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2 February 2009

Alaskan Way Viaduct & Seawall Replacement Program

Central Waterfront ~~Tri Agency~~ Partnership

INDEPENDENT PROJECT MANAGER FINAL REPORT

U.S. Department of Transportation Federal Highway Administration

Washington State Department of Transportation

King County

City of Seattle

FEBRUARY 2009

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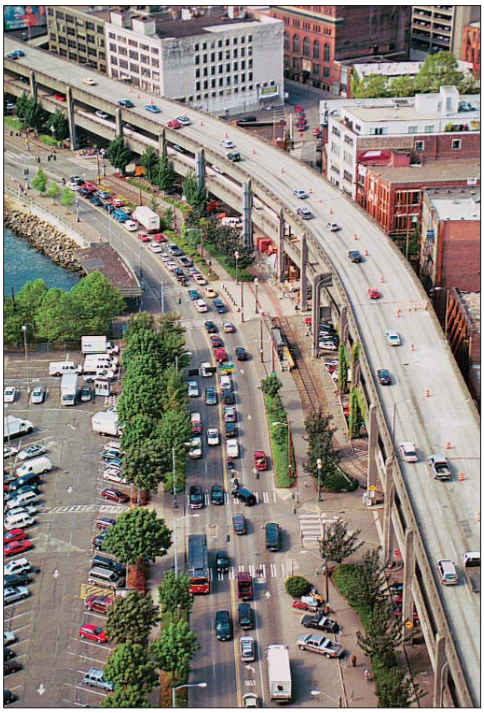

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CHAPTER 1 - EXECUTIVE SUMMARY

Background

The Alaskan Way Viaduct (part of State Route [SR] 99) is one of only two north-south limited-access routes through central Seattle. The 2001 Nisqually earthquake damaged the double-level elevated structure along Seattle's central waterfront. Replacing the Alaskan Way Viaduct and the ~~associated~~ seawall has been a top priority for the ~~S~~State and the City of Seattle since the Nisqually earthquake. A Draft Environmental Impact Statement (released in 2004) and a Supplemental Draft Environmental Impact Statement (released in 2006) considered a variety of six-lane elevated, tunnel, and surface replacement options. In 2007, an advisory vote was held in Seattle, calling for a separate up or down vote on a surface-tunnel hybrid and an elevated structure. Both received a majority "no" vote.

Partnership Process

Following the 2007 vote, Washington State Governor Christine Gregoire, King County Executive Ron Sims, and Seattle Mayor Greg Nickels committed to a collaborative effort to forge a solution for the Alaskan Way Viaduct. This

View of the ~~project area~~

partnership was intended to resolve the longstanding needs of the Alaskan Way Viaduct and related projects in a manner that could be broadly supported and implemented. A systems approach was taken to include a study area beyond the narrow SR 99 corridor previously considered and to consider multi-modal solutions. An Independent Project Management (IPM) Team was retained to provide overall guidance for the process, coordinate the staff and consultant resources of the three agencies, and ensure that all options were given fair consideration. This document is the IPM Team's summary report and provides an overview of the Alaskan Way Viaduct Central Waterfront Partnership Process, which began in late 2007 and concluded in December 2008.

The partnership process began with Washington State Department of Transportation (WSDOT), King County, and the City of Seattle (the partnership agencies) developing and agreeing to a set of principles to guide the selection of a central waterfront solution with input from a group of stakeholders. The principles focused the process on ensuring public safety, providing efficient transportation of people and goods, improving the economy, enhancing the urban environment, being fiscally responsible, and improving the health of the environment.

The three partnership agencies ~~and the stakeholders~~ then developed evaluation measures as a means to evaluate the central waterfront options against the guiding principles. Concurrently, the partnership team developed building blocks, or strategies for keeping people and goods moving, in five different categories-surface streets, Interstate 5 (I-5), transit, transportation policies and management, and SR 99 replacements. Over 170 possible solution elements were identified.

Systems Scenarios

In June, the agencies grouped the most promising building blocks into eight scenarios, or comprehensive solutions. These included three scenarios in which SR 99 would operate as a surface street, two in which SR 99 would be elevated, and three in which SR 99 would be located below-grade. The scenarios were then evaluated by the previously determined evaluation measures to determine which building blocks worked best together (full evaluation results can be found in the , which accompanies this document). The systems scenario approach did not identify a single preferred scenario, but

rather was used to help understand how the various building blocks might perform together, as well as to identify the many tradeoffs among the choices and to aid in the development of more refined hybrid scenarios.

Hybrid Scenarios

Because no single configuration would completely satisfy all six guiding principles, the partnership team constructed three hybrid scenarios so that the tradeoffs among the scenarios could be considered by the executives. For example, the surface and transit scenarios (A, B, and C) performed quite well on the environmental, urban design, and cost measures, while the bypass scenarios (D, E, F, G, and H) performed better on the measures related to future travel needs, mobility for trips passing through downtown, and the potential impact on the local economy. As a result, the team felt it useful to focus on developing two ~~classes~~ of hybrids—an optimal surface and transit hybrid and one or more hybrids with a bypass element.

The optimal surface and transit hybrid was based on the surface couplet contained in Scenario C. This couplet would route northbound traffic via a one-way, three-lane Western Avenue and southbound traffic on a one-way, three-lane Alaskan Way. It would provide better transportation performance for through trips and would have the ~~smallest~~ Alaskan Way ~~roadway~~ cross section.

The bored tunnel would be the most expensive and take the longest time to build of all the bypass options, but it would have substantial transportation benefits and the greatest potential to meet the urban design and urban environment guiding principles. In addition, the bored tunnel would be the least disruptive from a construction standpoint, both to the central waterfront and the operation of SR 99. Therefore, a bypass hybrid using the bored tunnel as the basis was also developed.

In addition, 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 since it performed quite well on many of the mobility measures and was the only one of the SR 99 bypass elements that could be constructed within the state's $2.8 billion commitment.

Next Steps

The information documented in this report and the associated ~~and~~ appendices, as well as the input~~s~~ from the Stakeholder~~s~~ Advisory Committee (SAC) and ~~broader~~ public outreach effort, is the basis for the recommendation developed by the Tri-Agency Partnership and the three executives. This final recommendation and the summary rationale for it are contained in the Executives Recommendation. In addition, the Executives Recommendation summarizes the next steps in implementing the chosen program. These key steps include resolution of the major design and implementation issues raised in this report, development of a strategy to complete the necessary environmental reviews, development of a finance plan, and development of a process to monitor and coordinate the actions of the three partner agencies in carrying out the recommendations

CHAPTER 2 - INTRODUCTION

Background

For years, attempts to forge a solution for the ~~at risk~~ Alaskan Way Viaduct and the ~~associated~~ seawall along Seattle's central waterfront have ~~proved elusive~~.

The state highway (known as SR 99) sustained serious damage during the 2001 Nisqually earthquake. While immediate and ongoing repairs enabled officials to reopen the highway—one of only two limited-access north-south routes through the ~~c~~ity of Seattle-efforts to devise a longer-term remedy fell short.

A Draft Environmental Impact Statement (released in 2004) and a Supplemental Draft Environmental Impact Statement (released in 2006) considered a variety of six-lane elevated, tunnel, and surface replacement options together with options for the seawall replacement. In 2007, an advisory vote was held in Seattle, calling for separate up or down votes on a surface-tunnel hybrid and an elevated structure. Both received a majority "no" vote. In short, the region was at an impasse.

In an effort to break the stalemate, Governor Christine Gregoire, King County Executive Ron Sims, and Seattle Mayor Greg Nickels launched a new effort known as the Alaskan Way Viaduct Central Waterfront Partnership Process. This effort was formalized in a Memorandum of Understanding executed by the three parties in December 2007.

The *Independent Project Manager's Report* provides an overview of that partnership process, which ran from late 2007 to December 2008 and served as the basis for the three executives' recommended central waterfront solution sent to the Washington State Legislature in January 2009. For more information about their recommendation, please see the *Executives Recommendation*. Detailed findings of the work of the Indep[illegible]ent Project Management (IPM) Team are contained in the .

