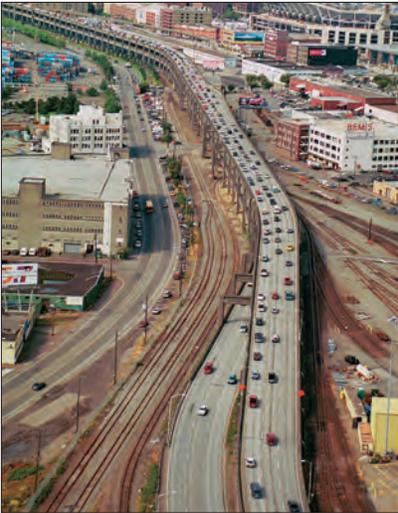
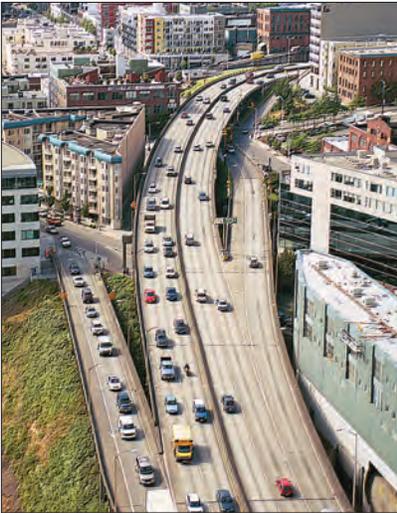


# ALASKAN WAY VIADUCT REPLACEMENT PROJECT HISTORY REPORT





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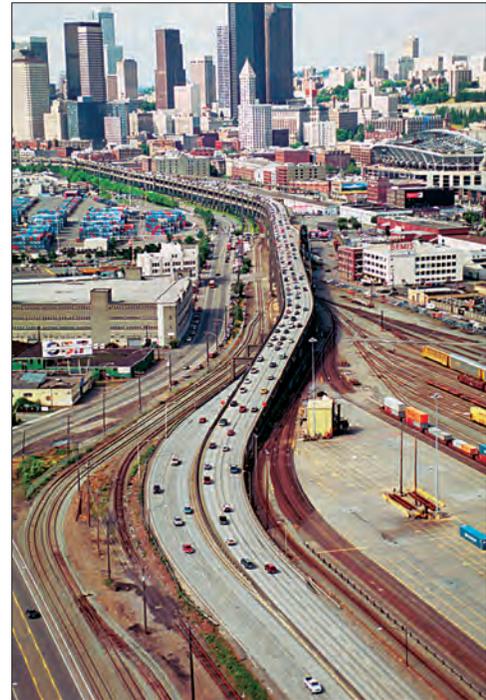
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## ACRONYMS

### D

DOT Department of Transportation

### E

EIS Environmental Impact Statement

### F

FHWA Federal Highway Administration

### H

HOV high-occupancy vehicle

### N

NEPA National Environmental Policy Act

### S

SEPA State Environmental Policy Act

SR State Route

### U

UMP Urban Mobility Plan

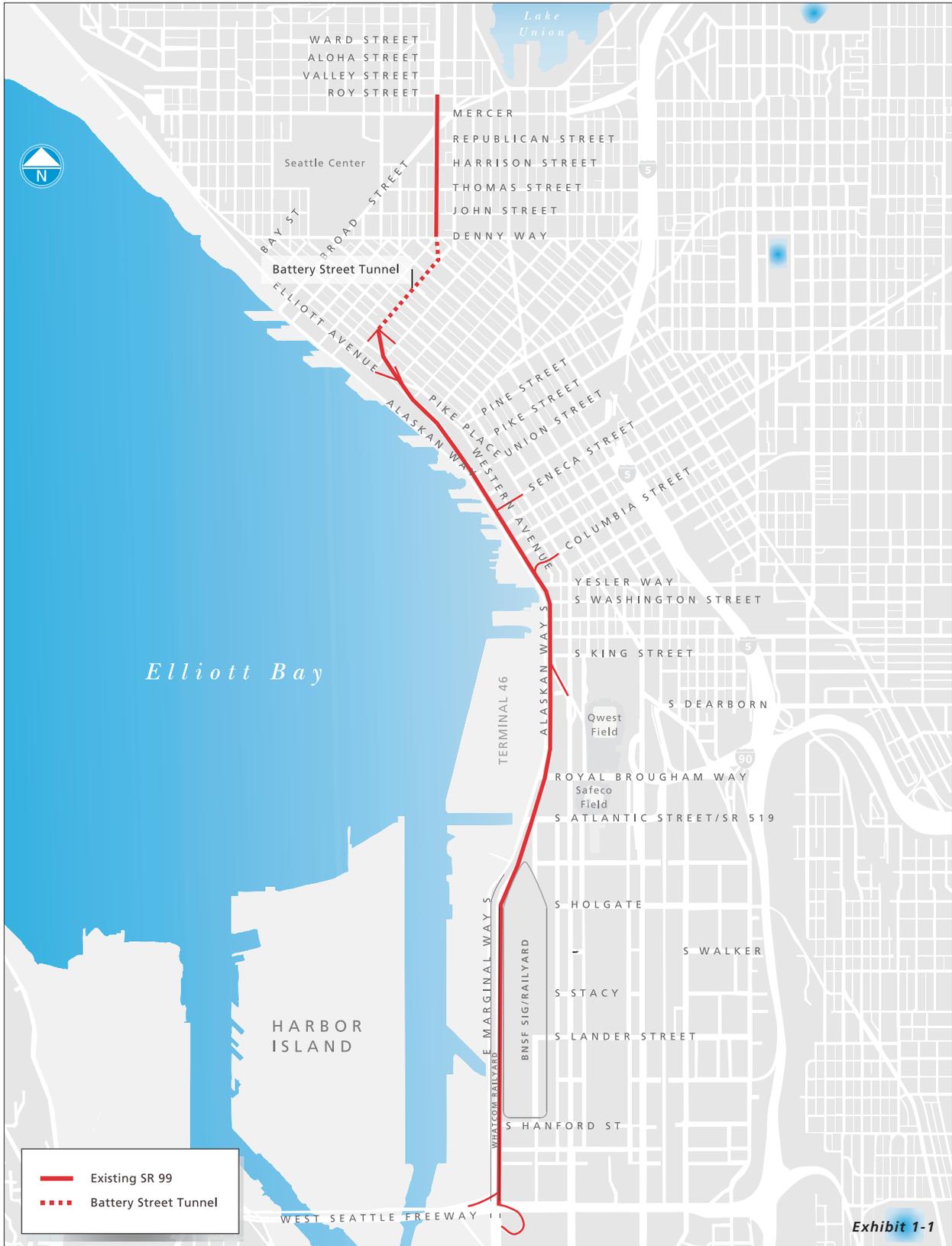
### W

WSDOT Washington State Department of Transportation



*ALASKAN WAY VIADUCT REPLACEMENT PROJECT  
HISTORY REPORT*

# Alaskan Way Viaduct Project Area



## ***CHAPTER 1 - INTRODUCTION***

### **1 Why was the Alaskan Way Viaduct and Seawall Replacement Program initiated?**

The Alaskan Way Viaduct section of State Route (SR) 99 has been a fixture of the downtown Seattle waterfront for over five decades. Exhibit 1-1 shows the project location. The Alaskan Way Viaduct carries about 110,000 vehicles a day and provides a convenient route to and through downtown Seattle. Among its transportation functions, the viaduct provides a north-south route for neighborhoods west of I-5. The viaduct and Battery Street Tunnel play an important role in freight mobility, providing a major truck route through downtown. The viaduct also provides access to the Ballard-Interbay and greater Duwamish manufacturing and industrial centers via the Elliott and Western Avenue ramps. However, the viaduct's days are numbered. The Nisqually earthquake and wear and tear from daily traffic have taken their toll on the facility.

In response to several large earthquakes in other parts of the world, Washington State Department of Transportation (WSDOT) began to study the viaduct in the mid-1990s. These studies showed that the 1950s-era viaduct was vulnerable to earthquakes and nearing the end of its useful life. In early 2001, a team of structural design and seismic experts began work to determine what to do about the viaduct. In the midst of this investigation, the 6.8-magnitude Nisqually earthquake shook the Puget Sound region on February 28, 2001.

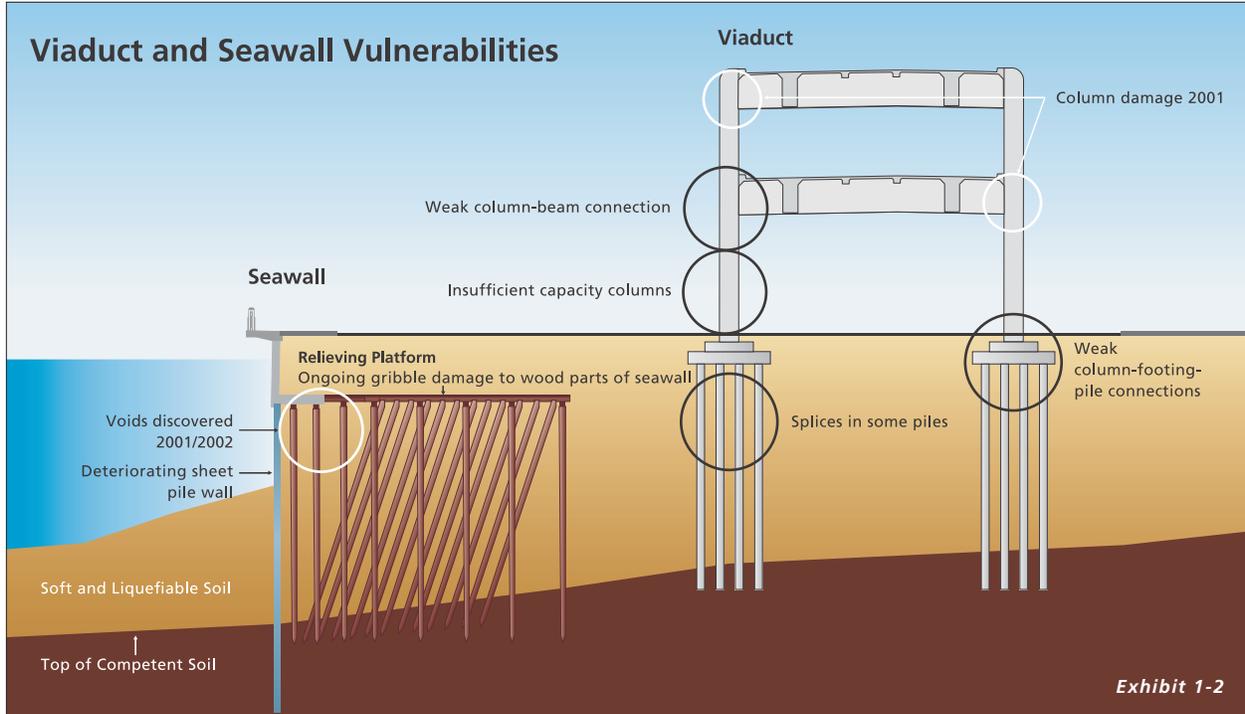
The Nisqually earthquake damaged the viaduct, forcing WSDOT to temporarily shut it down. Post-earthquake inspections of the viaduct by a team of experts revealed that the

#### **What function does the Battery Street Tunnel provide?**

The Battery Street Tunnel is part of SR 99 and connects the Alaskan Way Viaduct with Aurora Avenue (SR 99) north of Denny Way. The tunnel allows the local street grid in the Belltown neighborhood and SR 99 to operate independently.

The Battery Street Tunnel is regularly inspected and maintained by both WSDOT and the City of Seattle. Investigations conducted on the Battery Street Tunnel in 2008 determined that the walls of the tunnel are corroding and must be repaired for the tunnel to continue in operation.

earthquake damaged the viaduct's joints and columns, further weakening the structure and exposing its vulnerabilities, as shown in Exhibit 1-2.



Soon after the Nisqually earthquake, WSDOT repaired four viaduct sections in the Pioneer Square area near S. Washington Street where the damage was most severe. WSDOT also imposed roadway restrictions for large vehicles such as trucks and buses that remain in effect today. These restrictions prevent over-legal loads on the viaduct and prohibit vehicles that weigh over 10,000 pounds from using specific ramps. The restrictions reduce travel speeds for large vehicles (from 50 miles per hour to 40 miles per hour) and require large vehicles traveling southbound to use only the right-hand lane of the viaduct.

In 2005, WSDOT commissioned outside experts to complete a study evaluating the condition of the viaduct. The study found that the viaduct's deterioration has accelerated since the Nisqually earthquake.<sup>1</sup> Additional studies between 2006 and 2008 also looked at the deterioration of the viaduct's structure and its seismic capacity and concluded that the viaduct needs to be replaced.<sup>2,3,4</sup> The earthquake imposed extreme forces on the viaduct, and these forces were well beyond those the structure was designed for in the 1950s when it was built. At least two consequences of the extreme forces imposed during the earthquake continue to affect the structural integrity of the viaduct today:

- *Increasing cracks and crack widths* – Cracks in the concrete structural support members of the viaduct continue to grow. These cracks grow when the reinforcing steel embedded into concrete slips due to vehicle loads and other forces. Reinforcing steel used in roadway projects today is designed to prevent slippage and withstand much greater loads than the reinforcing steel commonly used in the 1950s.
- *Continued settlement of the viaduct's foundations* – The earthquake caused soil underneath the viaduct to shift in some places. In some cases, these shifts are placing additional demands on the viaduct, which further weakens the structure.

According to the study, ongoing deterioration so long after an earthquake is unexpected, especially because today's traffic volumes are similar to what they were before the Nisqually earthquake and restrictions on large vehicles have been put in place

1 Ty Lin International. 2005. *Alaskan Way Viaduct Summary – Safety and Service Limitations of the Alaskan Way Viaduct*. November 22, 2005.

2 American Society of Civil Engineers Review Committee. 2006. *Report of the American Society of Civil Engineers Review Committee*. December 4, 2006.

3 KPFF Consulting Engineers. 2008. *Alaskan Way Viaduct Independent Project Management Team: Evaluation of Seismic Retrofit Options*. September 28, 2008.

4 Parsons Brinckerhoff. 2007. *Seismic Vulnerability Analysis Report*. November 2007.

to lower demand on the viaduct from pre-earthquake conditions. The accelerated deterioration of the viaduct since the earthquake can be attributed to a combination of the destructive effects of the earthquake and the viaduct’s age. According to the study, these latent earthquake effects and the risk of additional damage from potential future earthquakes are what heighten the need for immediate action to replace the viaduct. Recent studies in 2007 have concluded that there is a 1-in-10 chance during the next 10 years an earthquake would render the Alaskan Way Viaduct unusable or even cause collapse.<sup>5</sup>

WSDOT conducts a full inspection of the viaduct every 6 months and a visual inspection every 3 months. The inspections have shown that the 1950s-era viaduct continues to settle and deteriorate in many locations. Near Yesler Way, the viaduct had unevenly settled 5.5 inches since the 2001 Nisqually earthquake. Four column foundations between Columbia Street and Yesler Way were strengthened in April 2008, and no further settlement has occurred at this location since the repair work. Settlement near Seneca Street reached 1.625 inches in March 2009.

Shortly after the Nisqually earthquake, a 100-foot-long by 10-foot-wide section of the Alaskan Way surface street settled, raising concerns about the condition of the Alaskan Way Seawall. Soil held back by the seawall is prone to liquefy in earthquakes, and that’s exactly what happened along this section of the waterfront. When soil liquefies, it transforms from a solid material that can support roadways and other structures to a quicksand-like material that flows like a liquid, potentially damaging roadways or structures built on it.

The viaduct’s foundations are embedded in the soil held back by the seawall from S. Washington Street to approximately Pine Street. The seawall provides structural support to surface streets, buildings, and utilities; north of Bell Street it also supports the BNSF railroad mainline. If the seawall were to fail, sections of the viaduct, the Alaskan Way surface street, and adjacent structures and utilities could collapse or become unsafe, forever changing the face of Seattle’s waterfront and potentially resulting in loss of life.

5 Parsons Brinckerhoff. 2007. *Seismic Vulnerability Analysis Report*. November 2007.

**What function does the Alaskan Way surface street provide?**

The Alaskan Way surface street extends from S. Atlantic Street to Broad Street along the west side of the existing viaduct. Alaskan Way provides access to the Seattle Ferry Terminal on Colman Dock, Fire Station No. 5, the Seattle Aquarium and Waterfront Park, Waterfront Condominiums, Port of Seattle headquarters and cruise ship terminal, and other piers along the central waterfront.

**What function does the Alaskan Way Seawall provide?**

The Alaskan Way Seawall extends from S. Washington Street to Broad Street along Elliott Bay on Puget Sound and is owned and maintained by the City of Seattle. The seawall provides structural support for the viaduct up to approximately Pine Street, the surface streets, buildings and utilities along the waterfront. North of Bell Street, it also supports the mainline of the BNSF railroad.

Seawall investigations conducted by the City of Seattle have shown that the seawall continues to deteriorate despite regular maintenance. In addition to the poor soil found along the waterfront, marine organisms called gribbles have been eating away at the timbers that support the seawall. Inspections have shown that substantial portions of the seawall's timber support structures have been weakened or destroyed by gribbles, as shown in Exhibit 1-3. Additionally, seawall inspections conducted in 2005 found new seawall damage from another marine organism called a shipworm. Shipworms have damaged approximately 55 percent of the wood panels that protect portions of the seawall.<sup>6</sup>

6 Berger/Abam Engineers. 2005. *Draft Alaskan Way Seawall Ekki Wood Replacement*. April 2005.



## 2 What is the purpose of this Project History Report?

Since the *Alaskan Way Viaduct and Seawall Replacement Project Supplemental Draft Environmental Impact Statement (EIS)* was published in 2006, additional study and evaluation of alternatives has taken place. The purpose and need statement for the project has also been revised. This report not only summarizes the alternatives that have been studied since the Program began in 2001, but focuses on the evaluation of alternatives through the Partnership Process and how the Bored Tunnel Alternative emerged. Environmental analysis is currently underway for the Bored Tunnel Alternative, and a Supplemental Draft EIS is expected to be published in early 2010.

*Above Left: Gribble damage to boards of the seawall relieving platform.*

*Above: Example of L. limnoria or gribbles. Photo courtesy of Clare Tupper*

### 3 What information will I find in this document?

This document provides information about how the alternatives and the Alaskan Way Viaduct and Seawall Replacement Program have evolved.

Chapter 2 discusses the alternatives considered from the time of the Nisqually earthquake in 2001 up to the announcement of the Moving Forward projects in March 2007 by Governor Gregoire, King County Executive Sims, and City of Seattle Mayor Nickels.

Chapter 3 discusses what happened to the Program since March 2007, how scenarios were evaluated during the Partnership Process, and what recommendations were made.

Chapter 4 discusses what progress has been made since the Bored Tunnel Alternative was recommended and the next steps that the project is taking.

