period following tolling authorization.
- Advanced traffic management technology on 520, I-90, I-405 and I-5.
- A coordinated transit implementation plan developed by WSDOT, King County and Sound Transit.
- Transit service expansion via the Urban Partnership Agreement in the 520 corridor and possible other improvements to transit service in response to anticipated or actual traffic diversion.
- Transit-related improvements such as new or expanded park-and-rides should be added, including in the I-90 corridor, if it is tolled.
- In a two-bridge scenario, expansion work on I-405 and I-405 alternate routes should proceed as quickly as possible.
- Local jurisdictions support new transit service in the corridor. The Urban Partnership Agreement would fund the purchase of 45 new buses, but operational funds are needed.
- Funding to operate transit needs to be identified and secured. Using toll revenues to pay for that service is a policy decision to be made by the Legislature.

appendices

Volume 1:

- A: Legislation - ESHB 3096
- B: Outreach Events and Materials
- C: Travel Demand Modeling and Financial Analysis
- D: Travel Demand Model Peer Review
- E: Active Traffic Management
- F: Toll Collection Technology
- G: Mitigation Recommendations for Diversion
- H: Discussions on I-90

Volume 2:

- I: Public Comments
 - Letters from jurisdictions
 - Summaries of public comment
 - All public comments received

How can tolls work for people who use 520, nearby communities, and taxpayers?



for more information contact:

David Hopkins

Director, Government Relations and Communications
Urban Corridors Office
Washington State Department of Transportation
401 Second Ave. South, Suite 400
Seattle, WA 98104
206.464.1194
hopkida@wsdot.wa.gov

Americans with Disabilities Act (ADA) Information: Sign language and communications materials in alternative formats can be arranged given sufficient notice by calling 206.464.7090 or TDD/TTY 206.464.5409.

Title VI: The 520 Tolling Implementation Committee ensures full compliance with Title VI of the Civil Rights Act of 1964 by prohibiting discrimination against any person on the basis of race, color, national origin or sex in the provision of benefits and services resulting from its federally assisted programs and activities.