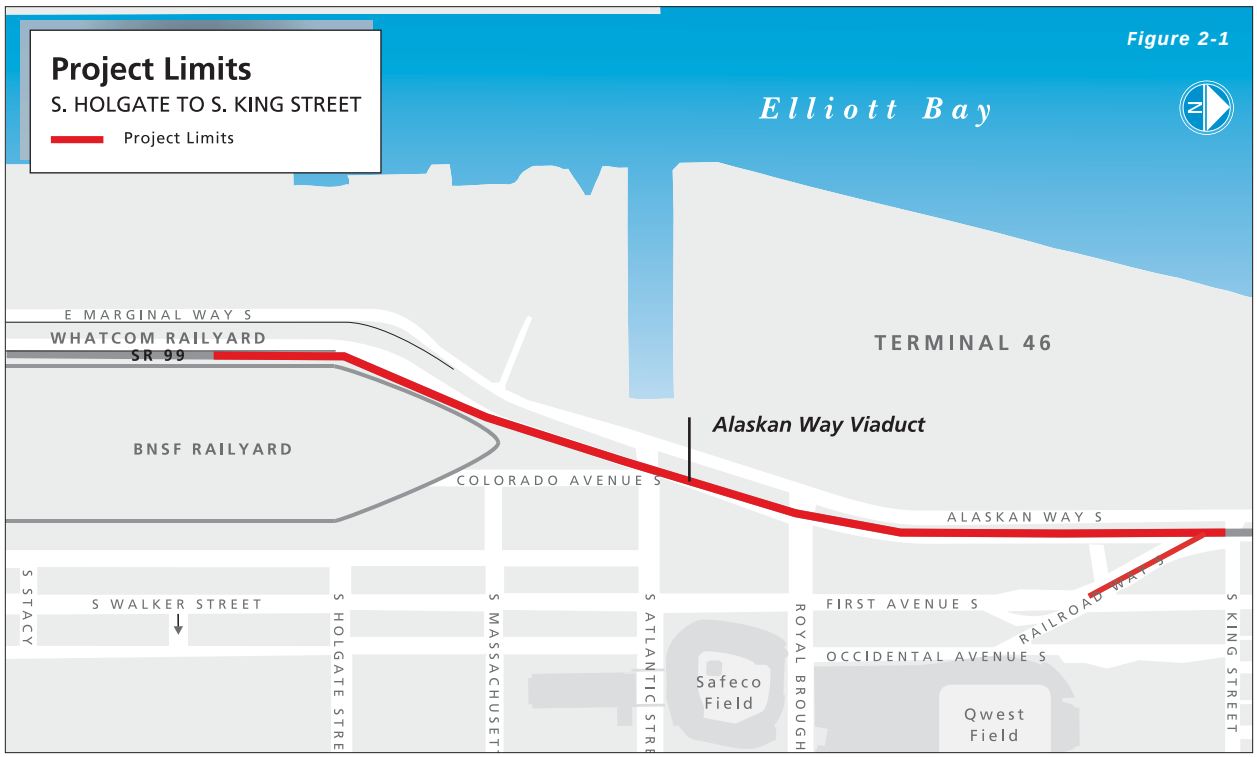
Partnership Process

Following the 2007 vote, the three executives committed to a collaborative effort to forge a solution for the Alaskan Way Viaduct. This partnership was intended to resolve the long-standing needs of the Alaskan Way Viaduct and related projects in a manner capable of being broadly supported and implemented.

The specific elements included in the partnership process are summarized below:

Moving Forward projects.
A series of projects were identified to facilitate the timely removal and repair of a substantial portion of the Alaskan Way Viaduct. The most significant Moving Forward project is the S. Holgate Street to S. King Street Viaduct Replacement Project. This project involves replacing about one mile of the Alaskan Way Viaduct located between S. Holgate and S. King Streets, as shown in Figure 2-1. The project's environmental assessment was released in June 2008. Construction is to begin in mid-2009 and is expected to be completed in fall 2013.

Other Moving Forward projects included repairs to Bents 93 and 94, early utility relocations, Battery Street Tunnel improvements, Lenora to Battery Street Tunnel improve-



ments, and transit enhancements and other traffic improvements.

All Moving Forward projects were designed to ~~accommodate a wide range of solutions~~ for the central waterfront ~~and not preclude any eventual option~~.

Central waterfront.
The core issue for the Alaskan Way Viaduct has always been the central waterfront ~~portion~~. The State, ~~C~~ity, and ~~C~~ounty agreed to dedicate significant staff and consultant resources and hire an independent project manager and team to facilitate the identification and analysis of possible scenarios ~~to replace~~ the mile-long portion of the viaduct ~~that moves~~ along the waterfront section of downtown Seattle. This ~~element~~ is the focus of the balance of this report.

Emergency planning and management.
While the partnership agencies committed to working quickly to find a long-term solution to Alaskan Way Viaduct needs, they were also mindful that unexpected developments could affect the viability of the viaduct before a solution could be implemented. To that end, the partnership agencies agreed to track and implement contingency plans, including traffic mitigation measures for I-5 and city streets and additional transit service should the viaduct become unserviceable before a replacement can be implemented.

A New Way Forward: The Systems Approach

Prior to the Partnership Agreement, discussions regarding the Alaskan Way Viaduct focused more narrowly on the SR 99 corridor only. This framing constrained both the available options and opportunities and left parties with conflicting alternatives for the central waterfront.

To move forward, the parties embraced a new strategy—referred to as the Systems Approach-which looked more broadly at the region as a whole to identify innovative strategies for moving people and goods in and through Seattle. By broadening the frame-from the limited SR 99 corridor to a wider area more or less bounded by N~~E~~ 85TH Street to the north, the city limits to the south, Elliott Bay to the west, and Lake Washington to the east-the parties could explore and implement a range of capital and operating improvements to the entire existing transportation network (see Figure 2-2). This analytic and problem-solving approach included not only SR 99, but also I-5, Seattle's city streets, public transit, and

Systems Planning Approach

New Project Area

Figure 2-2

transportation demand management as possible solutions. It not only focused on roadway enhancements for cars, trucks, and buses, but also expanded the set of potential solutions to include a combination of transit, bicycle, and pedestrian improvements.

The Systems Approach offered the potential to ~~significantly reduce travel demand~~ along the central waterfront corridor and was further intended to encourage the partnership agencies to coordinate their efforts.

In executing the Systems Approach, the partnership agencies committed to pooling their engineering, technical, communication, and other support as needed to foster a transparent, accountable, and credible process. 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 that examined the potential changes to city streets. Similarly, the State led the analysis of any changes to I-5, and the County played a strong role in framing changes to the bus transit system. Also, each key step was informed by an ongoing dialogue both with stakeholders and the relevant legislative bodies.

In addition, the agencies asked the Port of Seattle, Sound Transit, Washington State Ferries, the U.S. Army Corps of Engineers, the Federal Highway Administration, and the Federal Transit Administration, as well as local agencies, to provide focused input as work progressed.

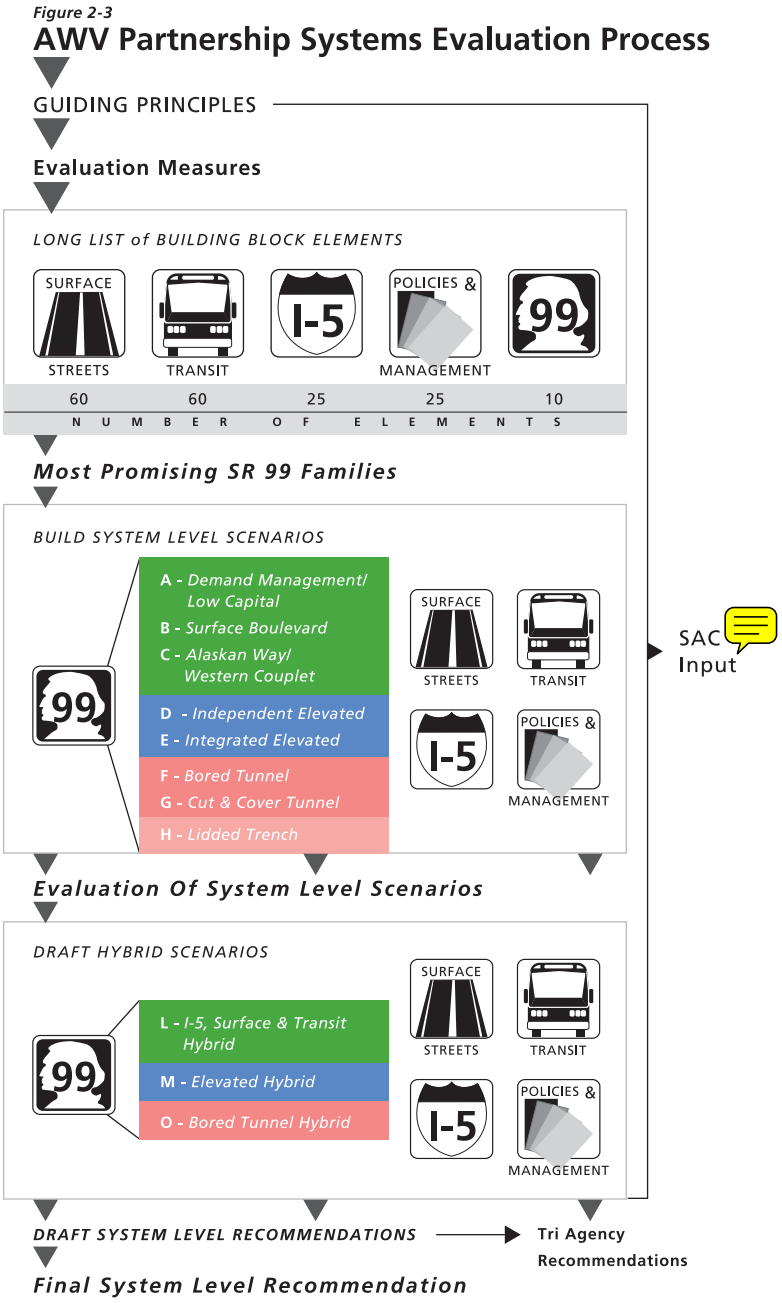
The chart presented in Figure 2-3 and the following sections summarize the process used to undertake the Systems Approach. The balance of the report describes each of these steps and the results in greater detail.