#### What are the Moving Forward projects?

In December 2006, Governor Gregoire called for an advisory vote by the citizens of Seattle to provide input on selection of the preferred alternative. The citizens voted down both alternatives that were presented. In response to the “no” vote results, and to continue progress on the program, WSDOT, King County, and the City proceeded with six **Moving Forward** projects while the agencies figured out a solution for the central waterfront. One project, Lenora Street to Battery Street Tunnel Replacement, is no longer active because it depends on the central waterfront solution. The five **Moving Forward** projects underway are:

- Column Safety Repairs – stabilize footings between Yesler Way and Columbia Street (Completed)
- Electrical Line Relocation – between S. Massachusetts Street & Railroad Way S.
- Battery Street Tunnel Maintenance – fire and life safety system repairs
- S. Holgate Street to S. King Street Viaduct Replacement
- Transit Enhancements and Other Improvements

## ***CHAPTER 2 - PROJECT DEVELOPMENT UP TO THE MOVING FORWARD PROJECTS***

*This chapter describes what studies took place before the Nisqually earthquake and what alternatives were considered between that time and when directions for the Moving Forward projects were given.*

### **1 What studies and investigations took place in the 1990s and just prior to the Nisqually earthquake?**

Washington State Department of Transportation (WSDOT) and the University of Washington conducted a geotechnical study in 1995 that showed that the viaduct was vulnerable to soil liquefaction in the event of an earthquake. Given that the viaduct was nearing the end of its useful life, WSDOT started to study feasible alternatives. In early 2001, a team of design and seismic experts began work to consider various options and determine whether it was feasible and cost-effective to strengthen the viaduct by retrofitting it. In the midst of this investigation, the 6.8-magnitude Nisqually earthquake shook the Puget Sound region.

### **2 How did the Nisqually earthquake change WSDOT's approach to the viaduct?**

The Nisqually earthquake damaged the viaduct joints and columns, forcing WSDOT to temporarily shut it down. Soon after the earthquake, a 100-foot-long by 10-foot-wide section of the Alaskan Way surface street settled, raising concerns about how soils reacted during the earthquake and the seawall's condition. The Alaskan Way Viaduct foundations are embedded in the soil that is held in place by the seawall (see Exhibit 1-2). If the seawall failed, the nearby portion of the viaduct could collapse or become too unsafe to use.

#### **What previous documents have evaluated alternatives?**

The Federal Highway Administration (FHWA), WSDOT, and the City of Seattle have published two environmental impact statements (EISs) to date, the *2004 Draft EIS* and *2006 Supplemental Draft EIS*. These documents analyzed alternatives for both the viaduct and the seawall along the existing SR 99 corridor.

#### **Screening Reports for the Draft EIS**

The *Final Revised Screening of Design Concepts* and *Final Revised Screening of Seawall Concepts* were published in June 2003 (Parametrix 2003a and 2003b).

WSDOT concluded that seismic retrofit of the viaduct, which was being studied prior to the earthquake, would not be cost-effective. They decided to either rebuild the structure within its existing footprint or replace it with an entirely different alternative. WSDOT's direction changed because they now had an urgent need to evaluate alternatives for the viaduct and seawall to provide a safe facility.

### 3 How were alternatives developed for the 2004 Draft EIS?

WSDOT began the screening process for developing the Draft Environmental Impact Statement (EIS) alternatives in late 2001. Early analysis by the project team and discussion with the community generated a wide range of ideas. Screening criteria were used to evaluate the relative ability of each design concept to satisfy the project's purpose and need. The criteria were expressed as a series of goals. Goal one, seismic integrity, had to be met for any design concept to be advanced. If the design concept did not meet goal one, it was dropped from consideration. Design concepts that met goal one were evaluated against the remaining criteria.

In 2002, the initial set of 76 replacement concepts and seven seawall concepts were gathered and organized into six groups:

- Viaduct improvements from S. Holgate Street to the Battery Street Tunnel
- Battery Street Tunnel improvements
- Roadway improvements outside of the corridor
- Multimodal solutions (transit, bike, and pedestrian opportunities)
- Related improvements
- Seawall improvements

Then, the best ideas from these six groups were shaped into the five alternatives evaluated in the Draft EIS. Ideas that would not work or could not meet the needs for the project were dropped from further consideration. The project team held open houses with the public and met with agencies, tribes, businesses, and neighborhood groups to gather feedback during the alternatives development process. Out of the 7-month screening process, five alternatives emerged. The five alternatives analyzed in the Draft EIS and shown in Exhibit 2-1 are:

- Rebuild
- Aerial

#### What was the purpose of the proposed action in 2004?

For the 2004 Draft EIS (WSDOT et al. 2004), the project's purpose was to provide a transportation facility and seawall with improved earthquake resistance that would maintain or improve mobility and accessibility for people and goods along the Alaskan Way Viaduct Corridor.

#### What were the goals of the 2004 Draft EIS screening process?

**Goal 1:** An alternative must provide facilities that meet current seismic design standards.

**Goal 2:** An alternative must maintain the current transportation functions of the Alaskan Way Viaduct Corridor.

**Goal 3:** An alternative should not further degrade the operation of other major transportation facilities.

**Goal 4:** An alternative should improve traffic safety.

**Goal 5:** An alternative should maintain regional transportation linkages.

**Goal 6:** An alternative should support bicycle and pedestrian accessibility and mobility.

**Goal 7:** An alternative should be compatible with local, express, and high-capacity transit.

**Goal 8:** An alternative should support land use and shoreline plans and policies pertaining to development of the downtown Seattle waterfront.

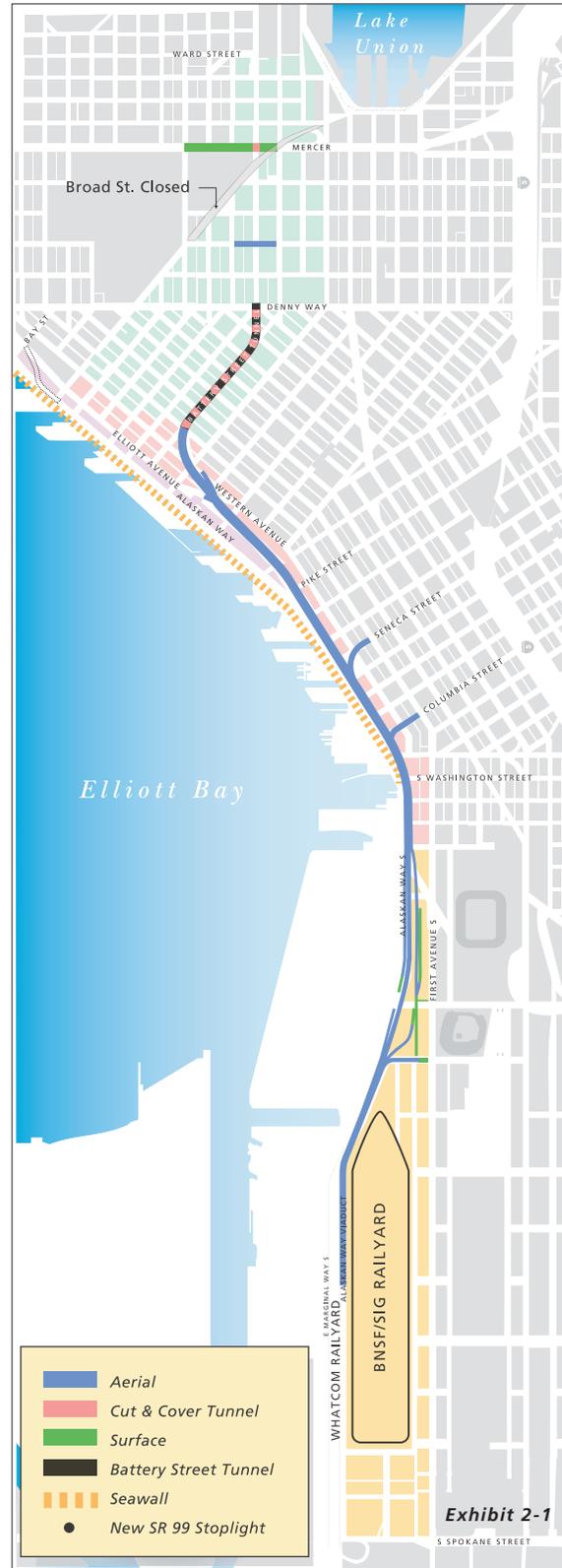
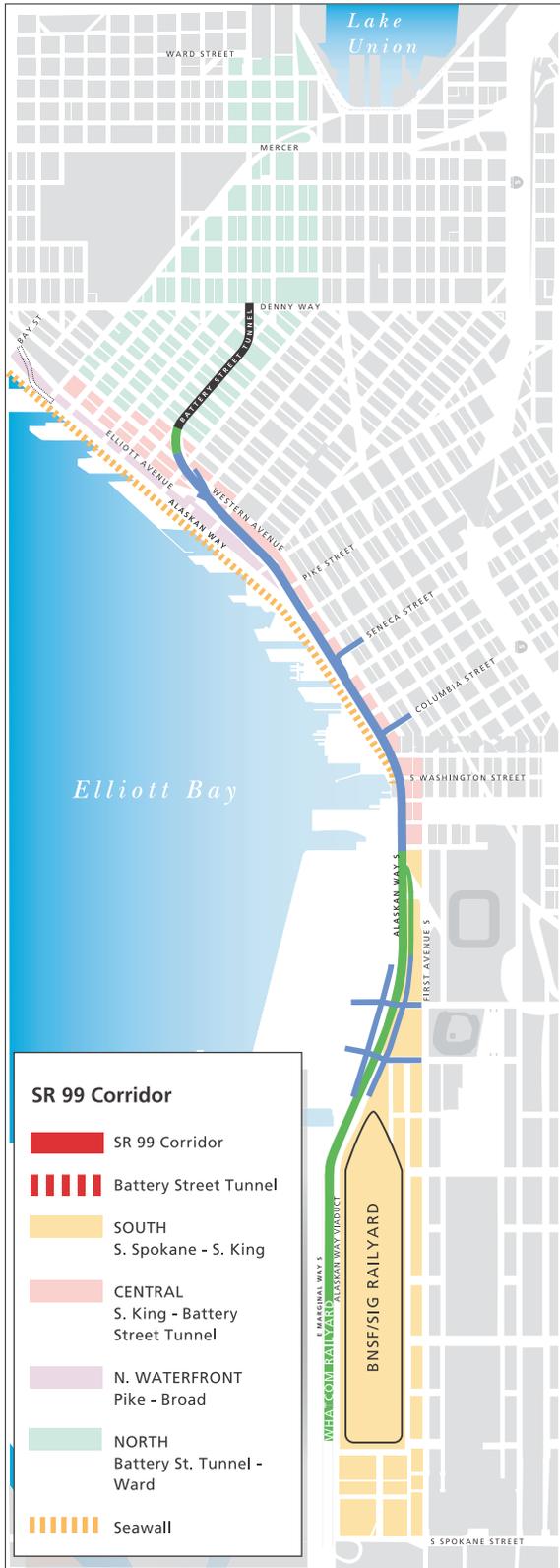
**Goal 9:** An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall.

**Goal 10:** An alternative should rely on proven construction methods, minimize construction duration, and promote effective traffic management during construction.

# 2004 Draft EIS Alternatives

Rebuild

Aerial



## 2004 Draft EIS Alternatives

Tunnel

Bypass Tunnel

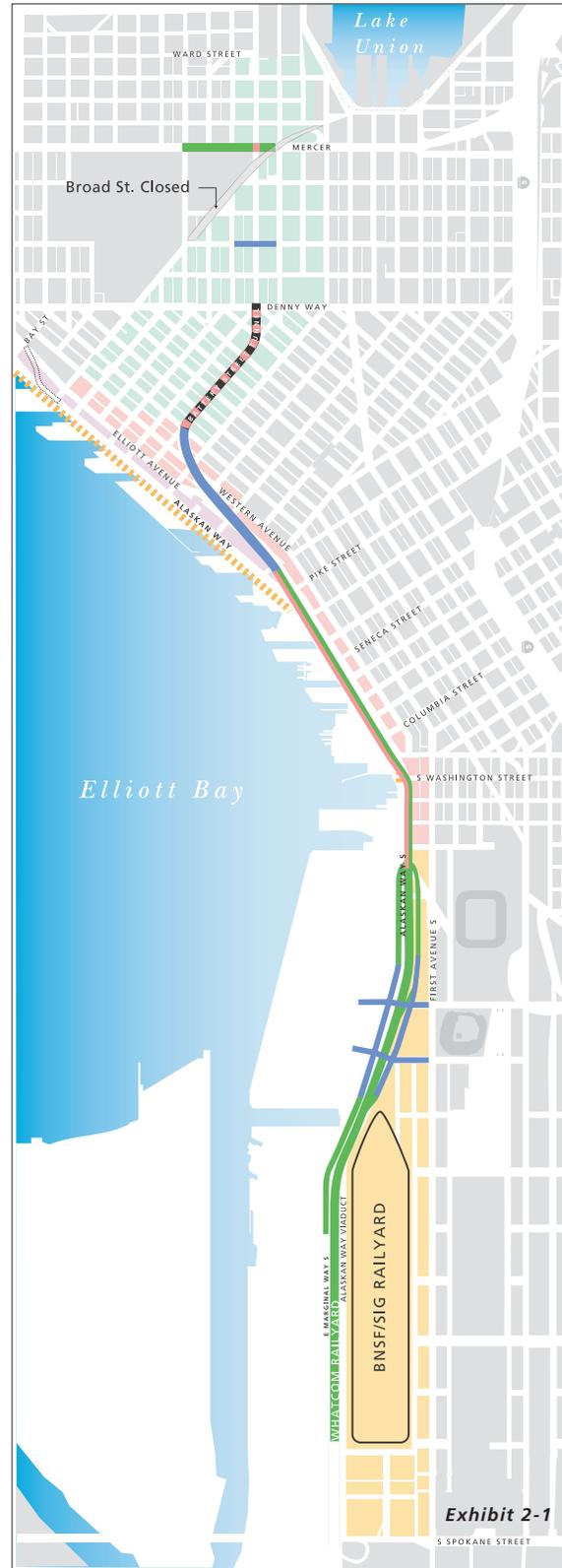
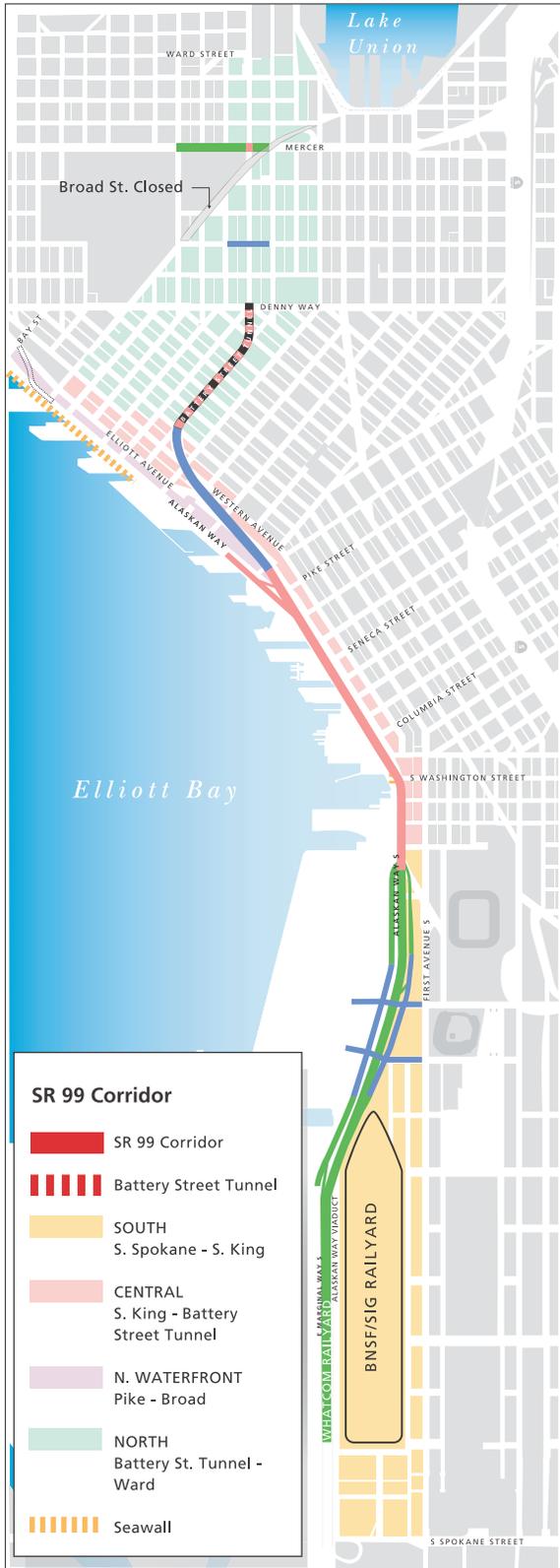
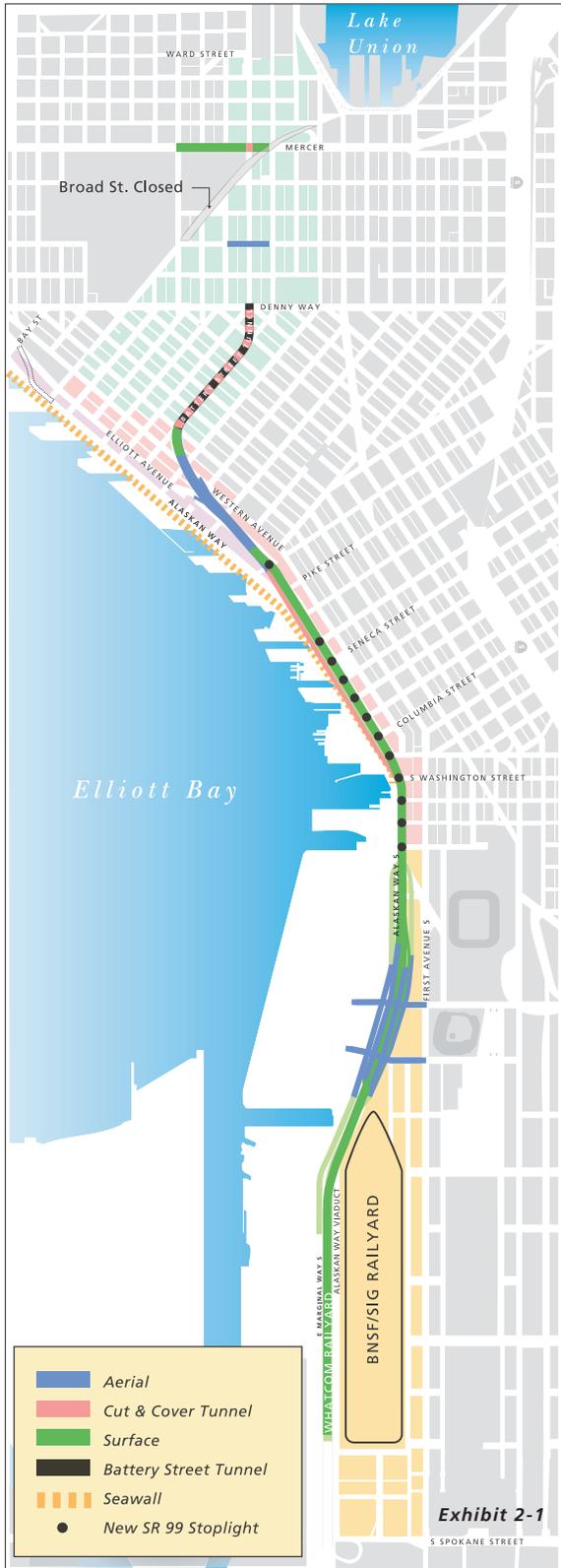