Frame guiding principles as foundation for analysis.
The first step in the Systems Approach was to develop an integrated set of guiding principles. These overarching principles served as the foundation for the analysis and led to the development of a common set of evaluation measures. These guiding principles were informed by early discussion with stakeholders and others.

Draft evaluation measures.
An important part of the Systems Approach was a carefully crafted process to assess the potential for different strategies to meet the city, region, and state's integrated needs. The key to this step was the drafting of a common set of evaluation

measures (both qualitative and quantitative). These measures—derived from the guiding principles and confirmed in discussion with stakeholders and legislative bodies—were used to ensure that the various scenarios under consideration were assessed consistently.

Figure 2-3



Craft building block elements.
Five categories of improvements were initially developed. These included surface street improvements, transit service and capital facilities investments, improvements to I-5 within

the study area, policies and programs aimed at reducing the volume of vehicle demand, and alternatives for replacing the central section of the ~~SR 99~~ Alaskan Way Viaduct. The numbers presented in Figure 2-3 are reflective of the approximate number of building blocks that were initially identified in each category. In total, more than 170 building blocks were considered as part of the process.

Build corridor-level scenario packages.
This step was the core of the process and represented a significant departure from past SR 99-centric efforts. In this step, the partnership agencies jointly assessed the potential for a range of transportation improvements, or building block elements—road~~way~~ and transit, pedestrian, and bicycle—to meet the demands for moving people and goods. In June 2008, the partnership agencies grouped the most promising building blocks into eight scenarios, or comprehensive solutions. The scenarios were created to test the performance of various combinations of SR 99, I-5, surface street, transit, and demand management building blocks. The purpose was not to select a particular scenario, but to learn which elements worked best together as evaluated by the six guiding principles.

Screen most promising SR 99 families.
The long list of SR 99 replacement options were screened to a short list of most promising families based on the guiding principles. This step, intended to bound the analysis to a realistic number of options, narrowed the SR 99 replacement options to three general families with a total of eight general facility concepts.

Complete evaluation of system-level scenarios.
Using the scenarios and evaluation measures developed under the previous steps, the partnership agencies jointly assessed the various system scenarios. This process applied a common set of assumptions, modeling approaches, and evaluation measures to ensure that all options under consideration were evaluated similarly. This step was undertaken in a fully transparent fashion to ensure that interested stakeholders and others could track and comment on the process.

Construct hybrid scenarios.
Following the completion of the scenario evaluation, hybrid scenarios were constructed based upon what the partnership agencies learned from the detailed evaluation of the initial eight scenarios. The hybrids were constructed to combine the best performing elements of the scenarios, recognizing that

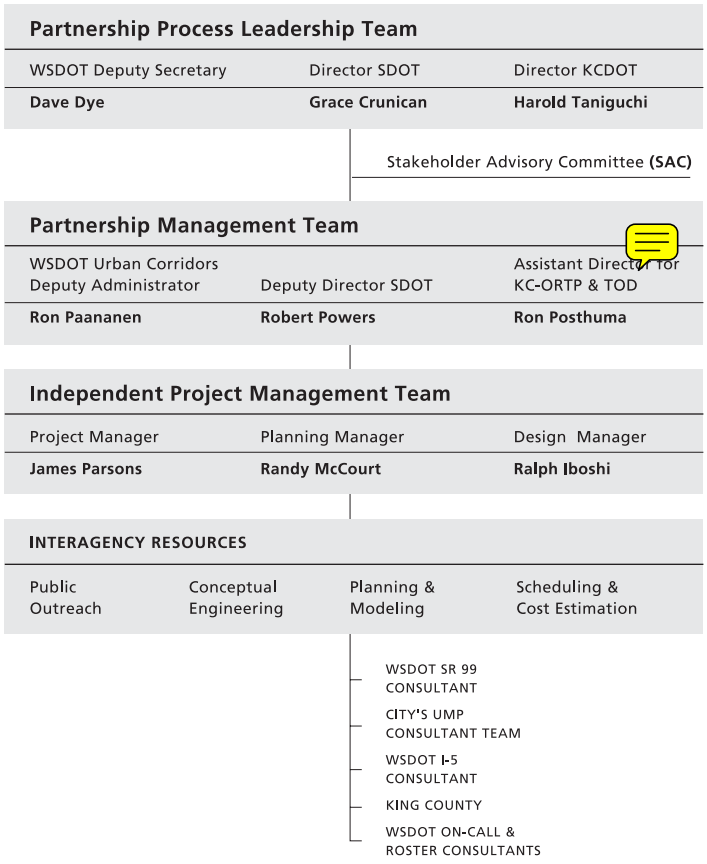
any combination of improvements would involve some level of tradeoffs among the guiding principles.

Develop Tri-Agency draft system-level recommendation. Based on the detailed scenario analysis and its associated findings and informed by extensive feedback from the Stakeholder Advisory Committee and others, the partnership agencies recommended a preferred scenario for the central waterfront portion of the study area and related actions to the executives.

Based on the recommendations of the partnership agencies, a final recommendation was agreed to by the Governor, King County Executive, and Mayor of Seattle.

Decision-Making Approach

Figure 2-4



The partnership agencies recognized that it was imperative to put in place a structure that could carry forward the Systems Approach in a timely and effective fashion. This management structure (shown in Figure 2-4) was intended to support coordinated decision-making and provide multiple opportunities and resources to identify and resolve potential roadblocks.

A key aspect of this approach was the formation of the Project Oversight Committee, comprising the Governor, King County Executive, the Mayor of Seattle, the ~~C~~chairs of the Senate and House Transportation Committees, one member of the King County Council, and one member of the Seattle City Council. The role of the Project Oversight Committee was to review and comment on the work of the collaborative process and the progress of the project proposals.

The Governor, King County Executive, and the Mayor of Seattle were responsible for managing the work of the collaborative process. Below is ~~a quick snapshot~~ of the collaborative process structure.

Partnership Leadership Team.
The Partnership Leadership Team, comprising the ~~Washington State Department of Transportation (DOT)~~ Urban Corridors Deputy Administrator, Seattle DOT Director, and King County DOT Director, had chief responsibility for ensuring that the Partnership was meeting key milestones and moving forward on schedule. The Partnership Leadership Team provided high-level oversight of the Partnership Management Team and resolved decisions necessary to keep the project on track.

Partnership Management Team.
The Partnership Management Team had primary responsibility for day-to-day project oversight. The Partnership Management Team supported the other members of the Partnership, as needed, in all stakeholder and legislative engagements. The Partnership Management Team consisted of two main components as follows:

- Agency Team. The Agency Team consisted of the Washington State DOT Urban Corridors Deputy Administrator, the King County DOT Assistant Director, and the Seattle DOT Deputy Director. The Agency Team met as frequently as necessary (but at least weekly) to keep the project on track and was responsible (along with the Partnership Management Team) for providing direction to the Independent Project Manager.
- Independent Project Manager. The Independent Project Manager, hired and directed by the Partnership Leadership Team, had direct responsibility for ensuring that the central waterfront work plan was completed on time. Additionally, the Independent Project Manager was responsible for ensuring that the alternatives analysis was carried out in a transparent, consistent, and credible fashion. The Independent Project Manager was also responsi-

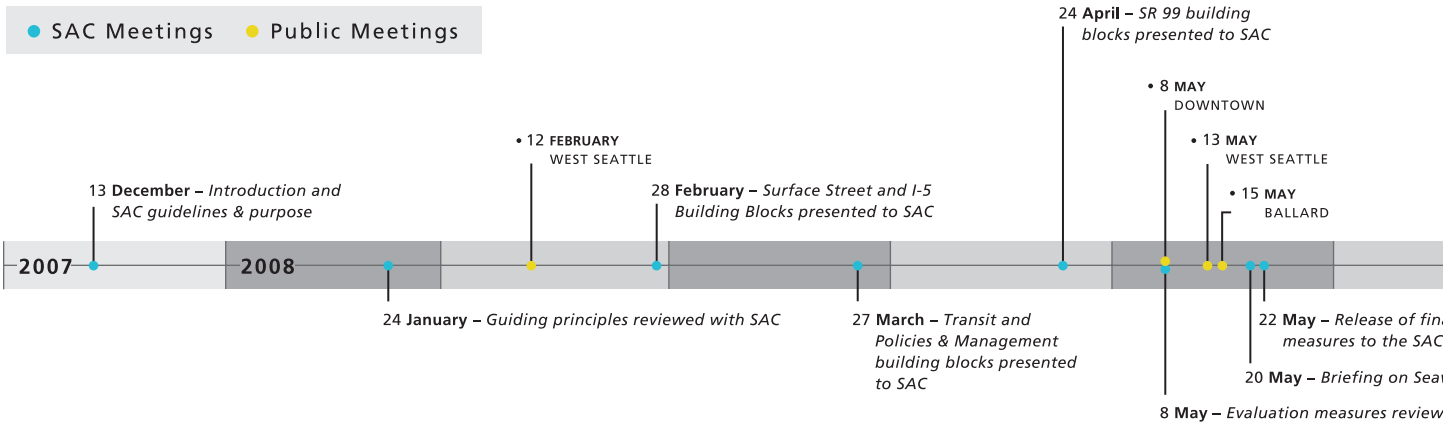
ble for identifying issues to be resolved by the Agency Team.

As shown in Figure 2-4, the partnership process was supported by interagency resources (both in-house and consultant) to ensure that the alternatives assessment was informed by the best available information. These resources include engineering, planning and modeling, urban design, scheduling and cost-estimating, and public outreach. As discussed earlier, different agencies took the lead on certain elements of the analysis, but all three partnership agencies had an equal role in decisions that guide the process.

Public Involvement

WSDOT, King County, and the City of Seattle used an open public process to help develop a solution for the Alaskan Way Viaduct. Through nearly a hundred different open public meetings and events held from 2007 through 2008, and with a website devoted to the project, the project partners encouraged the public to learn about and comment on the solutions being considered. Diverse formats were created to disseminate the latest information and elicit input.

Public Outreach Activities



The public involvement effort was designed to engage the public at project milestones such as the development of guiding principles, evaluation measures, building block and scenario development and evaluation, hybrid development, and recommendation. In addition to convening regularly scheduled meetings, the partnership agencies held open houses and encouraged comments in person, by mail and email, or through the project website. The effort was underpinned by frequent communication regarding evolving ideas and approaches to ensure that interested stakeholders had an opportunity to be aware of and provide input into the evolving analysis in a timely fashion.

Figure 2-5 shows a timeline with the major public events and milestones that were held. The public involvement effort included the following elements:

Regular meetings of the ~~Viaduct~~ Stakeholder Advisory Committee (SAC). This group featured representatives from business and economic stakeholders, Seattle neighborhoods, and public interest groups. Through regularly scheduled meetings and additional topic-focused briefings, the SAC reviewed and commented on the materials and presentations produced by the partnership agencies and technical experts. The intent

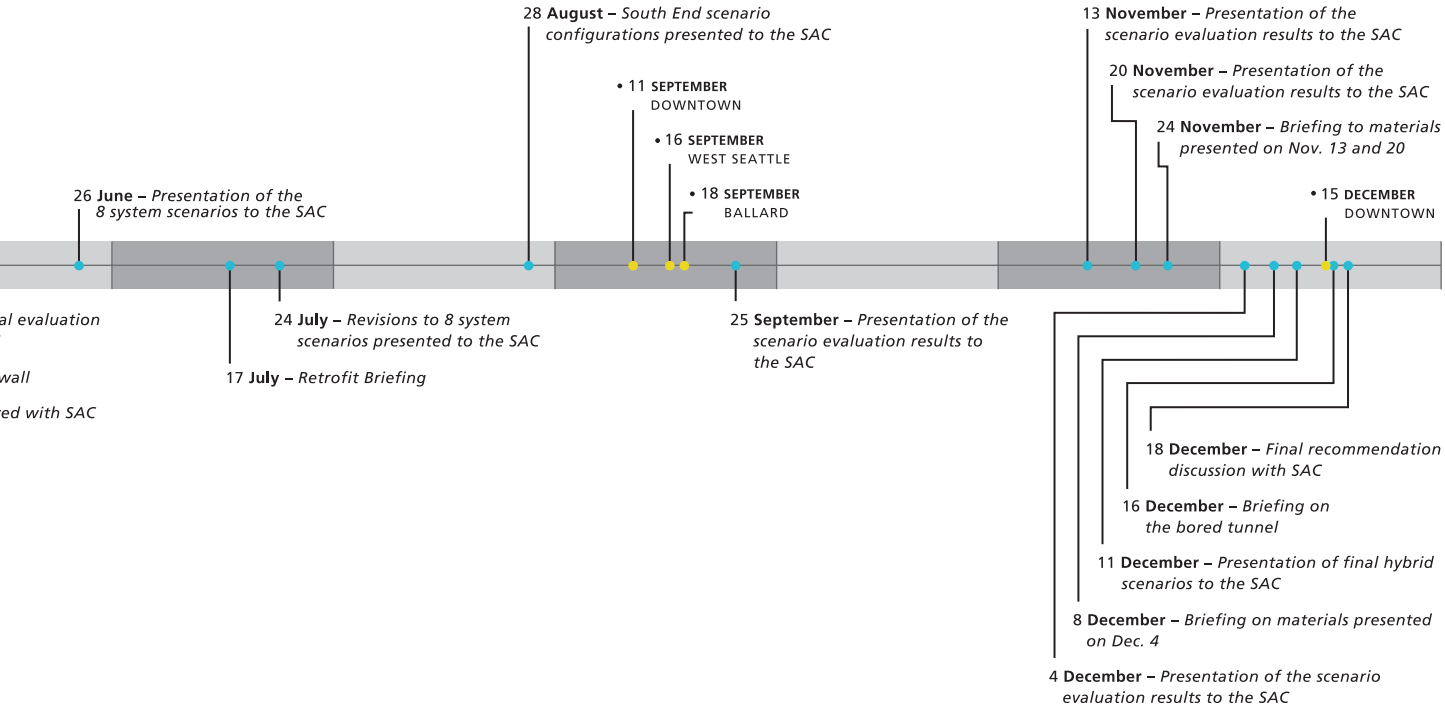


Figure 2-5

of this group was to provide the partnership agencies with informed feedback; it was *not* convened as a decision-making body. A total of 15 full meetings (lasting three or more hours each) and 5 focused briefings were held between December 2007 and December 2008. The SAC proved to be a dedicated, highly effective, informed group and helped shape the work of each step of the process. The full list of members and organizations is provided in the acknowledgements that preface this report.

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 SAC 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.

CHAPTER 3 - GUIDING PRINCIPLES & EVALUATION MEASURES

Guiding Principles

Prior to the formation of the partnership process, discussions on the Alaskan Way Viaduct tended to polarize parties within and across the city, region, and state. ~~Debates would accentuate divergent views and mask important overarching and overlapping interests.~~ In order to move forward with 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. Any solution to the Alaskan Way Viaduct would be grounded in the City, State, and County's recognition of, commitment to, and integration across a set of six guiding principles. These principles were shared with both the SAC and Project Oversight Committee for their input and finalized by Governor Gregoire, Mayor Nickels, and County Executive Sims in early 2008.

No weighting of relative importance was applied—the principles all received equal consideration when used to evaluate the scenarios. 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, the 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.

Evaluation Measures

The Systems Approach utilized a consistent set of evaluation measures to evaluate each scenario's ability to meet the guiding principles listed above. This process applied a common set of assumptions, modeling approaches, and evaluation measures to ensure that all options under consideration were evaluated similarly. These measures were used by the partnership agencies as a consistent yardstick to fairly assess the relative strengths and weaknesses of different scenarios and serve as the basis for the partnership agencies' eventual recommended approach. Conclusions drawn from this work helped in refining the hybrid scenarios, which combined the most promising components of the original eight scenarios.