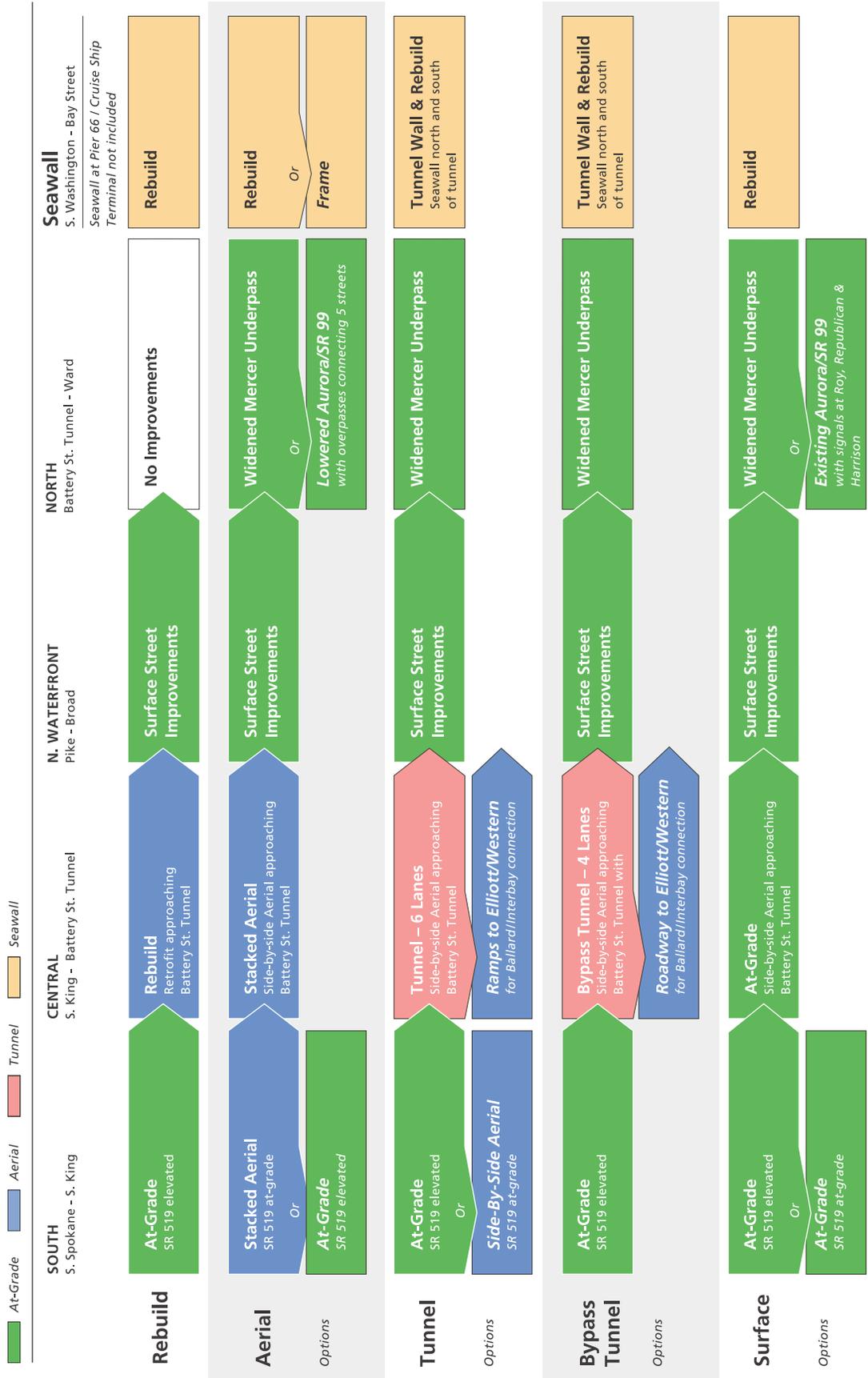
Exhibit 2-1

## 2004 Draft EIS Alternatives

### Surface



## 2004 Alternatives and Options Chart



- Tunnel
- Bypass Tunnel
- Surface

The alternatives had several options associated with them that could be mixed-and-matched, as shown in Exhibit 2-2.

#### **4 What was the preferred alternative identified in December 2004?**

In December 2004, Secretary of Transportation Doug MacDonald, Federal Highway Administration (FHWA) Division Administrator Dan Mathis, and Seattle Mayor Greg Nickels announced that the preferred alternative for replacing the aging viaduct was a cut-and-cover tunnel along the waterfront. An elevated structure was identified as the contingency plan for the preferred alternative.

The cut-and-cover tunnel was selected by our local officials because it provided a safe structure through downtown Seattle that maintained mobility and improved connections between the waterfront and downtown Seattle.

#### **5 Why was a Supplemental Draft EIS completed in 2006?**

A Supplemental Draft EIS is required when changes to a project introduce additional environmental effects that have not been evaluated and disclosed to the public in earlier EISs. In 2005, the purpose and need and screening criteria for the Alaskan Way Viaduct and Seawall Replacement Project were revised to include access and safety improvements north of the Battery Street Tunnel. The project also needed to evaluate the changes made to the Tunnel and Elevated Structure Alternatives, consider new construction information and concepts, and provide current information. The Supplemental Draft EIS was published in March 2006 and sought input from agencies, tribes, and the public on the changes proposed at that time. A timeline of the alternatives considered is shown in Exhibit 2-3.

#### **6 What alternatives were evaluated in the 2006 Supplemental Draft EIS?**

The 2006 Supplemental Draft EIS evaluated the Tunnel Alternative and the Elevated Structure Alternative. The alternatives proposed replacing SR 99 and the Alaskan Way surface street between S. Walker Street and Aloha Street.

#### **What was the purpose of the proposed action in 2006?**

The purpose of the proposed action in the 2006 Supplemental Draft EIS (WSDOT et al. 2006) was to provide a transportation facility and seawall with improved earthquake resistance. The project would maintain or improve mobility, accessibility, and traffic safety for people and goods along the Alaskan Way Viaduct Corridor as well as improve access from SR 99 from Battery Street Tunnel north to Roy Street.

## Alternatives Development Timeline

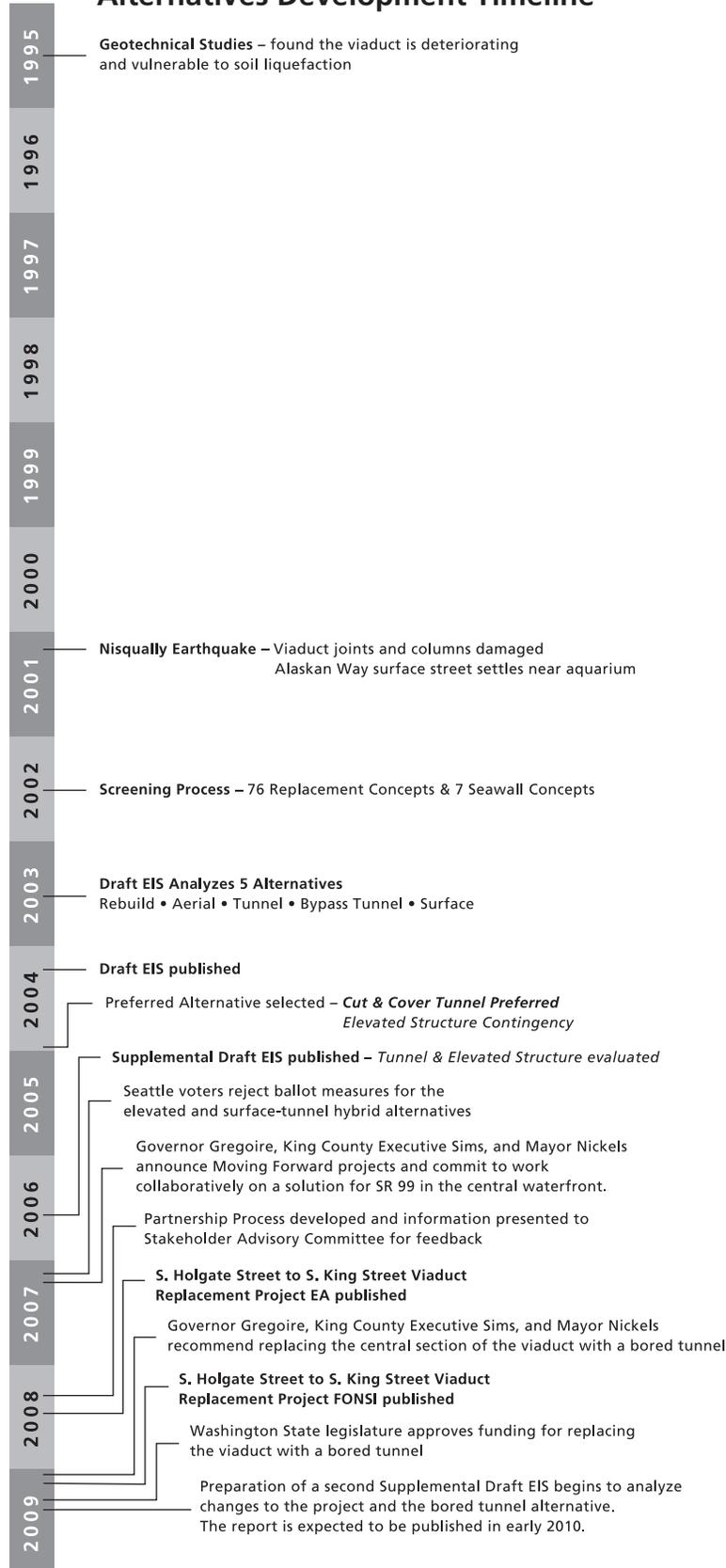


Exhibit 2-3

### **Tunnel Alternative**

At the south end of the corridor SR 99 would be at-grade. It would transition to an elevated structure over the railroad tracks, and then return to ground level where a new aerial interchange would be built over SR 99 near the stadiums at S. Atlantic Street and S. Royal Brougham Way, as shown in Exhibit 2-4. In the central waterfront area, SR 99 would be replaced with a six-lane cut-and-cover tunnel (three lanes in each direction) from approximately S. Dearborn Street to Pine Street. One wall of the tunnel would also be the new seawall. Between Pine Street and Virginia Street, a new aerial structure would be built, and then SR 99 would connect to the Battery Street Tunnel by traveling under Elliott and Western Avenues. North of the Battery Street Tunnel, SR 99 would be improved and widened up to Aloha Street.

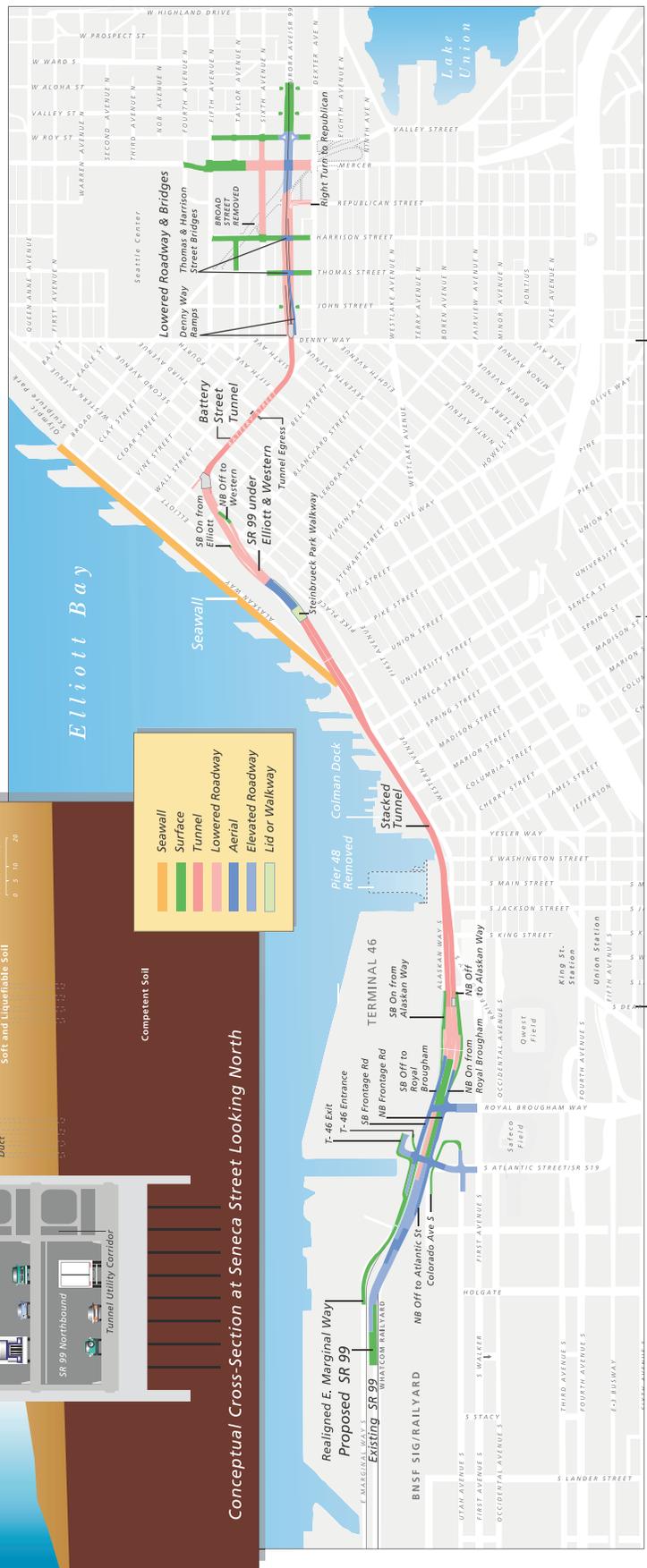
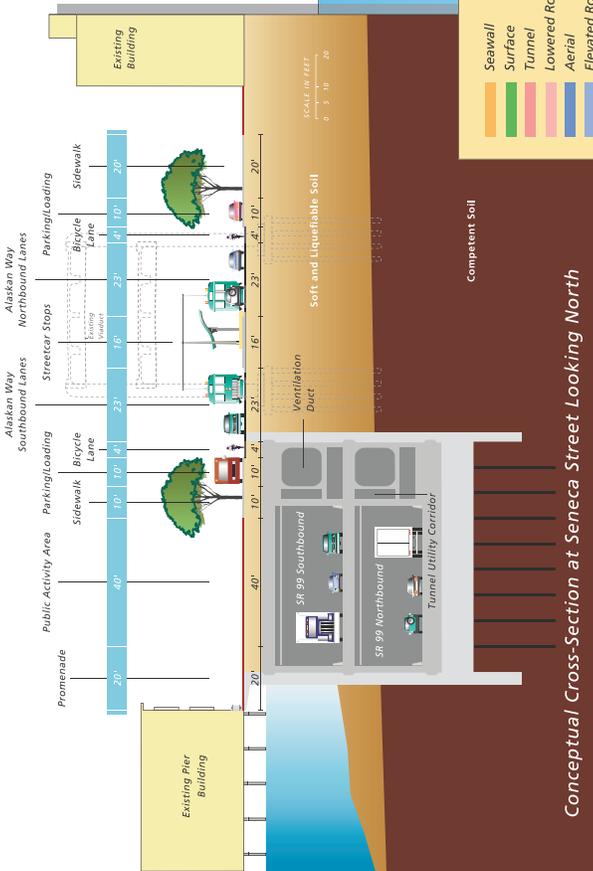
The Alaskan Way surface street would be replaced east of the existing roadway with two lanes in each direction and two waterfront streetcar tracks running in the center travel lanes. The center lane would have alternating turn pockets and streetcar stops. Between Railroad Way S. and Yesler Way, Alaskan Way would have three lanes in each direction.

### **Elevated Structure Alternative**

Elements of the Rebuild and Aerial Alternatives studied in the Draft EIS were combined to form the Elevated Structure Alternative, as shown in Exhibit 2-5. The Elevated Structure Alternative was identified as the contingency plan by the lead agencies for the preferred Tunnel Alternative.