Evaluation measures (both qualitative and quantitative) were keyed to the six guiding principles and, like the guiding principles, were developed through a process that included the informed input of both stakeholders and the legislative bodies. This step was undertaken in a fully transparent fashion to ensure that interested stakeholders and others could track and comment on the process. The evaluation measures follow:

:

Guiding Principle	Evaluation Measures
1 Improve public safety.	1 Seismic performance
	2 Safety for users
2 Provide efficient movement of people and goods.	1 Person throughput
	2 Travel times for general-purpose traffic
	3 Travel times for freight
	4 Changes in parking
	5 Transit speed, capacity, and travel time
	6 Mode share
	7 Connections among Center City neighborhoods
	8 Connections among freight facilities
	9 Bike connectivity in the Center City
	10 Construction phasing
3 Maintain or improve downtown Seattle, regional, the port and state economic vitality.	1 Long-term economic implications
	2 Short-term economic implications
4 Enhance Seattle's waterfront, downtown and adjacent neighborhoods as a place for people.	1 Open space
	2 Pedestrian connectivity to the waterfront
	3 Shadowing and view blocking
	4 Bicycle and pedestrian environment
	5 Traffic noise
	6 Transit access to the waterfront
	7 Impacts on historic structures and districts
5 Create solutions that are fiscally responsible.	1 Capital and operating costs
	2 Potential funding
	3 Design life
6 Improve the health of the environment.	1 Air quality
	2 Carbon footprint
	3 Water quality
	4 Near-shore habitat

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CHAPTER 4 - BUILDING BLOCK ELEMENTS

From January through April, the partnership agencies developed an extensive list of potential action 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. This 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. It 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* – by providing improvements on streets such as Mercer Street, Roy Street, S. Spokane Street, and north of the Ship Canal.
- *Better distribute vehicles through downtown north-south routes* – such as Aurora Avenue, Sixth Avenue, Fairview Avenue, First Avenue S., Airport Way, and a new Alaskan Way surface street.
- *Increase north-south capacity through downtown* – through improvements like an Alaskan Way surface street, or added lanes on other downtown north-south streets.
- *Enhance the downtown street grid* – by adding lanes, providing two-way movements, or completing connections for both east-west and north-south streets.

- *Provide reliable truck routes* – accommodating freight on streets such as Mercer Street; Second, Third, and Fourth Avenues; Lander and S. Spokane Streets; and SR 519.
- *Keep transit fast and reliable* – by providing 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* – with 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* – by providing improved crossings, new pedestrian bridges, widened sidewalks, and other facilities for pedestrians traveling to and through downtown.

I-5 Building Blocks. This set looked at ways to address the problems of congestion and reliability on I-5. Many of the strategies focused on ways to manage the corridor traffic more efficiently, while others proposed added capacity. The following were key themes:

- *Prioritize throughput over access* – by removing or metering existing ramps in downtown.
- *Improve flow by reducing weaving* – particularly the I-5 and I-90 interchange.
- *Operate the system more efficiently* – through systems for active traffic management, driver information systems, and changes to how reversible lanes and high-occupancy vehicle (HOV) lanes operate.
- *Keep transit moving quickly and reliably* – through peak period shoulders, improved ramp access, tolls, and changes in HOV and express lane operations.
- *Add capacity for vehicles and freight* – by adding or extending lanes through downtown.

Transit Building Blocks. The transit building block set was focused on using transit to move more people, with strategies to increase and improve service to and through downtown. The themes included the following:

- *Expand RapidRide Service* – increased frequency on existing and planned routes and added routes serving areas such as West Seattle, Ballard, and north Seattle.
- *Improve transit frequency, speed, and reliability* – measures for more frequent service all day on transit routes, along with measures to improve speed and reliability.

- *Add new commuter-oriented routes to serve edges of downtown* – increased service and added routes to serve areas such as First Hill, South of Downtown (SODO), and South Lake Union.
- *Add streetcar lines* – advocate new street car routes connecting SODO to Seattle Center, South Lake Union to the University District and Fremont/Ballard, and International District to First Hill and 23rd Avenue.
- *Increase West Seattle Ferry Service* – increase fleet size and provide better transit service to the ferry terminal.
- *Give buses priority in traffic* – through the use of bus-only lanes and transit signal priority, by improving stop spacing, and by modifying the route network and street system to improve transit operations.
- *Extend Link light rail* – include the light rail extensions north, south, and east called for in ST2, and supported by bus transit feeding to light rail.
- *Increase Sounder commuter rail service* – more frequent two-way service, all day, with greater park-and-ride capacity.

Policies and Management. This set included strategies for managing vehicle demand and encouraging the use of other transportation choices. Key themes included the following:

- *Manage parking supply* – with measures to reduce drive-alone commute trips and make short-term parking available for customers.
- *Promote transit, walking, and biking instead of driving* – through incentives, promotions, and supporting systems and facilities.
- *Make transit an affordable, reliable, and easy-to-use choice* – through increased coverage and quality of service.
- *Reduce auto use through land use choices* – promoting higher-density, mixed-use development around transit nodes or corridors.
- *Use employer-based strategies to encourage employees to travel by alternative modes* – programs and incentives focused on parking management and encouraging transit, ridesharing, or telework.
- *Use pricing to discourage peak period single-occupant auto travel* – through tolls on major corridors, with higher prices at the most congested times.
- *Actively manage roadways to optimize throughput of people and goods* – through enforcement, technology, and operating changes.
- *Manage traffic flow and give trucks and transit priority* – through 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. This set represents more than 100 individual concepts that offer different design, construction, or alignment approaches for SR 99. There were three key groupings of potential treatments, which include ideas that have been considered in the past, as well as new concepts. They included the following themes:

- *Above-ground SR 99* – 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 roof).
- *Surface Facility* – such as an Alaskan Way boulevard, Alaskan Way/Western Avenue couplet (a pair of streets with each street carrying one way of opposing traffic), and an Alaskan Way surface expressway.
- *A below-ground facility* – featuring a bored tunnel, cut and cover tunnel, or a depressed/lidded roadway.

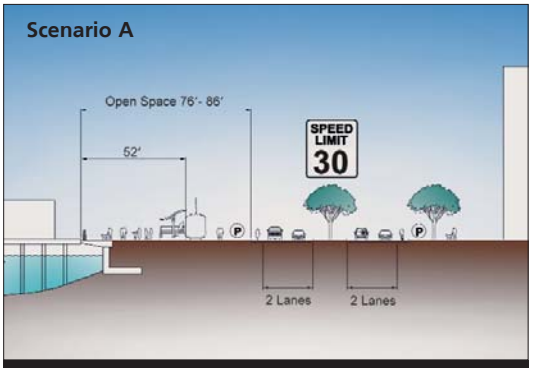
CHAPTER 5 - SYSTEMS SCENARIOS

Using these various building blocks, WSDOT, King County, and the City of Seattle developed eight scenarios, or comprehensive solutions, for replacing the viaduct's central waterfront section. The scenarios were created to test the performance of various combinations of SR 99, I-5, surface street, transit, and 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.

The first three scenarios consist of combinations of building blocks that did not include a limited-access roadway element as a replacement for SR 99 and are described below:

Scenario A: Demand Management and Low Capital

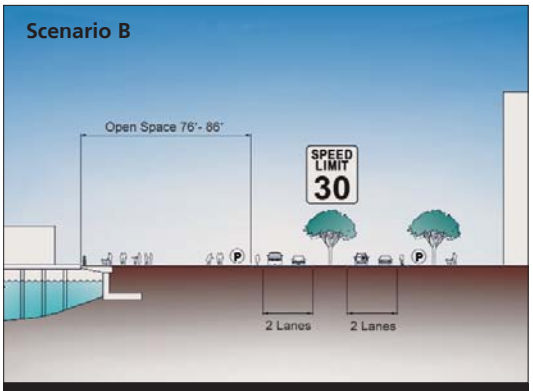
This scenario combined lower cost investments in new roads or transit service with a maximum effort to manage transportation systems and demand. Alaskan Way would be two lanes in each direction north of Yesler Way, with bike lanes and parking. There would be signalized intersections on the waterfront. 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 or enhanced bus rapid transit lines would be introduced in Delridge, Ballard, and West Seattle and on Lake City Way and Aurora Avenue. 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 were also included. This scenario would offer an open space along the central waterfront approximately 76 feet wide.