As with the Tunnel Alternative, in the south end of the corridor, SR 99 would be at-grade. It would transition to an elevated structure over the railroad tracks, and then return to ground level where a new aerial interchange would be built over SR 99 near the stadiums at S. Atlantic Street and S. Royal Brougham Way. The Elevated Structure Alternative would then transition to a stacked aerial structure along the central waterfront. For the most part, the new aerial structure would have three lanes in each direction, and it would have wider lanes and shoulders than the existing viaduct. Between S. King Street and the ramps at Columbia and Seneca Streets, SR 99 would have four lanes in each direction. The existing ramps at Columbia and Seneca Streets would be rebuilt. The new elevated structure

# 2006 Tunnel Alternative



**SOUTH**  
S. Spokane - S. Dearborn

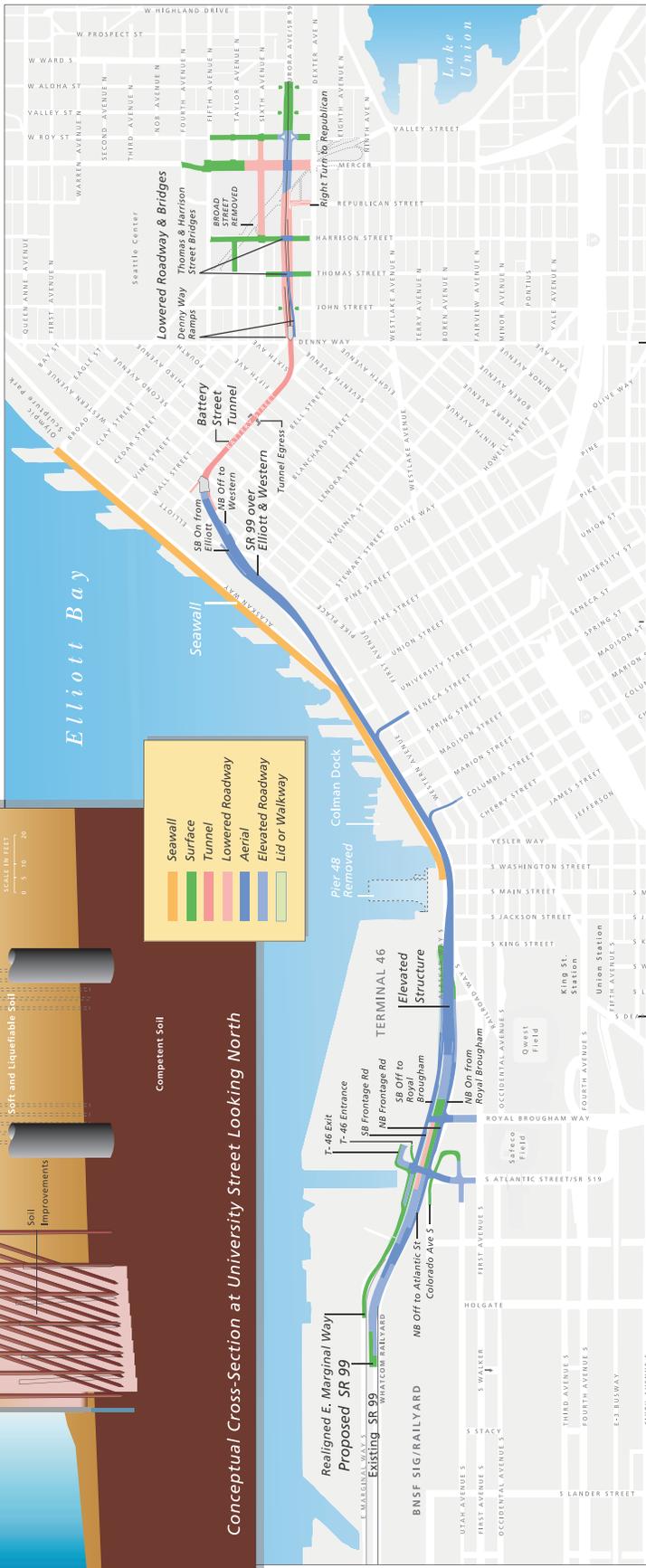
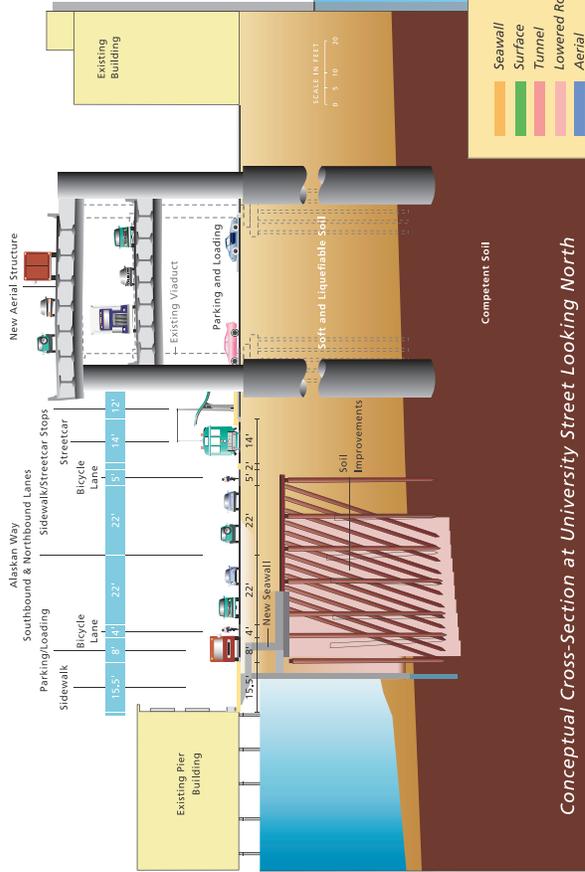
**CENTRAL**  
S. Dearborn - Battery St. Tunnel

**N. WATERFRONT**  
Pine - Broad

**NORTH**  
Battery St. Tunnel - Constock

**Exhibit 2-4**

# 2006 Elevated Structure Alternative



**SOUTH**  
S. Spokane - S. Dearborn

**CENTRAL**  
S. Dearborn - Battery St. Tunnel

**N. WATERFRONT**  
Pine - Broad

**NORTH**  
Battery St. Tunnel - Comstock

**Exhibit 2-5**

would be 11.5 to 35 feet wider than the existing viaduct from south of S. Main Street up to Union Street. Near S. King Street to south of S. Main Street, the new elevated structure would be 54 to 74 feet wider than the existing viaduct as SR 99 transitions from a side-by-side at-grade roadway in the south to a new double-level elevated structure. The new structure would also be about 3 feet taller than the existing structure.

The SR 99 structure would pass over Elliott and Western Avenues between Pine Street and the Battery Street Tunnel. The existing ramps would be rebuilt similar to the existing facility. Improvements from the Battery Street Tunnel north would be the same as with the Tunnel Alternative.

The Alaskan Way surface street would be replaced in approximately the same location as it is today with two lanes in each direction. Between S. King Street and Yesler Way, left-turn pockets could be provided. The seawall would be replaced. A single waterfront streetcar track would be rebuilt on the east side of Alaskan Way, and a passing track would be provided on the east side of Alaskan Way between Union and Pike Streets.

## **7 Why was an expert review panel appointed and what did the panel study?**

In early 2006, the Washington State Legislature passed new legislation that required an expert review panel to provide an independent financial and technical review of the Alaskan Way Viaduct and Seawall Replacement Project's financial plan and implementation plan. The expert review panel was selected by the Governor, the chairs of the State Senate and House Transportation Committees, and WSDOT's Secretary of Transportation. The panel's study included a review of the project's costs, risks, design plans, and environmental process.

The expert review panel reported its findings and recommendations to the Governor on September 1, 2006<sup>1</sup>. While the panel found the overall financial plan to be sound and reasonable, they were concerned about cost estimates. As a result, WSDOT updated the cost estimates for both alternatives. The panel concluded that the biggest risk “more severe than financial and logistical hazards – is that of indecision and vacillation by political and civic leaders.”

<sup>1</sup> WSDOT (Washington State Department of Transportation). 2006. *The Alaskan Way Viaduct and SR 520 Bridge Projects: Report of the Expert Review Panel, Revision 1*. Published September 1, 2006.

## **8 What changed after the 2006 Supplemental Draft EIS was published?**

After receiving information from the Program team and the expert review panel's report, Governor Gregoire called for an advisory vote in December 2006. The advisory vote was intended to allow the citizens of Seattle to provide input on the preferred alternative selection. The City of Seattle held a vote on March 13, 2007, and included an elevated alternative and a surface-tunnel hybrid alternative on the ballot. The surface-tunnel hybrid alternative on the ballot differed from the cut-and-cover tunnel alternative in the 2006 Supplemental Draft EIS. The citizens voted down both alternatives.

## **9 How did the Governor, County Executive, and Mayor decide to proceed in March 2007?**

After the March 2007 vote in Seattle, Governor Gregoire, King County Executive Sims, and City of Seattle Mayor Nickels chose to "move forward" with critical safety and mobility improvement projects at the north and south ends of the Alaskan Way Viaduct. These Moving Forward projects could proceed while the executives worked together through a collaborative public process to develop a replacement solution for the central waterfront that would have broad consensus among the lead agencies, cooperating agencies, tribes, and the public.

The Moving Forward projects are:

- Column safety repairs in the Pioneer Square area
- Electrical line relocation along the viaduct's south end
- Battery Street Tunnel maintenance and repairs
- South end viaduct replacement between S. Holgate Street and S. King Street
- Transit enhancements and other improvements

Originally, there was a sixth project that focused on replacing SR 99 between Lenora Street and the Battery Street Tunnel. However, this section was later included as part of the central waterfront process.

### **10 What is the status of the Moving Forward projects?**

The status for each of the Moving Forward projects is listed below.

#### **Column safety repairs in the Pioneer Square area**

Construction to strengthen four column footings between Columbia Street and Yesler Way was completed in April 2008. To prevent the columns from further sinking, crews drilled a series of steel rods surrounded by concrete into stable soil and added a layer of reinforced concrete to tie the new supports to the existing column footings.

#### **Electrical line relocation along the viaduct's south end.**

Construction to relocate electrical lines began in September 2008 and is expected to be complete in fall 2009. WSDOT and Seattle City Light are relocating electrical lines from the viaduct to underground locations east of the viaduct between S. Massachusetts Street and Railroad Way S.

#### **Battery Street Tunnel maintenance and repairs**

The need for maintenance and repairs to the Battery Street Tunnel depends on how the tunnel might be used in the future. The Battery Street Tunnel would still be used as part of the alternatives studied in the 2004 Draft EIS and 2006 Supplemental Draft EIS. With a Bored Tunnel Alternative, the Battery Street Tunnel would not be needed and would be decommissioned. WSDOT and the City of Seattle remain committed to maintaining the Battery Street Tunnel to ensure it remains safe for drivers for as long as it is needed.

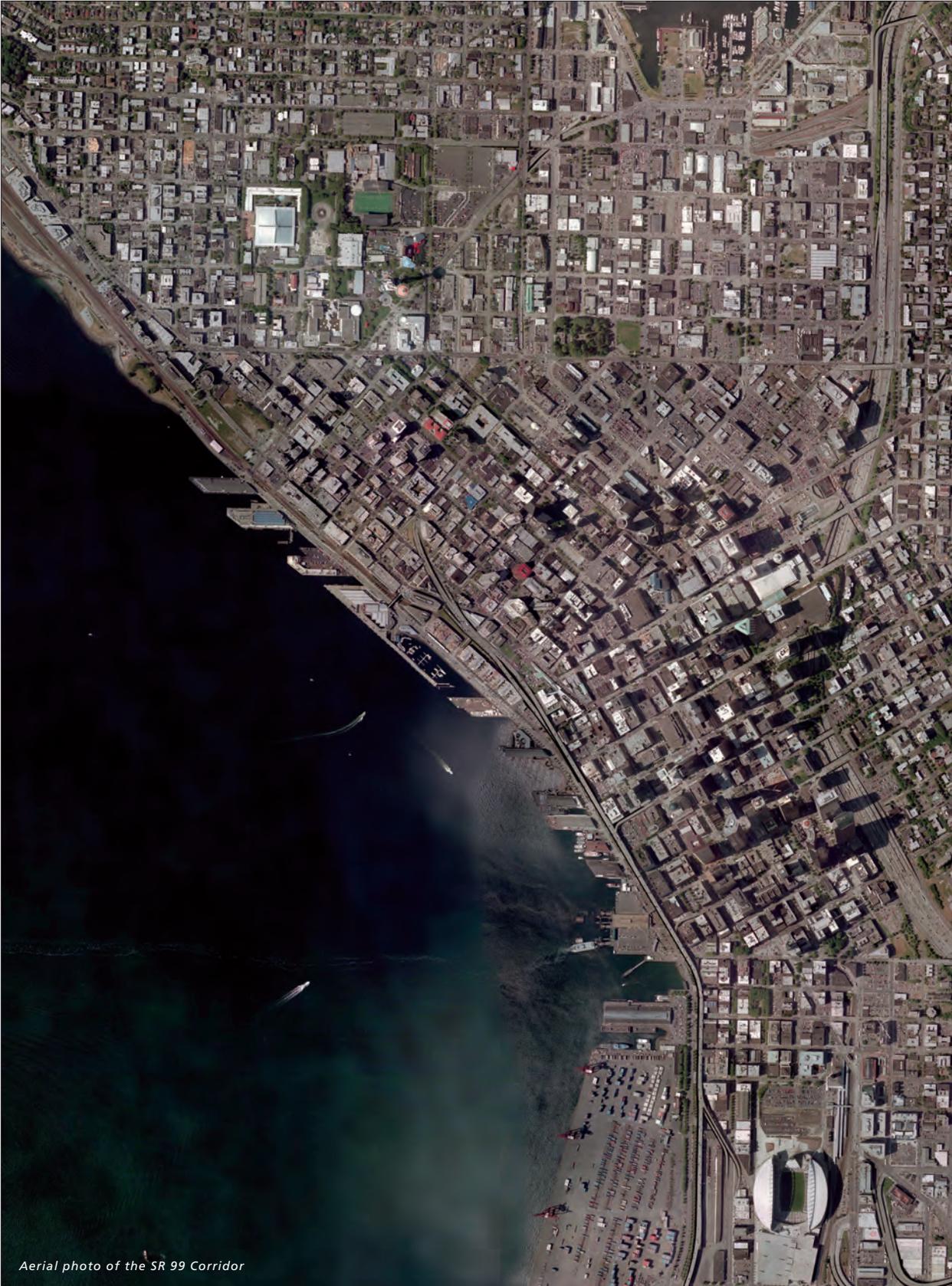
#### **South end viaduct replacement between S. Holgate Street and S. King Street**

The S. Holgate Street to S. King Street Viaduct Replacement Project will replace this seismically vulnerable portion of SR 99 with a seismically sound structure that is designed to current roadway and safety standards. An Environmental Assessment for this project was completed in June 2008, and the Finding of No Significant Impact was published in February 2009. Construction and early utility relocations will begin in mid-2009. Construction is expected to be completed at the end of 2014.

**Transit enhancements and other improvements**

WSDOT, King County, and the City of Seattle are providing transit enhancements and other improvements to keep people and goods moving during construction of the Moving Forward projects. These improvements include the following strategies:

- Add variable speed signs and travel time signs on I-5 to help maximize safety and traffic flow.
- Provide funding for the Spokane Street Viaduct Widening Project, which includes a new Fourth Avenue S. off-ramp for West Seattle commuters.
- Add buses and bus service in the West Seattle, Ballard/Uptown, and Aurora Avenue corridors during the construction period, as well as a bus travel time monitoring system.
- Upgrade traffic signals and driver information signs for the Denny Way, Elliott Avenue W./15th Avenue W., south of downtown, and West Seattle corridors to support transit and traffic flow.
- Provide information about travel alternatives and incentives to encourage use of transit, carpool, and vanpool programs.



*Aerial photo of the SR 99 Corridor*

## ***CHAPTER 3 - PARTNERSHIP PROCESS***

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### **1 What was the Partnership Process and why was it needed?**

Following the March 2007 vote, Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels committed to a collaborative effort to forge a solution for the Alaskan Way Viaduct. This collaborative effort, referred to as the Partnership Process, was created to resolve the longstanding needs of the Alaskan Way Viaduct, seawall, and related projects in a manner that could be broadly supported and implemented. The three parties formalized this effort in a Memorandum of Understanding in December 2007.

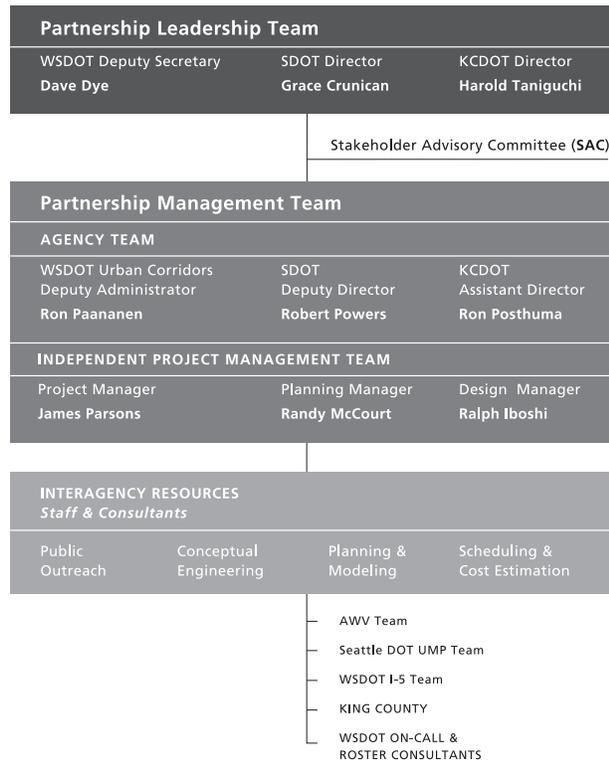
### **2 How were decisions made during the Partnership Process?**

To guide the Partnership Process in a timely and effective fashion, the participants implemented the management structure displayed in Exhibit 3-1. This structure supported coordinated decision-making between the agencies and provided multiple opportunities and resources to identify and resolve potential roadblocks.

A Project Oversight Committee consisting of the following members was formed:

- Washington State Governor
- King County Executive
- Mayor of Seattle
- Chairs of the Senate and House Transportation Committees
- One member of the King County Council
- One member of the Seattle City Council

Exhibit 3-1



The Project Oversight Committee reviewed and commented on the work of the Partnership Process and the progress of the project proposals. The Governor, King County Executive, and Mayor of Seattle were responsible for managing the work of the Partnership Process.

Leadership and management teams were formed to guide the Partnership Process. The Partnership Leadership Team, comprising the Washington State Department of Transportation (WSDOT) Deputy Secretary, Seattle Department of Transportation (DOT) Director, and King County DOT Director, was chiefly responsible for ensuring that the Partnership Process met its key milestones and moved forward on schedule. The Partnership Leadership Team was responsible for leading the Stakeholder Advisory Committee process. The Partnership Leadership Team also provided high-level oversight of the Partnership Management Team and resolved decisions necessary to keep the project on track.

The Partnership Management Team was primarily responsible for day-to-day project oversight. The Partnership Management

**In addition to the Stakeholder Advisory Committee, how did the Partnership Process involve the public?**

**Interagency Working Group.** The Interagency Working Group included staff from different public agencies around the region. The purpose of the group, which met until December 2008, was to share information with these public agencies and to collect technical feedback. Agencies participating in the working group included Community Transit, Federal Highway Administration (FHWA), Freight Mobility Strategic Investment Board, Passenger Ferry District, Pierce Transit, Port of Seattle, King County Public Health, Puget Sound Clean Air Agency, Puget Sound Regional Council, Sound Transit, and Washington State Ferries.

**Open houses and public meetings.** The partners held eight public meetings throughout the city, focusing on the major milestones for developing and evaluating potential solutions. These public meetings, which were advertised in both major and local publications, through mailings, and on the project website, provided opportunities for members of the public to review and comment on the evolving analysis.

**Community briefings.** Officials, staff, and representatives from the partnership agencies and Stakeholder Advisory Committee also participated in a series of direct briefings to community groups and other interests, providing further opportunities for the public to weigh in on the solutions and the findings being considered by the partnership agencies.

**Ongoing public information.** The Alaskan Way Viaduct and Seawall Replacement Program’s website and overall communications program is designed to allow the public to access and comment on project information at any time. The program maintains a mailing list and email listing to help inform interested members of the public of events. The website lists current and recent meetings and provides a library of the presentations and deliverables developed through the process. The website also provides contacts for comments and questions.

Team consisted of the Agency Team and the Independent Project Management Team.

### 3 What was the Independent Project Management Team?

The Independent Project Manager and Independent Project Management Team, directed by the Partnership Leadership Team, were responsible for developing and managing the overall central waterfront work plan and ensuring that all work was completed on time. Additionally, the Independent Project Management Team was responsible for carrying out the alternatives analysis in a transparent, consistent, and credible fashion. The Independent Project Management Team also identified issues for the Agency Team to resolve.

### 4 What was the Stakeholder Advisory Committee?

The 29-member Stakeholder Advisory Committee included representatives from business and economic stakeholders, neighborhoods, and public interest groups. Through regularly scheduled meetings and additional topic-focused briefings, the Stakeholder Advisory Committee reviewed and commented on the materials and presentations produced by the Partnership Process between December 2007 and December 2008.

The purpose of the Stakeholder Advisory Committee was to give the partnership agencies feedback; it was not convened as a decision-making body. The Stakeholder Advisory Committee played major roles in helping define the evaluation process, constructing and evaluating the systems scenarios, and giving feedback on the final hybrid recommendations that were submitted to the executives for consideration.

### 5 What was the Systems Approach and why was it used?

The Alaskan Way Viaduct and Seawall Replacement Program focused on the SR 99 corridor in the 2004 Draft Environmental Impact Statement (EIS) and 2006 Supplemental Draft EIS. These limits focused WSDOT, Federal Highway Administration (FHWA), and the City of Seattle's efforts appropriately on the immediate public safety and transportation issues, but left these agencies with conflicting alternatives for the central waterfront.

To move forward, the Partnership Process embraced a new strategy—referred to as the Systems Approach—that looked

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#### Stakeholder Advisory Committee Members

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##### ECONOMIC INTERESTS

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Warren Aakervik – Interbay/BINMIC  
 Bob Donegan  
 Seattle Historic Waterfront Commission  
 David Freiboth – King County Labor Council  
 John Odland – Manufacturing Industrial Council  
 Peter Philips – Seattle Marine Business Coalition  
 Susan Ranf – Sports Stadiums  
 Rob Sexton – Downtown Seattle Association  
 Herald Ugles  
 International Longshore & Warehouse Union  
 Tayloe Washburn  
 Greater Seattle Chamber of Commerce

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##### COMMUNITIES

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Jeff Altman – Northwest County  
 Carol Binder – Pike Place Market  
 Mahlon Clements – Ballard/Fremont  
 John Coney – Uptown/Queen Anne  
 Mary Hurley – Ballard/Fremont  
 Don Newby – Southwest County  
 Jim O'Halloran – Northeast Seattle  
 Vlad Oustimovitch – West Seattle  
 John Pehrson – Belltown  
 Earl Richardson – Southeast Seattle  
 Pete Spalding – West Seattle  
 Sue Taoka – International District

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##### CAUSE-DRIVEN ORGANIZATIONS

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Chuck Ayers – Cascade Bicycle Club  
 Kathy Fletcher – People for Puget Sound  
 Gene Hogle  
 Working Families for an Elevated Solution  
 Rob Johnson – Transportation Choices Coalition  
 Mary McCumber – Futurewise  
 Cary Moon – People's Waterfront Coalition  
 Mike O'Brien – Sierra Club  
 Todd Voge – Allied Arts

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### Study Area for Systems Planning Approach



more broadly at the region as a whole to identify innovative strategies for moving people and goods in and through Seattle. The study area was broadened from the limited SR 99 corridor to a wider area more or less bounded by N. 85<sup>TH</sup> Street to the north, the Seattle city limits to the south, Elliott Bay to the west, and Lake Washington to the east (Exhibit 3-2). This allowed the Partnership Process to develop and analyze a range of capital and operating improvements for the entire existing transportation network. The Systems Approach not only included SR 99, but also I-5, Seattle's city streets, public transit, and policies and management actions designed to influence transportation modes and demand as possible solutions. The approach also expanded the set of potential solutions to include a combination of transit, bicycle, and pedestrian improvements.

The Systems Approach offered the potential to replace the function of the existing viaduct with a comprehensive, multi-modal strategy through the study area and encouraged the partnership agencies to coordinate their efforts. Different agencies took the lead on different facets in support of the Systems Approach. For example, the City of Seattle, consistent with its Urban Mobility Plan, led efforts to examine potential changes to city streets. Similarly, WSDOT led the analysis of any changes to I-5, and King County played a strong role in framing changes to the bus transit system.

## **6 What were the guiding principles and why were they needed?**

Before the Partnership Process, discussions on the Alaskan Way Viaduct tended to polarize parties within and across the city, region, and state. To help create a shared vision, WSDOT, King County, and the City of Seattle began by developing and agreeing to a set of guiding principles that defined goals for any central waterfront solution. These principles were discussed with the Stakeholder Advisory Committee for their thoughts and confirmed by Governor Gregoire, County Executive Sims, and Mayor Nickels in early 2008.

The guiding principles are as follows:

**Guiding Principle 1: Improve public safety.**

Replacing the viaduct is an urgent public safety issue. Any solution to the Alaskan Way Viaduct must improve public safety for current viaduct users and along the central waterfront.

**Guiding Principle 2: Provide efficient movement of people and goods now and in the future.**

Any solution to the Alaskan Way Viaduct must optimize the ability to move people and goods today and in the future in and through Seattle in an efficient manner, including access to businesses and port and rail facilities during and after construction.

**Guiding Principle 3: Maintain or improve downtown Seattle, regional, port, and state economies.**

Any solution to the Alaskan Way Viaduct must sustain the economic vitality of the city, region, port, and state during and after construction.

**Guiding Principle 4: Enhance Seattle’s waterfront, downtown, and adjacent neighborhoods as a place for people.**

Any solution to the Alaskan Way Viaduct must augment Seattle’s reputation as a world-class destination.

**Guiding Principle 5: Create solutions that are fiscally responsible.**

Any solution to the Alaskan Way Viaduct must make wise and efficient use of taxpayer dollars. The State’s contribution to the project is not to exceed \$2.8 billion in 2012 dollars.

**Guiding Principle 6: Improve the health of the environment.**

Any solution to the Alaskan Way Viaduct must demonstrate environmental leadership, with a particular emphasis on supporting local, regional, and state climate change, water quality, and Puget Sound recovery initiatives.

**7 How were the guiding principles used?**

The ability of a solution to meet all of the guiding principles served as the basis for the eventual recommended approach. To assess each scenario’s ability to meet the guiding principles, the Independent Project Management Team developed a set of evaluation measures (both qualitative and quantitative) for each of the six guiding principles, as shown in Exhibit 3-3. Like

## Exhibit 3-3

## Evaluation Measures

Guiding Principle	Evaluation Measures	Measurement Methodology
<b>1 Improve public safety.</b>	1 Seismic performance.	1 Evaluation compared to seismic design standards.
	2 Safety for users.	2 Qualitative transportation safety assessment based on travel modes, types of facilities, and potential exposure routes.
<b>2 Provide efficient movement of people and goods.</b>	1 Person throughput.	1 Peak period person throughput at select points.*
	2 Measure travel times for general purpose traffic for representative trips to and through the Center City.	2 Peak period travel times for representative trips.*
	3 Measure travel times for freight for representative trips to and through the Center City, including to port facilities and industrial areas.	3 Peak period and midday travel times for representative freight paths.*
	4 Evaluate changes in parking and loading access to the central waterfront and other affected business districts.	4 Concept-level range of loading/parking impacts by general area and possible strategies to mitigate any loss.
	5 Evaluate transit speed, capacity, and travel time.	5 Peak period travel times for representative transit paths.*
	6 Measure change in share of trips made by transit, carpool, bicycle, or foot.	6 Percent of trips by mode (drive alone auto, ride share, transit, non-motorized) for AM and PM peaks.*
	7 Measure quantity, capacity, and quality of access to and connections among Center City neighborhoods.	7 Qualitative assessment of changes to representative connection by mode.
	8 Measure directness, capacity, reliability, and quality of access to port facilities, rail yards, and industrial centers.	8 Qualitative assessment of changes to representative connections.
	9 Assess changes to bicycle connectivity in the Center City.	9 Qualitative assessment of changes in relation to bicycle and pedestrian plan.
<b>3 Maintain or improve downtown Seattle, regional, the port, and state economic vitality.</b>	1 Develop construction phasing concepts.	1 Develop construction phasing concepts for two construction conditions (construction efficient and traffic efficient) and use the concepts to bracket the range of possible impacts for consideration in the economic analysis.
	2 Assess long-term economic implications, based on the level of investment in the transportation infrastructure and changes to the following: <ul style="list-style-type: none"> <li>• Urban amenities and attractiveness of the central waterfront.</li> <li>• Environmental quality of the central waterfront.</li> <li>• Transportation access and user costs for travel to and through the central waterfront and greater Center City.</li> </ul>	2 Qualitative evaluation comparing differences across scenarios for standard measures of economic performance, such as: <ul style="list-style-type: none"> <li>• Real estate measures: vacancy rates, property values, and lease rates.</li> <li>• Economic activity measures: employment, sales, revenues, commodity volumes.</li> </ul> The evaluation will try to address all of these measures, but will do so at a high level aimed at identifying relative differences in economic impacts, supported by quantitative information from both local and national sources.
	3 Assess short-term economic implications during the construction period based on displacements; changes in access over time; and disruptions, noise, vibration, and other environmental consequences of the construction activities.	3 Qualitative evaluation using the same measurements as for long-term impacts; however, the focus will be narrower, in both time (short-run, construction) and geography (the downtown and immediately surrounding areas). As with the long-term economic impacts, the evaluation here will not address the impacts measure by measure, but in logical groupings that will yield a qualitative but understandable description of the major economic impacts on different types of businesses and locations during construction.

\* Note: Many of the transportation measures relied on the results of the regional transportation modeling work, modified by information gathered from case studies and the judgments of the professional transportation staff.

Exhibit 3-3

## Evaluation Measures

Guiding Principle	Evaluation Measures	Measurement Methodology
<b>4 Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.</b>	1 Evaluate open space opportunities.	1 Quantitative measures: promenade width, width of east sidewalk, acres of new public space. Qualitative measures: quality of new public space and impact of utility conflicts with waterfront open spaces.
	2 Evaluate pedestrian connectivity and barriers between the waterfront and other key downtown destinations.	2 Quantitative measures: number of waterfront pedestrian connections. Qualitative measures: quality of pedestrian connections.
	3 Measure shadowing and view blocking impacts.	3 Quantitative measures: area directly shaded by waterfront transportation structures. Qualitative measures: view blockage to the waterfront from University Street and from Pier 55 to downtown, location and bulk of ventilation structures, and view from the roadway.
	4 Assess changes in bicycle and pedestrian environment throughout Center City, including impacts of traffic volumes, speeds, and air pollution.	4 Qualitative assessment of pedestrian and bicycle environment based on overall Center City surface street changes in traffic volumes and speeds.
	5 Assess changes in traffic noise levels on the waterfront.	5 Estimate PM peak noise level at Pier 55 (quantitative).
	6 Assess transit access to and on the waterfront.	6 Review of waterfront stop coverage and service (qualitative).
	7 Assess impacts on historic structures and districts.	7 Qualitative description of changes to historic structures related to traffic, congestion, or character; and identification of potential modifications to or removals of historic structures.
<b>5 Create solutions that are fiscally responsible.</b>	1 Evaluate changes in parking and loading access to the central waterfront and other affected business districts.	1 Preliminary cost estimates of scenarios (quantitative). Preliminary operating cost estimates of scenarios (quantitative).
	2 Identify available and potential funding and impacts to the State of Washington's bond rating.	2 Qualitative description of funding sources and limitations of funds both committed and potential.
	3 Compare the design life of the proposed SR 99 and seawall improvements.	3 Anticipated design life of SR 99 and seawall.
<b>6 Improve the health of the environment.</b>	1 Assess changes in air quality.	1 Travel model data and estimated emission rates to assess changes in air quality.*
	2 Assess changes in carbon footprint.	2 Travel model data and emission rates measure tons of CO <sub>2</sub> (quantitative); vehicle miles traveled for study area and region* (quantitative).
	3 Estimate change in pollutants from storm water runoff into water bodies.	3 Assess opportunities to improve storm water quality (qualitative).
	4 Assess opportunities to improve near-shore habitat.	4 Describe potential for alternative treatments of seawall and opportunities for habitat creation (qualitative).

\* Note: Many of the transportation measures relied on the results of the regional transportation modeling work, modified by information gathered from case studies and the judgments of the professional transportation staff.

the guiding principles, the evaluation measures were developed with review and comments from both stakeholders and the legislative bodies.

The evaluation process applied a common set of assumptions, modeling approaches, and evaluation measures to ensure similar evaluation of all concepts under consideration. The Partnership Process used these evaluation measures as a fair and consistent yardstick to assess the relative strengths and weaknesses of different scenarios.

### **8 What transportation projects and programs were considered for inclusion in the systems scenarios?**

From January through April 2008, the Partnership Process developed an extensive list of potential strategies to help move people and goods in and through Seattle. They organized these strategies into five categories, or building blocks:

- Surface Streets
- I-5
- Transit
- Policies and Management
- SR 99

Within each set of building blocks, individual strategies were arranged into subgroups, or themes, representing similar types of actions that could be considered as part of an overall systems solution.

#### **Surface Streets Building Blocks**

The surface street building block set focused on how local streets and connections could be improved and managed to better serve auto, transit, bicycle, pedestrian, and freight movements through downtown Seattle. They covered streets from north of the Lake Washington Ship Canal to south of S. Spokane Street and included the following eight themes:

- *Create strong east-west connections* – add improvements on streets such as Mercer Street, Roy Street, and S. Spokane Street.
- *Create manifolds to distribute traffic over multiple pathways into downtown from the north and the south* – improve access to and from Aurora Avenue, Sixth Avenue, Dexter

Avenue, Fairview Avenue, First Avenue S., and Airport Way; build a new arterial across the north lot of Qwest Field and a new Alaskan Way surface street.

- *Increase north-south capacity through downtown* – construct improvements such as an expanded Alaskan Way surface street, or added lanes on other downtown north-south streets.
- *Enhance the downtown street grid* – add new lanes on key streets, provide new two-way movements, or complete connections for both east-west and north-south streets.
- *Provide reliable truck routes* – accommodate freight on streets such as Mercer Street; Second, Third, and Fourth Avenues; S. Lander and S. Spokane Streets; E. Marginal Way; and SR 519.
- *Keep transit fast and reliable* – provide transit-only lanes, transit signal priority, and streetcar improvements throughout the downtown grid, including streetcars to First Hill and along First Avenue.
- *Provide high-quality bicycle connections* – provide bike lanes or sharrows (shared bike and traffic lanes with special markings) giving bicyclists high-quality routes through downtown; potential streets include Second, Fourth, and Ninth Avenues; Alaskan Way; and Pine Street.
- *Provide high-quality pedestrian connections* – provide improved crossings, new pedestrian bridges, widened sidewalks, and other facilities for pedestrians traveling to and through downtown.

### **I-5 Building Blocks**

The I-5 building block set looked at ways to address the problems of congestion and reliability on I-5. Many of the improvements focused on ways to manage the corridor traffic more efficiently, while others addressed key bottlenecks and choke points. The following were key themes:

- *Prioritize throughput over local access* – remove or meter existing ramps in downtown.

- *Improve flow by reducing weaving* – make improvements to reduce or eliminate congestion causing weaving movements between the Spokane Street and I-90 interchanges.
- *Operate the system more efficiently* – implement active traffic management systems and driver information systems, and change how reversible lanes and high-occupancy vehicle (HOV) lanes operate.
- *Keep transit moving quickly and reliably* – implement peak period shoulder use, improved ramp access, tolls, and changes in HOV and express lane operations.
- *Add capacity for vehicles and freight* – add new through lanes in the most restricted downtown section.

### **Transit Building Blocks**

The transit building block set focused on adding new transit facilities and new and expanded transit services to move more people to and through downtown. The themes included the following:

- *Enhance RapidRide service* – increase frequency on existing and planned lines and/or add lines serving areas such as West Seattle, Ballard, and north Seattle. RapidRide Service is scheduled to begin in 2010.
- *Improve transit frequency, speed, and reliability* – add more frequent service all day on transit routes, along with investments to improve speed and reliability.
- *Improve priority pathways for transit* – add bus-only lanes and transit signal priority, improve stop spacing, and modify the route network and street system to improve transit operations.
- *Add new commuter-oriented routes to serve edges of downtown* – increase service and add routes to serve areas such as First Hill, South of Downtown (SODO), and South Lake Union.
- *Add streetcar lines* – add new streetcar lines connecting SODO to Seattle Center, South Lake Union to the

University District and Fremont/Ballard, and International District to First Hill and 23<sup>RD</sup> Avenue.

- *Extend Link light rail* – build light rail extensions north, south, and east as called for in Sound Transit Phase 2 (ST2), and supported by bus transit feeding to light rail.
- *Increase Sounder commuter rail service* – add more frequent two-way service, all day, with greater park-and-ride capacity.

### **Policies and Management Building Blocks**

The policies and management building block set included strategies for managing vehicle demand and encouraging the use of other transportation choices. Policies and management also included strategies to improve the efficiency of the existing transportation system. Key themes included the following:

- *Manage parking supply* – implement measures to reduce drive-alone commute trips and make short-term parking available for customers.
- *Promote transit, walking, and biking instead of driving* – implement incentives, promotions, and supporting systems and facilities.
- *Make transit an affordable, reliable, and easy-to-use choice* – increase transit coverage and quality of service.
- *Reduce auto use through land use choices* – promote higher-density, mixed-use development around transit nodes or corridors.
- *Use employer-based strategies to encourage employees to travel by alternative modes* – implement programs and incentives focused on parking management and encouraging transit, ridesharing, or telework.
- *Consider pricing to discourage peak period single-occupant auto travel* – implement tolls on major corridors, with higher prices at the most congested times.

- *Actively manage roadways to optimize throughput of people and goods* – implement better enforcement, technology, and operating changes.
- *Manage traffic flow and give trucks and transit priority* – add signals, priority lanes, and other treatments.
- *Provide travelers with real-time information on transportation conditions and options.*
- *Manage demand and congestion related to special events.*

### **SR 99 Building Blocks**

The SR 99 building block set represented more than 100 individual concepts that offered different design, construction, or alignment approaches for the central waterfront section of SR 99. Potential solutions fell into three key groups, which included ideas that have been considered in the past, as well as new concepts. They included the following themes:

- *Above-ground Facility* – such as a retrofit of the existing viaduct, an Elliott Bay crossing, an Alaskan Way elevated roadway, or an integrated elevated roadway (adjacent buildings/right-of-way with a potential park on the roof).
- *Surface Facility* – such as an Alaskan Way boulevard, Alaskan Way/Western Avenue couplet (a pair of streets with each street carrying one direction of opposing traffic), or an Alaskan Way surface expressway.
- *Below-ground Facility* – featuring a bored tunnel, cut-and-cover tunnel, or a depressed/lidded roadway.

### **9 How were the building blocks combined?**

Using the various building blocks, eight systems scenarios (or comprehensive solutions) were constructed for replacing the viaduct's central waterfront section. The systems scenarios were created to test the performance of various combinations of SR 99, I-5, surface street, transit, and transportation demand management building blocks. The intent of this analytic step was not to select a particular scenario, but rather to learn which elements worked best together as evaluated by the six

guiding principles. With this knowledge, one or more hybrid scenarios could then be developed and evaluated.