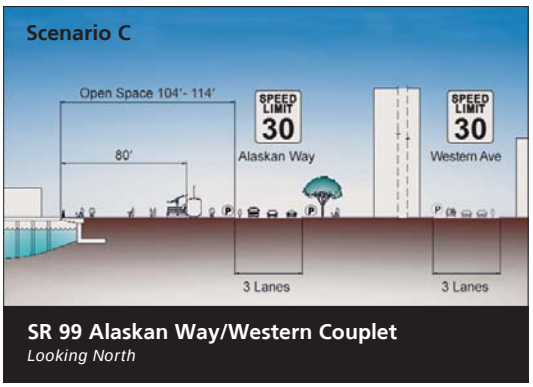
SR 99 4-Lane Boulevard
Looking North

Scenario B: Surface Boulevard and Transit

Scenario B was similar to Scenario A, but it had more capital investments and more aggressive transit improvements. Alaskan Way would be two lanes in each direction north of Yesler Way, with bike lanes and parking. There would be signalized intersections along the waterfront. The east-west streets north of the Battery Street Tunnel would be reconnected with new signalized intersections on Aurora Avenue. In this scenario the streetcar system would be extended, with lines to Fremont/Ballard, University District, central downtown, and Capitol Hill/First Hill. The bus rapid transit system would build upon the system proposed in Scenario A with an enhancement of the service on Pacific Highway S. and from Ballard to the University District. On I-5, instead of the transit-only lane starting at Olive Way 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 is included in Scenario B as well. This scenario would also offer an open space approximately 76 feet wide along the central waterfront.



SR 99 4-Lane Boulevard
Looking North



SR 99 Alaskan Way/Western Couplet
Looking North

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

Scenario C would replace SR 99 with a pair of north- and southbound one-way streets, called 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. 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. I-5 and transit improvements would be similar to Scenario B, except this scenario does 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 D through H were known collectively as the "bypass" scenarios, all of which provide some limited-access capacity in the SR 99 corridor to replace the viaduct. All of the bypass scenarios ~~included~~ a new interchange in the vicinity of S. King Street ~~that~~ would replace the ramps at Columbia and Seneca Streets that would be demolished along with the exist-

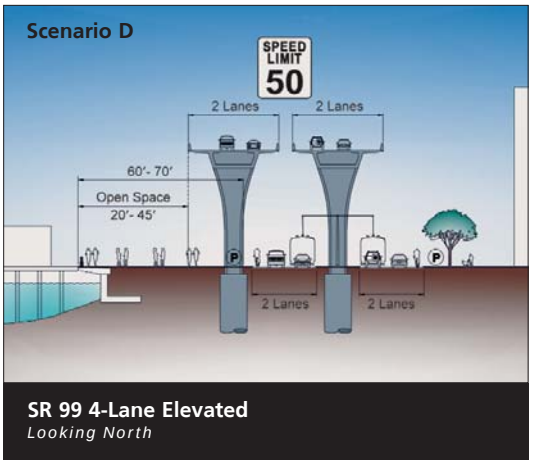
ing viaduct. Distinctions among the bypass scenarios are summarized below.

Scenario D: Independent Elevated

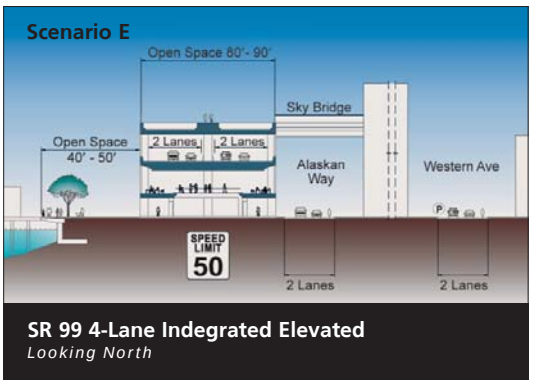
Scenario D paired four elevated lanes on the waterfront with a lower level of surface and transit improvements than found in Scenarios A through C. SR 99 would run along the waterfront on two independent bridge structures, side-by-side, with two lanes in each direction. Efforts to reconnect the street grid north of the Battery Street Tunnel would include a new Republican Street underpass. New transit lanes, RapidRide routes, transit service, and streetcar lines would be scaled down from what is proposed in Scenarios B and C. 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.

Scenario E: Integrated Elevated

This scenario paired four bypass lanes on the waterfront with a lower level of surface and transit improvements than are found in Scenarios A through C. 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. New transit lanes, RapidRide routes, transit service, and streetcar lines would be scaled down from what is proposed in Scenarios B and C. On I-5, this scenario would include a northbound transit-only lane from Olive Way to SR 520 ~~but no change to the southbound lanes~~. Open space provided along the central waterfront would be approximately 40 feet wide at ground level, with an approximately 90-foot-wide elevated park. Unlike the other scenarios, the integrated elevated structure would be depend-



SR 99 4-Lane Elevated
Looking North

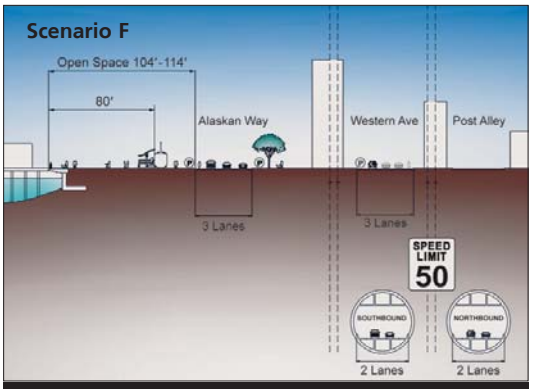


SR 99 4-Lane Indegrated Elevated
Looking North

ent on private investment to complete the commercial space located beneath the roadway.

Scenario F: Bored Tunnel

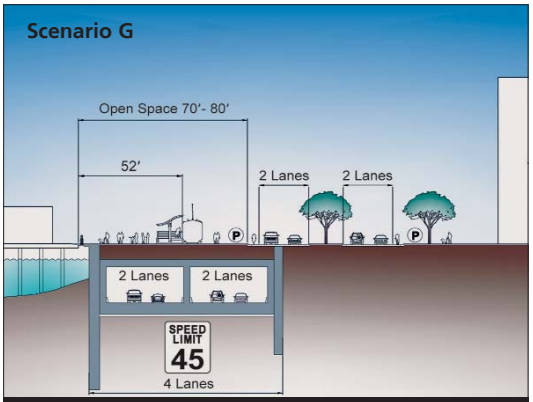
This scenario paired four bypass lanes in two bored tunnels with a lower level of surface and transit improvements than found in Scenarios A through C. The tunnels would have two lanes in each direction. They would extend from approximately S. Royal Brougham Way to Harrison Street. This scenario also includes the Alaskan Way and Western Avenue couplet, similar to Scenario C, and I-5 improvements similar to Scenario E. New transit lanes, RapidRide routes, transit service, and streetcar lines would be scaled down from what is proposed in Scenarios B and C. Open space provided along the central waterfront would be approximately 104 feet wide. Unlike the other scenarios, the bored tunnel does not use the existing Battery Street Tunnel and could be constructed without removing the existing viaduct.



SR 99 4-Lane Bored Tunnel
Looking North

Scenario G: Cut and Cover Tunnel

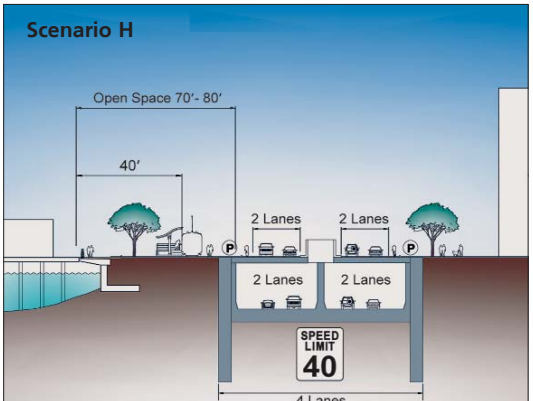
This scenario paired four bypass lanes on the waterfront in a cut and cover tunnel with a lower level of surface and transit improvements than found in Scenarios A through C. The cut and cover tunnel would be side-by-side with two lanes in each direction. Alaskan Way would be a four-lane boulevard with two lanes in each direction. This scenario includes a new Republican Street underpass to reconnect the street grid north of the Battery Street Tunnel. New transit lanes, RapidRide routes, transit service, and streetcar lines would be scaled down from what is proposed in Scenarios B and C. I-5 improvements would be similar to Scenario D. Open space provided along the central waterfront would be approximately 76 feet wide.



SR 99 4-Lane Cut-and-Cover Tunnel
Looking North

Scenario H: Lidded Trench

This scenario paired four bypass lanes on the waterfront in a lidded trench tunnel with a lower level of surface and transit improvements than are found in Scenarios A through C. The four-lane lidded trench concept represented a tunnel that was not fully enclosed. It would have two lanes in each direction in a side-by-side trench with openings roughly every 300 feet between Union Street and Yesler Way. The openings would allow for natural ventilation, and the lidded portions would provide pedestrian connections and east-west connections to Alaskan Way surface street. North of Union Street and south



SR 99 4-Lane Lidded Trench
Looking North

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 routes, transit service, and streetcar lines would be scaled down from what was proposed in Scenarios B and C. I-5 improvements would be similar to Scenarios D and G. 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, the retrofit of the existing viaduct, Elliott Bay crossing, and Alaskan Way surface expressway were not included among the scenarios assembled for evaluation. As previously discussed, any solution to the Alaskan Way Viaduct must be grounded in the State, County, and City's recognition of, commitment to, and integration across a set of six guiding principles. The preliminary analysis conducted by the ~~Independent Project Manager~~ showed conclusively that the retrofit of the existing viaduct, the Elliott Bay crossing, and the Alaskan Way surface expressway all failed to meet two or more of these guiding principles, as noted below, and therefore should not be carried further for additional analysis.