### **Scenarios Without SR 99 Limited-Access Facilities**

The first three scenarios included combinations of building blocks that did not include a limited-access roadway element as a replacement for SR 99. All of these scenarios assumed a new interchange near S. King Street, which is part of the S. Holgate Street to S. King Street Viaduct Replacement Project. These scenarios are described below.

#### ***Scenario A: Demand Management and Low Capital***

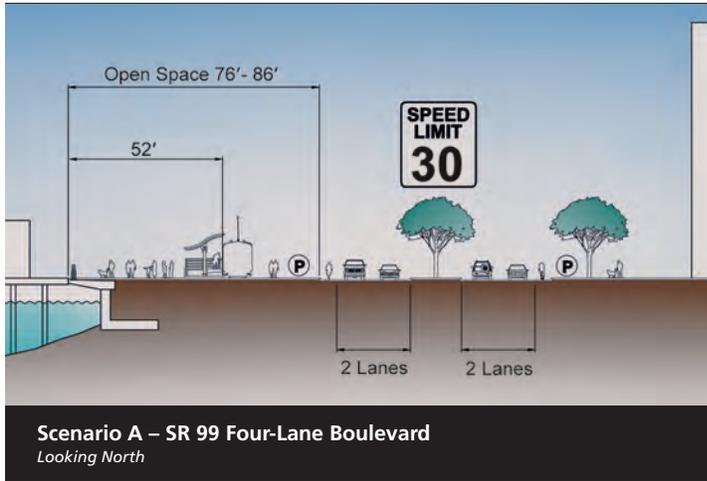
Scenario A combined lower-cost investments in new roads and transit service with a maximum effort to manage transportation systems and demand. This scenario included the most aggressive program of actions to manage roadway demand and was the only scenario that tested tolling.

With Scenario A, SR 99 would be replaced with an improved Alaskan Way surface boulevard that would be two lanes in each direction north of Yesler Way, with bike lanes and parking. There would be signalized intersections on the waterfront. A new street would be constructed in the footprint of the existing viaduct to connect Alaskan Way surface street near Pier 59 to Elliott and Western Avenues and the Battery Street Tunnel. This scenario would also reconnect the east-west street grid north of the Battery Street Tunnel with new signalized intersections on Aurora Avenue. Transit lanes would be added on several downtown streets, including a second transit lane on Second and Fourth Avenues.

In this scenario, the waterfront streetcar would be rebuilt, and a new streetcar line would extend from King Street Station to Capitol Hill/First Hill. New RapidRide (bus rapid transit) lines would be introduced between Burien and downtown Seattle via Ambaum and Delridge and on Lake City Way. Service levels on Ballard, West Seattle, and Aurora RapidRide lines would all be improved. Seattle's transit system would be enhanced through the creation of a seven-route network of rapid trolley buses. Incorporating elements of RapidRide into the electric trolley bus network would provide frequent service meeting the goals of Seattle's Urban Village Transit Network.

On I-5, a northbound transit-only lane from Olive Way to SR 520 and a southbound managed lane from Mercer Street to S. Spokane Street would also be included.

This scenario would offer an open space along the central waterfront approximately 76 feet wide. See Exhibit 3-4 for more detail.



***Scenario B: Surface Boulevard and Transit***

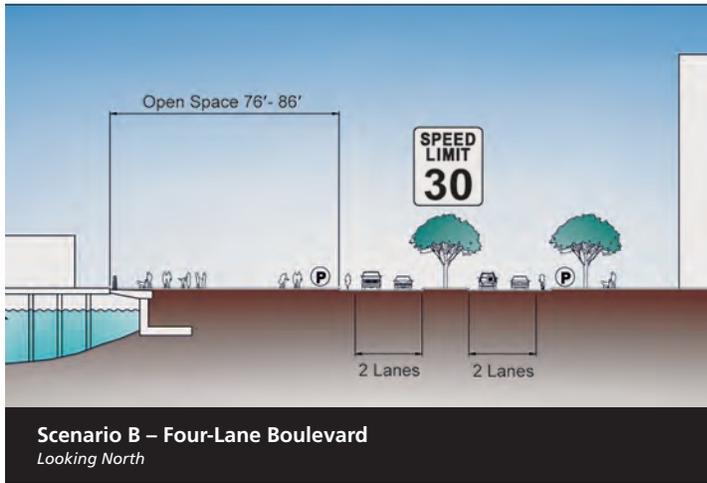
Scenario B was similar to Scenario A, but it had more capital investments and more aggressive transit improvements with only a moderate level of transportation demand and system management elements.

With Scenario B, SR 99 would be replaced with an improved Alaskan Way that would be two lanes in each direction north of Yesler Way, with bike lanes and parking. There would be signalized intersections along the waterfront. A new street would be constructed in the footprint of the existing viaduct to connect the Alaskan Way surface street near Pier 59 to Elliott and Western Avenues and the Battery Street Tunnel. A new arterial would be built through the north parking lot of Qwest Field connecting from Second Avenue to Airport Way. The east-west streets north of the Battery Street Tunnel would be reconnected with new signalized intersections on Aurora Avenue.

The waterfront streetcar would not be replaced. Instead, a new streetcar would connect the International District Station to Pioneer Square and Seattle Center via First Avenue. In this scenario, the streetcar system would be extended, with lines to Fremont/Ballard, University District, central downtown, and Capitol Hill/First Hill. New RapidRide (bus rapid transit) lines would be introduced between Burien and downtown Seattle via Ambaum and Delridge and on Lake City Way. Service levels on Pacific Highway South, Ballard, West Seattle, and Aurora RapidRide lines would all be improved. Seattle's transit system would be enhanced through the creation of a nine-route network of rapid trolley buses. Incorporating elements of RapidRide into the electric trolley bus network would provide frequent service meeting the goals of Seattle's Urban Village Transit Network.

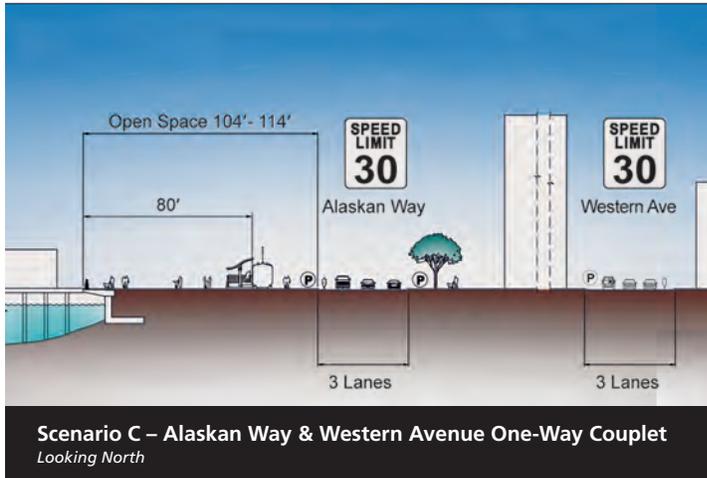
On I-5, instead of the transit-only lane starting at Olive Way as proposed in Scenario A, an additional northbound managed lane would start near Seneca Street and go north to SR 520. The southbound lane on I-5 was included in Scenario B as well.

This scenario would also offer an open space approximately 76 feet wide along the central waterfront. See Exhibit 3-5 for more detail.



**Scenario C: Alaskan Way and Western Avenue One-Way Couplet**

As shown in Exhibit 3-6, Scenario C would replace SR 99 with a pair of north- and southbound one-way streets, a couplet, along the waterfront. Western Avenue would become a one-way northbound street with three lanes and a bike lane. Alaskan Way would become a one-way southbound street with three lanes and a bike lane. A new street would be constructed in the footprint of the existing viaduct to connect the Alaskan Way surface street near Pier 59 to Western Avenue and the Battery Street Tunnel. Northbound Western Avenue would start near Yesler Way and include an underpass near Pike Place Market to minimize interference with market activities. The street grid north of the Battery Street Tunnel would be reconnected with signalized intersections on Aurora Avenue.



With Scenario C, I-5, surface street, and transit improvements, as well as a moderate level of transportation demand and system management elements, would be similar to Scenario B. However, the rapid trolley bus network would be expanded to 10 routes, and this scenario did not include streetcar extensions to Ballard, Fremont, and the University District. This scenario would offer an open space approximately 104 feet wide along the central waterfront.

#### **Scenarios With SR 99 Limited-Access Facilities**

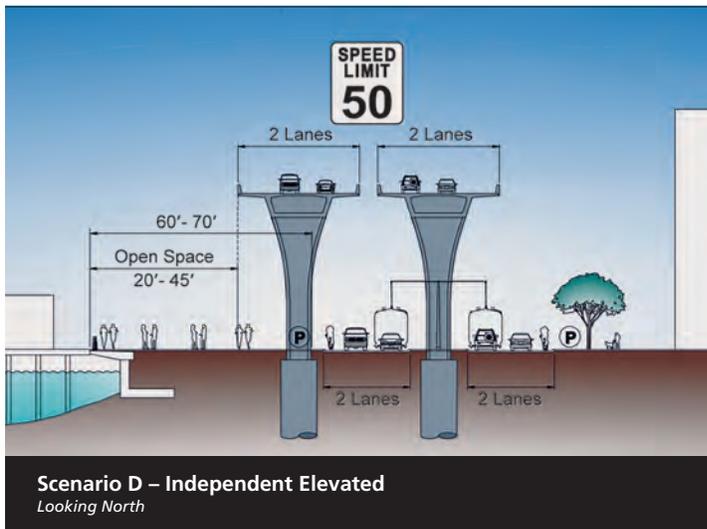
Scenarios D through H were known collectively as the “bypass” scenarios, all of which would provide a new limited-access facility to replace the viaduct. All of the bypass scenarios assumed a new interchange near S. King Street, which is part of the S. Holgate Street to S. King Street Viaduct Replacement Project. All of the bypass scenarios would eliminate the existing midtown access ramps at Columbia and Seneca Streets. Instead, midtown access would be provided near S. King Street. Distinctions among the bypass scenarios are summarized below.

#### ***Scenario D: Independent Elevated***

Scenario D paired four elevated lanes on the waterfront with a lower level of surface and transit improvements than found in Scenarios A through C. This scenario also included a moderate level of transportation demand and system management elements.

With Scenario D, SR 99 would run along the waterfront on two independent bridge structures, side-by-side, with two lanes in each direction. Efforts to reconnect the street grid north of the Battery Street Tunnel would include a new Republican Street underpass.

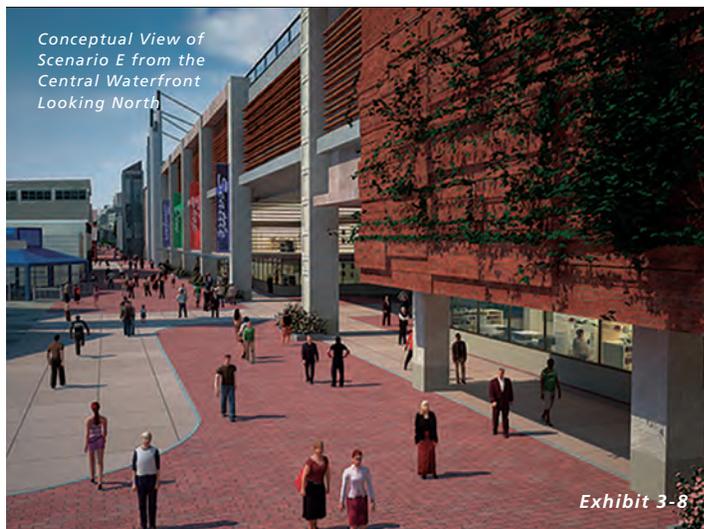
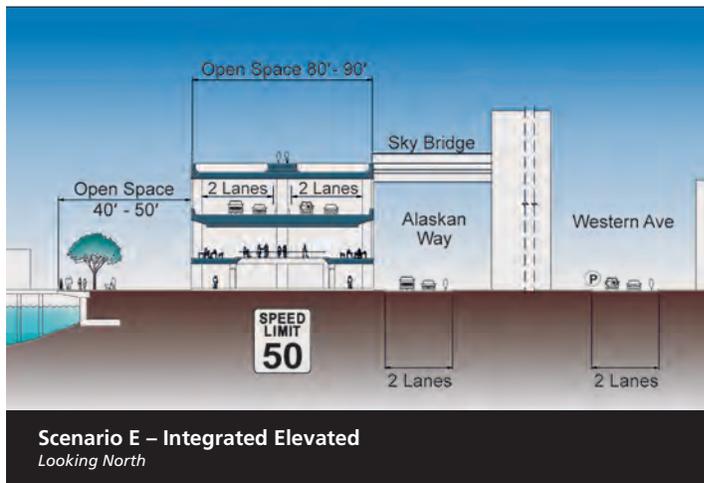
New transit lanes, RapidRide lines, transit service, and streetcar lines would be scaled down from what was proposed in Scenarios B and C. Additional RapidRide (bus rapid transit) investments would be limited to the Burien-Delridge and Lake City Way RapidRide lines. The rapid trolley bus network would be reduced to a four-route network, and streetcar expansion would be limited to the waterfront and King Street Station to First Hill/Capitol Hill routes.



This scenario would have the north- and southbound I-5 improvements mentioned in Scenario B and would offer an open space approximately 68 feet wide along the central waterfront. Of all the alternatives studied, Scenario D most closely resembled the existing viaduct. See Exhibit 3-7 above for more detail.

***Scenario E: Integrated Elevated***

Scenario E paired four bypass lanes on the waterfront with a lower level of surface and transit improvements than Scenarios A through C. This scenario also included a moderate level of transportation demand and system management elements.



As shown in Exhibit 3-8, the integrated elevated structure would have one level of enclosed traffic with two lanes in each direction. The upper deck would be an open park, and development space would be included underneath the roadway. The development could be offices, retail space, or housing. The Alaskan Way surface street would have two southbound lanes, and Western Avenue would have two northbound lanes from S. Washington Street to Union Street. East-west traffic access to Alaskan Way would be provided through openings under the integrated elevated structure. Sky-bridges could connect the buildings on the east side of the structure to the park. Efforts to reconnect the street grid north of the Battery Street Tunnel would include a new Republican Street underpass.

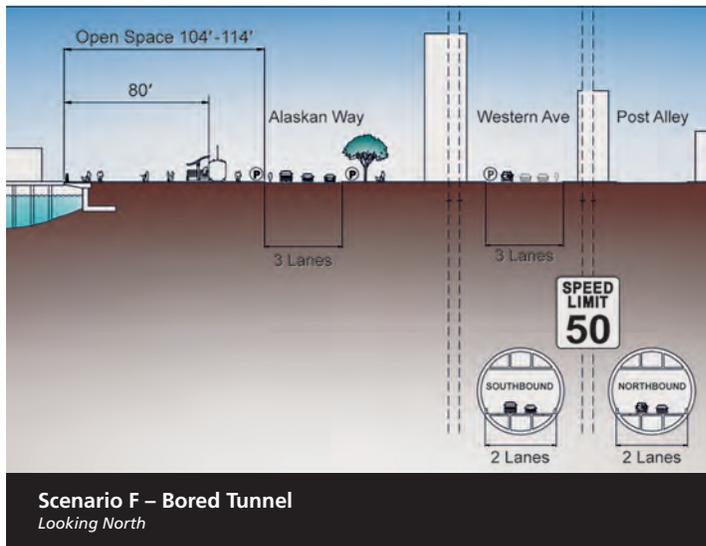
With Scenario E, new transit lanes, RapidRide lines, transit service, and streetcar lines would be very similar to those proposed in Scenario D with the exception that the waterfront streetcar would be replaced by a First Avenue streetcar. On I-5, this scenario would include only a northbound transit-only lane from Olive Way to SR 520. Open space provided along the central waterfront would be approximately 40 feet wide at ground level, with an approximately 90-foot-wide elevated park.

The integrated elevated structure would be dependent on private investment to complete the commercial space located beneath the roadway. This is the only scenario that included any integrated private development.

***Scenario F: Bored Tunnel***

This scenario paired four bypass lanes in two bored tunnels with a lower level of surface and transit improvements than found in Scenarios A through C. This scenario also included the lowest level of transportation demand and system management elements. Unlike the other scenarios, the bored tunnel would not use the existing Battery Street Tunnel and could be constructed without removing the existing viaduct.

The bored tunnels would have two lanes in each direction. They would extend from approximately S. Royal Brougham Way to Harrison Street. This scenario also included the Alaskan Way and Western Avenue couplet, similar to Scenario C, and I-5 improvements similar to Scenario E. New transit lanes, RapidRide lines, transit service, and streetcar lines would be very similar to those proposed in Scenario D without the RapidRide investments. Open space provided along the central waterfront would be approximately 104 feet wide. See Exhibit 3-9 for more detail.

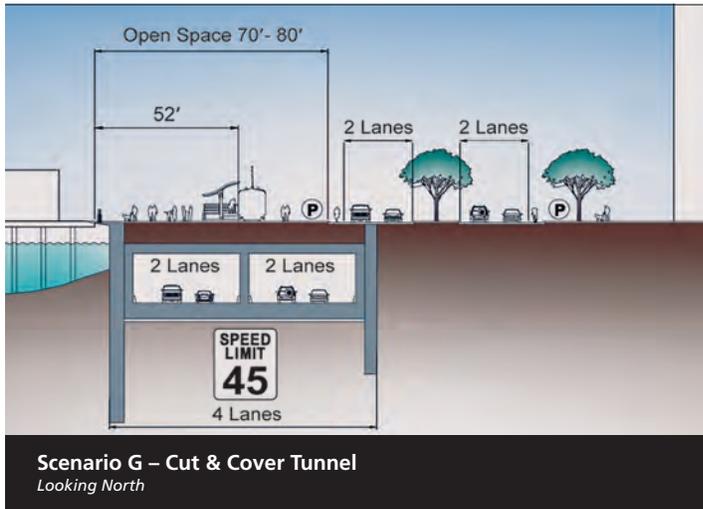


### ***Scenario G: Cut-and-Cover Tunnel***

This scenario paired four bypass lanes on the waterfront in a cut-and-cover tunnel with a lower level of surface and transit improvements than found in Scenarios A through C. This scenario also included a moderate level of transportation demand and system management elements.

The cut-and-cover tunnel would be side-by-side with two lanes in each direction. Alaskan Way would be a four-lane boulevard with two lanes in each direction. This scenario included a new Republican Street underpass to reconnect the street grid north of the Battery Street Tunnel. New transit lanes, RapidRide lines, transit service, and streetcar lines would be very similar to those proposed in Scenario D without the RapidRide invest-

ments. This scenario would have the north- and southbound I-5 improvements mentioned in Scenario B. Open space provided along the central waterfront would be approximately 76 feet wide. See Exhibit 3-10 for more detail.

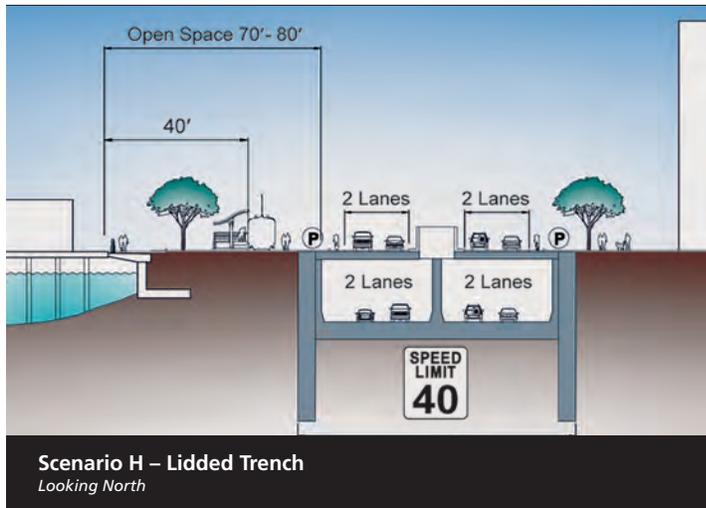


**Scenario H: Lidded Trench**

This scenario paired four bypass lanes on the waterfront in a lidded trench with a lower level of surface and transit improvements than Scenarios A through C. This scenario also included a moderate level of transportation demand and system management elements.

The four-lane lidded trench concept represented a subsurface roadway that was not fully enclosed and shorter in length com-

pared to the other bypass concepts, running only from Yesler Way to Union Street. It would have two lanes in each direction in a side-by-side trench with openings roughly every 300 feet. The openings would allow for natural ventilation, and the lidded portions would provide pedestrian connections and east-west connections to the waterfront piers, as shown in Exhibit 3-11.



North of Union Street and south of Yesler Way, this scenario was similar to a surface street scenario. Street grid improvements would include signalized intersections north of the Battery Street Tunnel and south of Yesler Way. New transit lanes, RapidRide lines, transit service, and streetcar lines would be very similar to those proposed in Scenario D. This scenario would have the north- and southbound I-5 improvements

mentioned in Scenario B. Open space provided along the waterfront would be approximately 76 feet wide.

### **SR 99 Concepts Not Included in a Scenario**

Of the original concepts identified for an SR 99 replacement, retrofit of the existing viaduct, an Elliott Bay crossing, and an Alaskan Way surface expressway (a high-speed Alaskan Way) were not included among the systems scenarios assembled for evaluation. As previously discussed, any solution to the Alaskan Way Viaduct must address all six guiding principles. A preliminary analysis conducted by the Independent Project Management Team showed conclusively that retrofit of the existing viaduct, an Elliott Bay crossing, and an Alaskan Way surface expressway all failed to meet two or more of these guiding principles; therefore, these concepts were not carried forward for additional analysis. The six-lane full-capacity bypass replacement concepts located within the SR 99 corridor were studied extensively in the 2004 Draft EIS and 2006 Supplemental Draft EIS preceding the Partnership Process, so they were not reexamined.

### ***Retrofit of the Existing Viaduct***

Earlier work in support of the 2004 Draft EIS had concluded that retrofitting the existing viaduct to meet current seismic standards was not cost-effective, since it would require nearly 80 percent of the cost of a new structure and result in a roadway with substandard design features. At the urging of the Stakeholder Advisory Committee, the retrofit concept was reexamined by both the Independent Project Management Team and additional outside experts. The new analysis reaffirmed the earlier work and demonstrated that retrofitting the existing viaduct would fail to meet the following guiding principles:

- *Guiding Principle 1 – Improve public safety.* A long-term solution must meet the 1,000-year earthquake standard. Standards for either a 500-year (the previous standard) or a 1,000-year earthquake can only be met with costly and disruptive partial reconstruction of the existing structure. Furthermore, a retrofitted viaduct would still have narrow lanes, no shoulders, and minimal space for merging.

- *Guiding Principle 4 – Enhance Seattle’s waterfront, downtown, and adjacent neighborhoods as a place for people.* A retrofitted viaduct would afford little or no change to the waterfront as a place for people.
- *Guiding Principle 5 – Create solutions that are fiscally responsible.* The cost of a retrofit approaches 80 percent of the cost of a new structure, which is not cost-effective.
- *Guiding Principle 6 – Improve the health of the environment.* A retrofitted viaduct would make little or no improvements to the environment.

#### ***Alaskan Way Surface Expressway***

This concept would create a six-lane high-speed facility with pedestrian overpasses and a frontage road for access to the piers. A surface expressway on Alaskan Way would fail to meet the following guiding principles:

- *Guiding Principle 4 – Enhance Seattle’s waterfront, downtown, and adjacent neighborhoods as a place for people.* A surface expressway would provide limited possibilities for public open space on the waterfront and could be a greater barrier for people accessing the waterfront than the existing viaduct.
- *Guiding Principle 6 – Improve the health of the environment.* A surface expressway would be likely to cause negative impacts to the environment on the central waterfront.

#### ***Elliott Bay Crossing***

A bridge or other crossing of Elliott Bay would fail to meet the following guiding principles:

- *Guiding Principle 3 – Maintain or improve downtown Seattle, regional, port, and state economies.* A bridge or other crossing of Elliott Bay would be likely to disrupt shipping and Port activity.
- *Guiding Principle 5 – Create solutions that are fiscally responsible.* A bridge or other crossing of Elliott Bay may not be cost-effective due to the depth of Elliott Bay and the high risk associated with this type of construction.

- *Guiding Principle 6 – Improve the health of the environment.*  
Structures in water would create environmental impacts that would be difficult to justify to permitting agencies under current law since alternatives on land are feasible.

## 10 How were the systems scenarios evaluated?

The eight systems scenarios were analyzed using 28 evaluation measures based on the six guiding principles. The guiding principles were not weighted when used to evaluate the scenarios. This section describes what was evaluated.

### Guiding Principle 1: Safety

Evaluation measures under Guiding Principle 1 assessed public safety. Analysts evaluated seismic risk by comparing proposed SR 99 replacement structures to seismic design standards. Transportation safety was assessed qualitatively, based on travel modes, types of facilities, and potential exposure routes.

### Guiding Principle 2: Transportation

Guiding Principle 2 covered many aspects of transportation performance, using both qualitative and quantitative methods of evaluation. To address the quantitative transportation assessment of the scenarios, analysts used the regional travel demand forecast model. This model provided representative travel patterns, calibrated to existing conditions, and showed future travel patterns in 2015 that would result from future transportation networks as defined in the scenarios. The data from the regional model were used as the basis for more refined operational modeling work in the Center City area of Seattle. The modeling results were used to conduct several of the quantitative evaluations under Guiding Principle 2.

Measures such as person trips, through trips, and mode share all were based on output from the travel demand model. Assessments of travel time for general-purpose traffic, freight, and transit relied on the refined operational modeling, supplemented by detailed ground survey data. Transit impacts were assessed based on both ridership forecasts from the modeling work and the level of transit service improvements included in each of the scenarios.

#### What is the Center City?

Center City is the area of Seattle that generally encompasses Uptown, South Lake Union, First Hill, Capitol Hill, and downtown proper (which includes Pioneer Square and the International District).

Parking effects were evaluated by providing a concept-level range of loading/parking impacts by general area and possible strategies to mitigate any loss.

Neighborhood, freight, bike, and pedestrian connectivity were evaluated qualitatively through an examination of the proposed transportation network.

The modeling effort used a 2015 horizon year to test the performance of the proposed transportation scenarios. The decision to use 2015 instead of a more distant horizon year was based on the following factors:

- The Governor had called for the removal of the existing viaduct by 2012. Selecting 2015 provided a time frame closely aligned with the time that replacement facilities and other system elements would need to be in place.
- The project-level environmental review processes that follow the recommendation on a preferred systems solution for the Alaskan Way Viaduct will include more detailed analysis of future horizon years (2030 to 2040).
- Funding conditions for transportation facilities are difficult to predict beyond a 5- to 10-year horizon. Selecting 2015 required fewer assumptions to be made regarding the regional transportation system, which provided a more consistent basis for comparison of scenarios.
- Given the volatile conditions today (economy, land use, oil prices, funding, carbon reduction policies), using a horizon year in the relatively near future provided a more tangible basis to the public and decision makers for judging how the scenarios might change travel.

### **Guiding Principle 3: Economics**

The evaluation measures under Guiding Principle 3 assessed local and regional short- and long-term economic implications.

Short-term economic effects were determined by considering displacements; changes in access over time; and disruptions, noise, vibration, and other environmental consequences of the construction activities. For each scenario, construction phasing

concepts were developed for two conditions: one aimed at minimizing construction impacts and the other aimed at maximizing efficiency. This provided a range of possible impacts for consideration in the economic analysis.

Long-term economic effects were determined by considering urban amenities and attractiveness of the central waterfront, environmental quality of the central waterfront, and transportation access and user costs for travel to and through the central waterfront and greater Center City.

#### **Guiding Principle 4: Urban Design**

The evaluation under Guiding Principle 4 assessed urban design both quantitatively and qualitatively.

Quantitative evaluation factors included promenade width, width of east sidewalk, acres of new public space, number of waterfront pedestrian connections, peak noise levels on the waterfront, and area directly shaded by waterfront transportation structures.

Qualitative evaluation factors included quality of new public space, quality of the pedestrian connections, quality of views, quality of pedestrian and bicycle environment, quality of transit access to the waterfront, and changes to historic structures and districts.

#### **Guiding Principle 5: Fiscal Responsibility**

The evaluation under Guiding Principle 5 considered the capital and operating cost estimates of the scenarios. The three agencies provided base costs for each of the building block elements included in the scenarios. These base costs were modified to account for contingency and risk, and a construction phasing plan was developed that allowed these costs to be escalated to year-of-expenditure dollars.

Funding sources and limitations of funds both committed and potential were considered. The anticipated design life of all SR 99 and seawall replacement concepts were considered, per applicable design standards. The state's total contribution to the project has been limited to \$2.8 billion, including commitments already made to the Moving Forward projects. This threshold became a major consideration when viewing the

costs of the SR 99 component and the need to find additional funding sources. In the end, the costs of a scenario must be weighed against the degree to which other guiding principles are met.

### **Guiding Principle 6: Natural Environment**

The evaluation under Guiding Principle 6 considered effects to the natural environment through a variety of quantitative and qualitative methods. Air quality effects and carbon footprint were assessed using travel model data and estimated emission rates. Opportunities to improve stormwater quality and near-shore habitat were assessed qualitatively, using available and emerging best management practices.

### **11 What were the findings of the scenario evaluations?**

The first guiding principle and its two associated evaluation measures related to public safety proved not to be a distinguishing factor among the scenarios. All of the scenarios improved seismic and transportation safety compared to today by removing the viaduct and making transportation investments that meet today's transportation and seismic safety standards.

The sixth guiding principle related to improving the health of the environment and its four associated evaluation measures also proved not to be a distinguishing factor. All of the scenarios offered opportunities to meet or exceed current environmental standards and regulations and improve the environment through stormwater treatment, noise reduction, and habitat creation. In addition, changes in air quality and greenhouse gas emissions did not appear to be significant discriminators among the scenarios.

No single scenario performed best on all guiding principles, and significant tradeoffs existed among the various choices. For example, the I-5, surface, and transit scenarios (Scenarios A, B, and C) performed quite well on the environmental, urban design, and cost measures, while the bypass scenarios (Scenarios D, E, F, G, and H) performed better on the measures related to future travel needs, mobility for trips passing through downtown, and potential effects on the local economy.

## 12 What were the hybrid scenarios?

After evaluating the eight systems scenarios, it was clear that no single combination of elements would perform best on all guiding principles and that significant tradeoffs exist among the various choices. As a result, the Independent Project Management Team decided to focus on developing two classes of hybrids: an optimal I-5, Surface, and Transit Hybrid and one or more hybrids with a bypass element. This approach was chosen to help focus the decision-making and highlight the major tradeoffs among the choices. The Independent Project Management Team, along with the staff and consulting teams working for WSDOT, King County, and the City of Seattle, developed hybrid scenarios by assembling the best-performing combinations from the original eight systems scenarios based on the findings of the evaluation.

The following key findings from evaluating the systems scenarios were useful in the development of the hybrid scenarios:

- The scenarios with an SR 99 surface element performed better from a transportation standpoint than some observers had originally expected. This occurred because of the performance of the improvements to I-5, surface streets, and transit, as well as the policy and management programs. Nevertheless, the surface scenarios did show substantially longer trip times for some of the through trips that now use the Alaskan Way Viaduct.
- Of the surface elements for SR 99, the Alaskan Way and Western Avenue one-way couplet should prove the most efficient from a transportation standpoint. This concept does raise concerns associated with the added traffic volumes on Western Avenue as well as the resulting change in Western Avenue's character.
- A number of the I-5 improvements, in particular the addition of a new northbound and a new southbound managed lane through downtown, were highly effective in improving I-5 operations and had the potential to absorb some through traffic from SR 99 if through capacity on SR 99 were restricted.

- Transit facility and service improvements proved very effective in handling the increased use of transit in many of the scenarios, particularly for travel to and from downtown.
- Policies and transportation demand management strategies (including tolling), surface street improvements, and pedestrian and bicycle improvements can enhance mobility, especially for travel to and from the Center City. However, these strategies were less effective in enhancing mobility for travel through downtown.
- The bypass scenarios (elevated structures, tunnels, and the lidded trench) all have the potential to provide a quantity (capacity) and quality (travel times) of travel through the Center City that cannot be realized with the surface scenarios. On the other hand, these scenarios did not significantly alter the quantity or quality of access to downtown.
- Construction impacts along the central waterfront associated with the cut-and-cover tunnel and lidded trench (Scenarios G and H), and to a lesser extent the integrated elevated and independent elevated scenarios (Scenarios E and D), were substantial and would be challenging to mitigate. Impacts would be much less with the SR 99 surface scenarios (Scenarios A, B, and C) and the bored tunnel (Scenario F).
- From an urban design and environmental perspective, the elevated bypass scenarios present serious challenges that would be difficult to overcome and mitigate. In this regard, the integrated elevated scenario (Scenario E) was the most challenging because of the scale of the structure and uncertainties about the usefulness and attractiveness of the commercial space under the structure and the public park above the roadway.
- The capital costs for all of the complete scenarios exceed the state's commitment of \$2.8 billion. However, without the I-5, surface street, and transit elements of Scenarios A, B, C, and D, the SR 99 element of these scenarios (surface boulevard, surface couplet, and independent

elevated structure) could be constructed within the commitment.

### **Approach to Hybrid Scenario Development**

Developing the hybrid scenarios was not easy. The analysis of the systems scenarios made clear the inevitable tradeoffs among different approaches and designs. No one approach was a clear winner on all six guiding principles. The Independent Project Management Team started with four hybrid scenarios that it felt maximized benefits and/or highlighted the inherent tradeoffs and eventually winnowed these to three that were recommended to the Partnership Leadership Team. Below is a synopsis of the Independent Project Management Team's approach.

The first step was to form a hybrid scenario from what was learned from analyzing the three surface scenarios (Scenarios A, B, and C). Using these findings, the Independent Project Management Team developed an I-5, Surface, and Transit Hybrid based on the surface couplet contained in Scenario C. This was viewed as a compromise that provided better transportation performance for through trips and the smallest possible Alaskan Way roadway cross-section but altered the character of Western Avenue.

Next, the team looked at possible SR 99 bypass elements and concluded that the many tradeoffs involved among the elevated and subsurface elements made it difficult to select a clear best choice. Instead, the team focused on developing a most promising approach within each general category.

The team developed an Elevated Bypass Hybrid using the independent elevated structure of Scenario D. The independent elevated structure was chosen as this hybrid's base because it was the only SR 99 bypass element that could be constructed within the state's \$2.8 billion commitment. While the independent elevated structure presents many challenges in satisfying the urban design and environmental guiding principles, it was the only bypass element capable of satisfying the fiscal responsibility guiding principle.

Given the independent elevated structure's drawbacks related to the urban design and environmental guiding principles, the

team concluded that a subsurface bypass hybrid should also be considered. While the subsurface choices would involve other tradeoffs with one or more of the guiding principles, it was felt that these choices needed to be presented to inform the three executives' deliberations. To that end, the three subsurface scenarios (Scenarios F, G, and H) had the greatest potential to satisfy the other guiding principles, but all failed the fiscal responsibility guiding principle. Also, the cut-and-cover tunnel and lidded trench involved major construction disruption both to the central waterfront and to the movement of through traffic along the SR 99 corridor.

Of all of the subsurface scenarios, the lidded trench was the least costly, but as configured in Scenario H with traffic signals at the north and south ends, it had limited ability to serve through traffic. As a result, additional work was done to explore the possible benefits of altering the trench to include all of the grade separations included with the cut-and-cover tunnel. This work found that the transportation performance of the trench could be improved to make it similar to both the cut-and-cover tunnel and the independent elevated structure, but that in doing so its construction costs rose close to the cost of the cut-and-cover tunnel while having the noise and urban design drawbacks of the ventilation openings. As a result, the lidded trench did not appear to have substantial advantages over the cut-and-cover tunnel.

The twin bored tunnel, while the most expensive of all of the SR 99 bypass scenarios, had substantial transportation benefits and the greatest potential to meet the urban design and environmental guiding principles. The twin bored tunnel was also the least disruptive from a construction standpoint to both the central waterfront and the operation of SR 99. In addition, advances in tunnel boring machine technology might allow the use of a single large-diameter bore to accommodate the four traffic lanes as opposed to the two tubes that had been assumed in Scenario F. Building a single large bore might reduce costs and construction time. Finally, the bored tunnel had the greatest potential to be built as a toll facility, and studies indicated that tolling might help contribute up to \$400 million to help pay for the bored tunnel's additional cost. An effect of the twin bored tunnel compared to the other bypass scenarios is a slight increase in travel times for bypass trips in the Elliott and

Western Avenue corridor since this scenario does not include the ramp connections contained in the other bypass scenarios. Based on all of these considerations, a decision was made to develop a second bypass hybrid scenario using the bored tunnel.

Each of the three hybrid scenarios are summarized below.

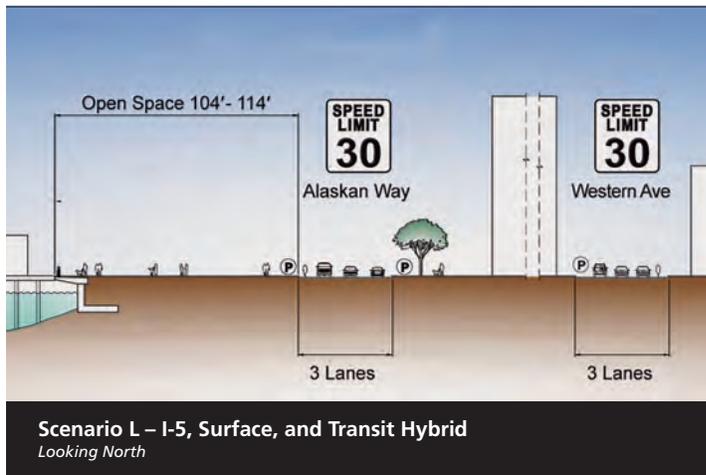
***Scenario L: I-5, Surface, and Transit Hybrid***

The SR 99 configuration in the I-5, Surface, and Transit Hybrid resembled Scenario C. SR 99 would run along a pair of north- and southbound one-way streets, called a couplet. Western Avenue would become a one-way northbound street with three lanes and a bike lane. Alaskan Way would become a one-way southbound street with three lanes and a bike lane.