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 SAC, the retrofit option was reexamined by both the IPM 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 requires a 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. ~~This~~

~~is in stark contrast to almost all other alternatives being looked at.~~

- **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.

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 crossing of Elliott Bay would fail to meet the following guiding principles:

- **Guiding Principle 3 (Maintain or improve downtown Seattle, regional, the port, and state economies).** A bridge or 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 crossing of Elliott Bay may not be cost-effective due to the depth of Elliott Bay and 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 options on land are feasible.

Finally, it is worth noting the extent to which the study looked at six-lane options. Six-lane full-capacity replacement options located within the SR 99 corridor were the subject of extensive study in the years preceding the Partnership Agreement. The partnership process sought to accommodate the mobility needs of people and goods using the SR 99 corridor by utilizing systems solutions that relied on surface

street improvements, changes to I-5, transit service enhancement, and implementation of policies and travel management to supplement the proposed SR 99 roadway replacement. The partnership process was not removing the six-lane options from consideration. Rather, it was tabling the six-lane corridor options in order to test the viability of the Systems Approach

8 Scenario Maps Here

CHAPTER 6 - EVALUATION OF SYSTEMS SCENARIOS

The eight systems scenarios were analyzed using the six guiding principles and the 28 evaluation measures noted above. This section describes the methods of evaluation and highlights some of the findings. The ~~provides greater~~ detail on the results of the analysis of the eight scenarios based on each of the 28 evaluation measures.

Guiding Principle 1: Safety

Evaluation measures under Guiding Principle 1 assessed seismic risk by comparing proposed SR 99 replacement structures to seismic design standards and assessed safety 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, the regional travel demand forecast model was used. This model provided representative travel patterns, calibrated to existing conditions, and shows future travel patterns that would result from the potential future transportation networks as defined in the scenarios. The data from the regional model was 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.

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.

It should be noted that 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 conclusions:

- Given the volatile conditions today (economy, land use, oil prices, funding, carbon reduction policies), using a horizon year in the relatively near future provided more predictable conditions and would be a better basis for comparison among scenarios.
- The Governor had called for the removal of the existing viaduct by 2012. By selecting 2015, this 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) for a preferred scenario and potentially other alternatives.
- Funding conditions for transportation facilities are difficult to predict beyond a 5- to 10 -year horizon. By selecting 2015, fewer assumptions regarding the regional transportation system were necessary, which provided a more consistent basis for comparison of scenarios.

Guiding Principle 3: Economics

The evaluation measures under Guiding Principle 3 assessed 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.

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 pedestrian connections, quality of views, quality of pedestrian and bicycle environment, and changes to historic structures and districts.

Guiding Principle 3: 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, which 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 options 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 an option must be weighed against the degree to which other guiding principals 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.

Systems Scenarios Evaluation Findings

The performance of the eight scenarios was analyzed using the 28 evaluation measures that were developed to gauge how well the guiding principles might be met. Details of the evaluation results can be found in the , which accompanies this document. This section of the summary report provides the key findings and conclusions from the evaluation.

Six guiding principles were used to evaluate the scenarios. 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 last guiding principle and its four associated evaluation measures related to improving the health of the environment also proved not to be a significant 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.

The following summarizes the distinguishing tradeoffs among the scenarios according to the remaining four guiding principles related to transportation, economics, the urban design, and fiscal responsibility. Figure 6-1 summarizes several key quantitative findings from this evaluation process.

Figure 6-1
Summary of Quantitative Findings from the Scenario Process

SCENARIOS	SR 99 Facility Cost*	2015 Daily Vehicle Trips Through the Center City	2015 Daily Vehicle Trips on SR 99 at Yesler Way During the 3-hour PM Peak Period	Acres of Public Open Space on Waterfront	Noise Decibels at 3 Feet from Edge of Pavement
A: Demand Management/ Low Capital	$800M	1,000,000	12,000	5.5	65
B: Surface Boulevard	$800M	1,050,000	11,000	6.1	65
C: Alaskan Way/ Western Avenue Couplet	$900M	1,060,000	12,000	7	64
D: Independent Elevated	$1.6B	1,070,000	19,000	3.7	68
E: Integrated Elevated	$2.2B	1,070,000	20,000	4.3**	70***
F: Bored Tunnel	$3.5B	1,090,000	23,000	7	63
G: Cut & Cover Tunnel	$2.7B	1,070,000	22,000	4.7	63
H: Lidded Trench	$1.9B	1,060,000	12,000	4	66

* *Includes base cost, costs for allowances, contingencies, risks, and inflation. Includes costs for central seawall ($51 million to $264 million) and utilities relocation ($207 million to $299 million). Does not include costs for north seawall replacement ($337 million).*
** *Scenario E includes an additional 10.2 acres of open space located on a lid above the SR 99 highway.*
*** *Estimate given is for a location adjacent to the openings in the elevated structure*

Scenario A: Demand Management and Low Capital

Guiding Principle 1 –Improve public safety.

- This principle is not a distinguishing factor among the scenarios.

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

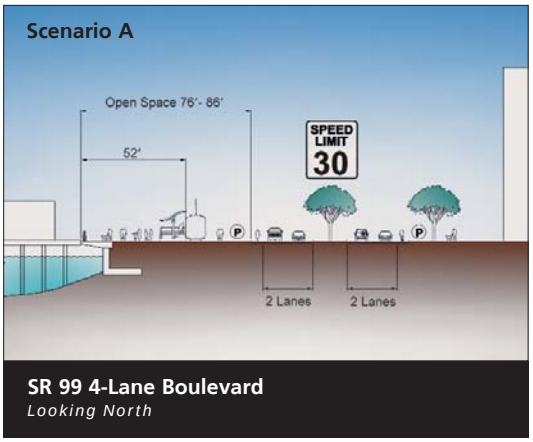
- The number of trips to and through the Center City was reduced due to tolling and a high level of demand management. Vehicle miles traveled in the Center City area would be reduced by ~~6~~ percent from today in 2015. However, this did not make a significant difference in how the overall system performed.
- Travel times on the SR 99 corridor through the central waterfront would take ~~5~~ to 10 minutes longer than the bypass scenarios and 10 to 15 minutes more than today.
- Cordon tolling could be a possibility in managing future vehicle growth and generating transportation revenue.
- While this scenario did not have the greatest transit investment, it did have the largest shift of travel to transit, largely because of the tolling and demand management strategies included.

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Impacts to traffic and mobility during construction would be less severe and last for a shorter period of time than for the scenarios that include a bypass element. Construction durations would be ~~2 to 3~~ years less with a surface street scenario compared to either an elevated or subsurface bypass scenario.
- Property and land values might increase as a result of more attractive conditions on the central waterfront.
- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of changes in transportation access. This would have the largest impacts for those businesses that now have a heavy dependence on through movements using the SR 99 corridor along the central waterfront.

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- The four-lane Alaskan Way Boulevard has a wider footprint (approximately 25 to 30 feet more) than the one-way couplet surface alternative. In addition, Alaskan Way would carry more vehicles (approximately 15,000 more daily vehicles) than the SR 99 one-way couplet, which splits traffic between Alaskan Way and Western Avenue.
- On the other hand, this scenario would not change the character of or result in large increases in traffic on



Western Avenue, as occurs with the scenarios that include a one-way couplet.

- The four-lane boulevard expands to five or six lanes in width to provide the needed turn lanes at some intersections. This would create a greater barrier for pedestrian access between the waterfront and downtown compared to those scenarios with a narrower street and lower traffic volumes.
- The scenario would provide improvements in open space, views, shading, and noise.
- Surface intersections north of the Battery Street Tunnel would improve the urban environment and connectivity in the South Lake Union, Uptown/Queen Anne, and Seattle Center areas.
- Surface intersections south of the Battery Street Tunnel improve the urban environment and connectivity in Belltown.

Guiding Principle 5 – Create solutions that are fiscally responsible.

- The total capital cost of this scenario exceeds the State's commitment of $2.8 billion; however, the SR 99 elements could be constructed within the commitment. Additional resources would be required for I-5, surface streets, and transit.