Northbound Western Avenue would start near Yesler Way and continue through the Pike Place Market via an underpass. The street grid north of the Battery Street Tunnel would be reconnected with signalized intersections on Aurora Avenue. See Exhibit 3-12 for more detail.

This scenario included a high level of investment in transit. New RapidRide (bus rapid transit) lines would be introduced between Burien and downtown Seattle via Ambaum and Delridge and on Lake City Way. Additional service would enhance the Ballard, West Seattle, and Aurora RapidRide lines. A network of eight rapid trolley bus lines would connect many of Seattle's Urban Villages. Incorporating elements of RapidRide into the electric trolley bus network would provide frequent service meeting the goals of Seattle's Urban Village Transit Network. A new streetcar line would serve areas along First Avenue from Pioneer Square to Seattle Center and Uptown/Queen Anne.

There would be extensive I-5 improvements, including an additional northbound lane on I-5 that would start near Seneca Street and go north to SR 520, and a direct transit access ramp from I-5 northbound to Industrial Way and the E3 Busway. This scenario would create an open space 80 to 114 feet wide along the central waterfront.



The total cost of this scenario was estimated to be \$3.3 billion in escalated year of expenditure dollars, of which \$930 million was associated with the central waterfront SR 99 elements. Transit service improvements included in this hybrid would add approximately \$30 million to \$40 million (2008 \$) to King County Metro's current annual operating costs.

The overall performance of this scenario on the other guiding principles was estimated to be similar to Scenario C. Major issues with this scenario included the tradeoffs between the economic implications of longer travel times and reduced vehicle capacity in the SR 99 corridor and the significant urban design and environmental benefits of a large public waterfront promenade. In addition, Scenario L was expected to be the least costly of the hybrid scenarios.

Scenario L had a number of outstanding issues associated with the development, performance, and impacts of the one-way couplet. In particular, the details of how Western Avenue would be configured and operated as a northbound one-way street need to be resolved. Particular attention would be required in the north end through the Pike Place Market and in the south end through Pioneer Square.

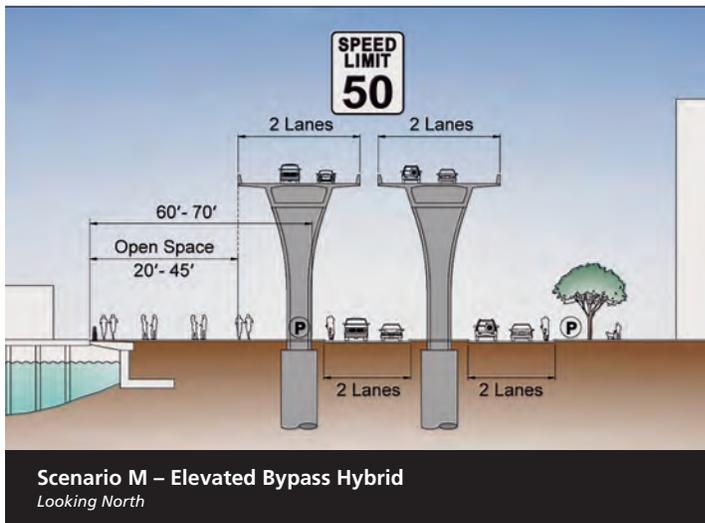
***Scenario M: Elevated Bypass Hybrid***

The SR 99 configuration in the Elevated Bypass Hybrid resembled that contained in Scenario D. SR 99 would run along the waterfront on two independent bridge structures, side-by-side, with two lanes in each direction. Access to downtown from SR 99 would be provided in the south by a S. King Street/Railroad Way S. off-ramp and in the north at Elliott Avenue/Western Avenue; there would be no access at Columbia Street or Seneca Street. Efforts to reconnect the street grid north of the Battery Street Tunnel would include a new Republican Street underpass. See Exhibit 3-13 for more detail.

This scenario included a scaled-back version of the transit investments in Scenario L. There would be no Lake City RapidRide line, and the rapid trolley bus network would be reduced to four lines. A new streetcar line would serve areas along First Avenue from Pioneer Square to Seattle Center and Uptown/Queen Anne.

I-5 improvements would be more limited than with Scenario L and include only operational and management improvements but no major new construction. This scenario would offer an open space 20 to 70 feet wide along the central waterfront.

The total costs of this scenario were estimated to be \$3.5 billion in escalated year of expenditure dollars, of which \$1.7 billion was associated with the central waterfront SR 99 elements. Transit service improvements included in this hybrid would add approximately \$10 million to \$20 million (2008 \$) to King County Metro's current annual operating costs.



The overall performance of this scenario on the other guiding principles was estimated to be similar to Scenario D: Independent Elevated. Major issues to be considered with this scenario included the tradeoffs between shorter travel times and added vehicle capacity in the SR 99 corridor and related economic implications and the significant urban design and environmental disadvantages created by the elevated structure. In addition, Scenario M would be more costly than Scenario L: I-5, Surface, and Transit Hybrid but less expensive than Scenario O: Twin Bored Tunnel Hybrid.

Further study of Scenario M could reduce the visual, shadowing, and noise impacts of the elevated structures. While this scenario assumed side-by-side structures, further study of a single structure, staggered structures, varying heights and vertical

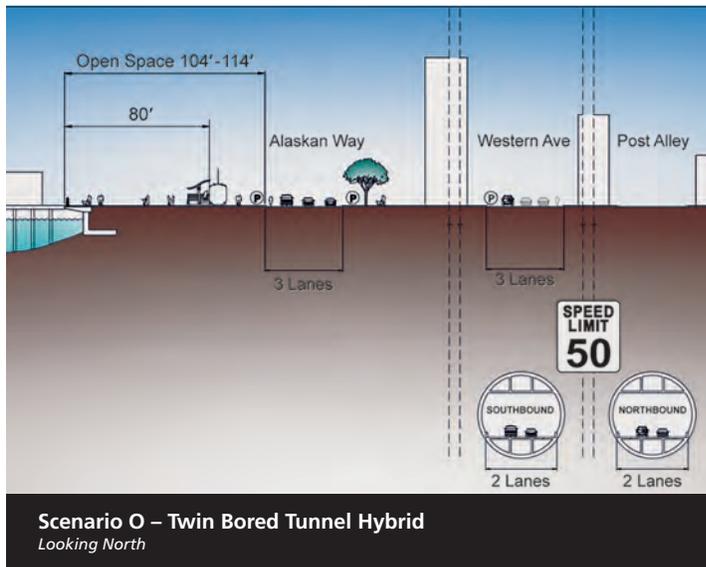
column spacings, and related structure depths could be undertaken. Such studies should consider visual and urban design impacts as well as cost tradeoffs in reaching a final configuration. Work would also be needed to find additional funds to fill the gap between the state's \$2.8 billion in committed funds and the total scenario cost of \$3.5 billion.

***Scenario O: Twin Bored Tunnel Hybrid***

The SR 99 configuration in the Twin Bored Tunnel Hybrid resembled that contained in Scenario F. Twin bore tunnels, each containing two lanes, formed the basis of this hybrid. However, the Independent Project Management Team strongly recommended that consideration also be given to a single large (approximately 55-foot-diameter) structure, carrying two lanes of traffic on both an upper- and lower-level roadway. See Exhibit 3-14 for more detail.

The tunnel would extend from approximately S. Royal Brougham Way to Harrison Street. After removal of the viaduct, a surface street couplet configuration similar to that included in Scenario C would be developed. Alaskan Way would serve southbound traffic and include a connection from Elliott Avenue down to the waterfront located in the footprint of the existing viaduct, and Western Avenue would serve northbound traffic between Pioneer Square and Denny Way. Access to downtown from SR 99 would be provided in the south by a S. King Street/Railroad Way S. off-ramp; there would be no access to the tunnel except at the north and south portals. Future use of the Battery Street Tunnel as well as efforts to reconnect the street grid north of Denny Way would require further study and design to accommodate the tunnel portal and access, as well as to allow access to downtown from the north.

This scenario had limited transit investments focusing mostly on capital improvements such as transit lanes and RapidRide service improvements to the Ballard, West Seattle, and Aurora lines and the new Burien-Delridge RapidRide lines. A new streetcar line would serve areas along First Avenue from Pioneer Square to Seattle Center and Uptown/Queen Anne.



I-5 improvements would not be included in Scenario O in order to keep the total costs down. However, it was recommended that the I-5 improvements be moved forward as other funding sources become available, because many of the planned actions proved highly beneficial to the operation of the freeway and its ability to accommodate projected future increases in travel. Open space provided along the central waterfront would be approximately 80 to 114 feet wide.

The total costs of this scenario were estimated to be \$4.7 billion in escalated year of expenditure dollars, of which \$2.8 billion was associated with the central waterfront SR 99 elements. Initial work indicated that the large-diameter single-bore con-

figuration might reduce those costs by as much as \$260 million. Transit service improvements included in this hybrid would add approximately \$10 million to \$20 million (2008 \$) to King County Metro's current annual operating costs.

The overall performance of this scenario on the other guiding principles was estimated to be similar to Scenario F. The major tradeoffs with Scenario O were high cost versus its strong performance on the other guiding principles. From a mobility, urban design, and downtown and neighborhood environmental standpoint, as well as from a construction disruption standpoint, this hybrid performed best. The longer travel times for bypass trips in the Elliott and Western Avenue corridor was the only area where the other bypass scenarios performed better from a mobility standpoint.

The biggest challenge of the bored tunnel hybrid was that it had costs that would require funding sources beyond the state's commitment of \$2.8 billion.

Additional work was needed to refine the tunnel's configuration, including the viability of the large-diameter single bore from a constructibility, cost, risk, and fire and life safety standpoint. Further design work was also needed to resolve a number of issues associated with the design and configuration of both the north and south portals. The north portal and the determination of the future use of the Battery Street Tunnel are major areas that needed to be addressed and could have significant cost and performance impacts. Finally, work is needed to look at ways that the time to construct the tunnel might be shortened and construction impacts minimized. This work should include considering a variety of project delivery options, including the possibility of using a design/build approach.

### **13 What did the Partnership Process recommend?**

The Partnership Leadership Team concluded that only two of the three hybrid scenarios were affordable with WSDOT's \$2.8 billion budget: Scenario L: I-5, Surface, and Transit Hybrid and Scenario M: Elevated Bypass Hybrid. Scenario O: Twin Bored Tunnel Hybrid had many attractive features, but based on the information available, it was too expensive. The Stakeholder Advisor Committee spent many hours in several meetings discussing the systems scenarios, hybrid sce-

narios, and what to recommend. When the Partnership Leadership Team presented its recommendations on the two hybrid scenarios, discussion generated the following broad themes:

- The state’s contribution should be limited to \$2.8 billion, and other partners and the region should identify funding sources able to cover costs associated with transit service, improvements to city streets, and other aspects of the project.
- Any solution should reliably meet the area’s mobility needs now and in the foreseeable future, but the City should take advantage of this rare opportunity to reconnect the central waterfront with downtown.
- While many members saw Scenario L as an attractive approach, and possibly a first phase of an ultimate recommendation, there was also broad interest in taking a bored tunnel forward for further consideration. Many felt that the tunnel’s costs might be reduced as a result of evolving technology and that additional funding might be found for a scenario with such broad appeal. At the urging of the Stakeholders Advisory Committee, a panel of independent tunnel experts was convened and reported that with a single bore and new techniques a bored tunnel would likely be less expensive than originally thought and could meet the State’s financial constraints.
- There was only limited support from a handful of Stakeholder Advisor Committee members for an elevated solution.

As a result, 22 of the active 25 members of the Stakeholder Advisor Committee signed a letter addressed to Governor Gregoire, County Executive Sims, and Mayor Nickels supporting an approach to formulating a hybrid solution that included consideration for a large-diameter single-bore bypass tunnel.

#### **14 What did the Governor, County Executive, and Mayor recommend?**

In January 2009, Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels recommended replacing the central waterfront portion of the Alaskan Way Viaduct and

Seawall with a deep bored tunnel, a new waterfront surface street, transit investments, and downtown city street and waterfront improvements. Their recommendation was grounded in the potential for the Bored Tunnel Alternative to meet the project's six guiding principles, based on the results of the technical analysis; the strong support of diverse interests for the bored tunnel; the viability of a single-bore tunnel; and the willingness of the partners, with the support of the Port of Seattle, to develop a funding program that supplements the state's committed \$2.8 billion.

In April 2009, the legislature passed Senate Bill 5768, which urged the state to expedite environmental review and authorized state funds to build a replacement tunnel and remove the existing structure. On May 12, 2009, Governor Gregoire signed a bill that commits \$2.8 billion in state funding for a tunnel alternative.

### **15 How does the executives' recommendation relate to the environmental process?**

The recommendation by the three executives clearly establishes the bored tunnel as a new alternative to replace the Alaskan Way Viaduct. This alternative has not been rigorously evaluated in an EIS as required by the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA). Therefore, a second Supplemental Draft EIS to evaluate the bored tunnel needs to be prepared.

Environmental review of the seawall has also changed. While replacing the seawall remains a critical need and part of the overall Program, it is not necessarily required as part of replacing the viaduct. The Bored Tunnel Alternative does not require the seawall. With the bored tunnel, seawall replacement would become a separate project led by the City of Seattle with its own environmental review. Other alternatives would evaluate replacing the seawall along with replacing the viaduct.

Analysis for the second Supplemental Draft EIS is underway. After publication and the opportunity for the public to comment on this Supplemental Draft EIS, FHWA, WSDOT, and the City of Seattle will prepare and publish the Final EIS. FHWA's Record of Decision will then follow the Final EIS. The Record of Decision identifies the alternative for the action and completes the environmental review process.

## *CHAPTER 4 - MOVING FORWARD & THE BORED TUNNEL ALTERNATIVE*

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### **1 How is the Alaskan Way Viaduct and Seawall Replacement Program moving forward?**

The January 2009 recommendation from Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels endorsing the Bored Tunnel Alternative showed consensus among the agencies to provide a safe facility and move the project forward.

The Federal Highway Administration (FHWA) is the lead federal agency responsible for distributing federal transportation funds and deciding which alternative gets built as part of the environmental review process required under the National Environmental Policy Act (NEPA). FHWA will base their decision on the information provided through the environmental review process, including the second Supplemental Draft Environmental Impact Statement (EIS) that includes the Bored Tunnel Alternative (now being prepared) and the Final EIS. After the Final EIS is published, FHWA can issue their NEPA decision, called the Record of Decision (ROD), independent from the other agency recommendations.

The environmental review process for the Bored Tunnel Alternative builds on the five alternatives evaluated in the 2004 Draft EIS and the two alternatives in the 2006 Supplemental Draft EIS. It will also incorporate work done during the Partnership Process. This work in part led to a revised purpose and need statement that will guide future evaluations. The revised purpose and need statement adapts several of the guiding principles for NEPA purposes. The bored tunnel was not studied in previous environmental documents, so it will be studied in detail in a Supplemental Draft EIS. The Supplemental Draft EIS



will also compare the bored tunnel with cut and cover tunnel and elevated structure alternatives. Several independent projects will be implemented in parallel or after bored tunnel construction is finished. These projects include seawall replacement, Alaskan Way surface street improvements and Elliott/Western Avenue connection, Mercer Street west of 5<sup>TH</sup> Avenue, the Alaskan Way waterfront promenade, and the First Avenue streetcar, each of which will be evaluated in future environmental reviews by the City of Seattle. Other improvements, such as those proposed in the Mercer corridor between Dexter Avenue and I-5, have already completed some or all of the necessary environmental review.

The lead agencies are working to prepare required environmental documentation as quickly as possible to begin construction of a central waterfront viaduct replacement in 2011. Environmental documentation for other independent projects related to replacing the vulnerable viaduct structure (including relocating utilities, enhancing transit, and replacing the viaduct south of S. King Street) has been completed. These projects are underway and are expected to be finished by 2014.

### Working Groups

Washington State Department of Transportation (WSDOT), King County, and the Seattle Department of Transportation established three working groups in April 2009 to help inform the design and environmental review process for the viaduct's central waterfront replacement. Participants represent neighborhoods, business and freight interests (including the Port of Seattle), and other interest groups. The working groups provide comments and feedback to the program team on design and mobility issues and convey information back to their communities. The working groups are focusing on the following areas:

- The central waterfront working group will discuss the surface street configuration along the waterfront, including the connection to Elliott and Western Avenues and waterfront traffic operations.
- The north portal working group will discuss access into and around the north entrance to the SR 99 bored tunnel, urban design features, and construction plans. This

### Single Bore Tunnel



*Above: Conceptual View of the Bored Tunnel*

group will also discuss city street improvements, including aspects of the two-way Mercer Street project.

- The south portal working group will discuss access into and around the south entrance to the SR 99 bored tunnel, urban design features, and construction plans.

## 2 What progress is being made on the Bored Tunnel Alternative?

Since the recommendation in January and legislative approval in April 2009, project engineers have been working to develop conceptual design plans for the Bored Tunnel Alternative. These plans will be used to assess potential environmental impacts, which will be presented in the Supplemental Draft EIS. The preliminary alignment for the bored tunnel is shown in Exhibit 4-1 above. The engineers are planning construction activities and sequencing that will be described and evaluated in the Supplemental Draft EIS. The team is also working to identify mitigation measures that could be needed to avoid or minimize potential environmental impacts. The second Supplemental Draft EIS is anticipated to be published in early 2010.

## 3 What pieces of the Alaskan Way Viaduct and Seawall Replacement Program are each of the agencies leading?

In addition to the proposed SR 99 bored tunnel, WSDOT is the lead for removing the existing viaduct structure, decommissioning the Battery Street Tunnel, and completing the Moving Forward projects. King County is the lead for RapidRide enhancements, additional peak hour bus service, and transit speed and reliability improvements. The City of Seattle is the lead for a surface connection from approximately Yesler Way to Battery Street, utility relocations, the waterfront promenade, city street improvements, the First Avenue Streetcar. The City is responsible for replacing the seawall and will lead an independent environmental evaluation.

## 4 What are the next steps?

The Supplemental Draft EIS is anticipated to be published in February 2010. A 45-day comment period will allow the public and other interested parties to provide comments on the Bored Tunnel Alternative. The Final EIS will then be prepared, followed by the ROD, which is anticipated in the spring of 2011.



Above: Conceptual View of Bored Tunnel Interior

### Project Information

Information about the projects that are part of the Alaskan Way Viaduct and Seawall Replacement Program can be found on WSDOT's website: [www.alaskanwayviaduct.org](http://www.alaskanwayviaduct.org).

Mitigation measures will continue to be developed as the design is refined. We are scheduling construction on the bored tunnel to begin in late 2011. Seattle will initiate planning, environmental review, and design of the projects it is responsible for concurrently.

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