Guiding Principle 6 – Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

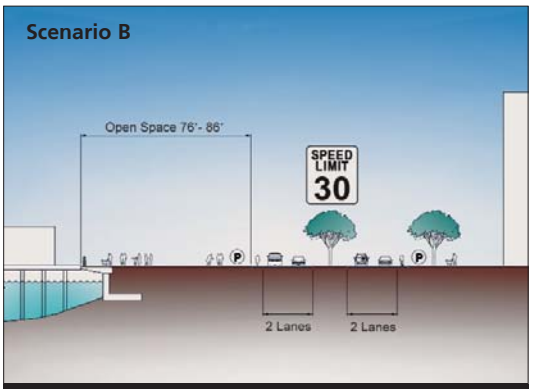
Scenario B: Surface Boulevard

Guiding Principle 1 – Improve public safety.

- This principle is not a distinguishing factor among the scenarios.

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

- Investments in I-5 would improve vehicle throughput and maintain today's travel times for trips using I-5 in the analysis year of 2015.
- Travel times on the SR 99 corridor through the central waterfront would take 5 to 10 minutes longer than the bypass scenarios and 10 to 15 minutes more than today.
- The very high level of bus and streetcar investments exceeds that needed to meet mobility needs in the 2015 analysis year.
- The transit investment in RapidRide and Rapid Trolley Bus Network would provide frequent transit service all



SR 99 4-Lane Boulevard
Looking North

day long; most of these investments would make a significant contribution to meeting mobility needs.

- The First Avenue Streetcar could replace most of the utility of the ~~W~~waterfront ~~S~~streetcar, attract more ridership, and connect to the First Hill Streetcar.

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Similar to Scenario A, impacts to traffic and mobility during construction would be severe and last for a shorter period of time than for the scenarios that include a bypass element. Construction durations would be ~~2 to 3~~ years less with a surface street scenario compared to either an elevated or subsurface bypass scenario.
- As with Scenario A, property and land values might increase as a result of the more attractive conditions on the central waterfront.
- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of change in transportation access. This would have the largest impacts for those businesses that now ~~have a heavy dependence for through movements using~~ the SR 99 corridor ~~along the central waterfront.~~

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- The four-lane Alaskan Way Boulevard would have a wider footprint (approximately 25 to 30 feet more) than the one-way couplet surface alternative. In addition, Alaskan Way would carry more vehicles (approximately 15,000 more daily vehicles) than the SR 99 one-way couplet, which splits traffic between Alaskan Way and Western Avenue.
- On the other hand, this scenario would not change the character of or result in large increases in traffic on Western Avenue, as occurs with the scenarios that include a one-way couplet.
- The four-lane boulevard expands to five or six lanes in width to provide the needed turn lanes at some intersections. This would create a greater barrier for pedestrian access between the waterfront and downtown compared to those scenarios with a narrow street and lower traffic volumes.
- This scenario would improve open space, views, shading, and noise on the central waterfront.
- Surface intersections north of the Battery Street Tunnel would improve the urban environment and connectivity in the South Lake Union, Uptown/Queen Anne, and Seattle Center areas.

- Surface intersections south of the Battery Street Tunnel would improve the urban environment and connectivity in Belltown.

Guiding Principle 5 – Create solutions that are fiscally responsible.

- The total capital cost of this scenario exceeds the State's commitment of $2.8 billion, but SR 99 elements could be constructed within the commitment. Additional resources would be required for I-5, surface streets, and transit.

Guiding Principle 6 – Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

Scenario C: Surface Couplet

Guiding Principle 1 – Improve public safety.

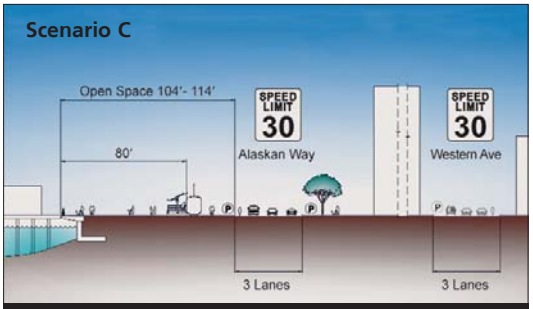
- This principle is not a distinguishing factor among the scenarios.

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

- The one-way couplet is the most effective SR 99 surface alternative at moving vehicles through the waterfront.
- As in Scenario B, investments in I-5 would improve vehicle throughput and maintain today's travel times in the analysis year of 2015 for I-5 trips.
- Travel times on the SR 99 corridor through the central waterfront would take ~~5~~ to 10 minutes longer than the bypass scenarios and 10 to 15 minutes more than today. Most trips to or through the Center City would have minimal changes in travel time.
- The transit investment in RapidRide and Rapid Trolley Bus Network would provide frequent transit service all day long; most of these investments make a significant contribution to meeting mobility needs.
- The First Avenue Streetcar could replace most of the utility of the Waterfront Streetcar, attract more ridership, and connect to the First Hill Streetcar.

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Similar to Scenarios A and B, impacts to traffic and mobility during construction would be less severe and last for a shorter period of time than for the scenarios that include a bypass element. Construction durations would be ~~2 to 3~~ years less with a surface street scenario compared to either an elevated or subsurface bypass scenario.



SR 99 Alaskan Way/Western Couplet
Looking North

- As with Scenarios A and B, property and land values might increase as a result of more attractive conditions on the central waterfront.
- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of changes in transportation access. This will have the largest impacts for those businesses that now have a heavy dependence on through movements using the SR 99 corridor along the central waterfront

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- The SR 99 one-way couplet has a narrower footprint (approximately 25 to 30 feet less) than the Alaskan Way surface boulevard contained in Scenarios A and B. In addition, Alaskan Way itself would carry fewer vehicles (approximately 15,000 fewer daily vehicles) than the four-lane Alaskan Way Boulevard.
- The one-way couplet has a shorter pedestrian connection between downtown and the waterfront, with three lanes at the intersections.
- Both the character and volumes of traffic on Western Avenue would be changed significantly by its operation as a three-lane, one-way northbound street from Yesler Way north.
- The undercrossing of Western Avenue through the Pike Place Market would improve pedestrian connectivity between the market and Steinbrueck Park.
- As with Scenarios A and B, a surface scenario improves waterfront open space, views, shading, and noise.
- Surface intersections north of the Battery Street Tunnel would improve the urban environment and connectivity in the South Lake Union, Uptown/Queen Anne, and Seattle Center areas.
- Surface intersections south of the Battery Street Tunnel would improve the urban environment and connectivity in Belltown.

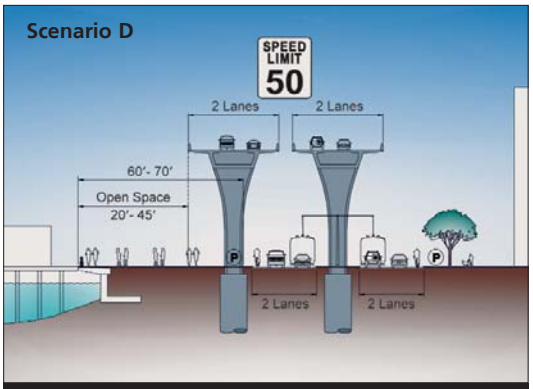
Guiding Principle 5 – Create solutions that are fiscally responsible.

- The total capital cost of this scenario exceeds the State's commitment of $2.8 billion, but SR 99 elements could be constructed within the commitment. Additional resources would be required for I-5, surface streets, and transit.

Guiding Principle 6 - Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

Scenario D: Independent Elevated



SR 99 4-Lane Independent Elevated
Looking North

Guiding Principle 1 – Improve public safety.

- This principle is not a distinguishing factor among the scenarios.

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

- This elevated scenario, along with Scenarios E and G, most closely mimics the current traffic patterns.
- The elevated structure would provide a bypass connection through downtown Seattle, with connections to Elliott/Western and Aurora Avenue.
- Travel times for trips through the central waterfront would be closer to current times than under the surface scenarios.
- Transport of flammables or hazardous materials would be allowed on the elevated viaduct during non-peak periods (unlike the subsurface scenarios).
- All RapidRide routes destined for downtown Seattle would have high ridership, especially in the peak period. Even with a bypass scenario, the new Delridge RapidRide would be a well-used service with over 19,000 riders per day.

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Construction impacts would be greater than with the surface alternatives. There would be more construction effects, which may produce higher construction mitigation costs.
- The construction period would be ~~2 to 3~~ years longer than a surface scenario, and it would result in traffic disruptions over a longer period of time.
- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of changes in transportation access.

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- While providing a modest improvement over the impacts of the existing elevated structure, there would be significant view, shading, noise, and open space effects on the waterfront compared to both the surface and subsurface scenarios.

Guiding Principle 5 – Create solutions that are fiscally responsible.

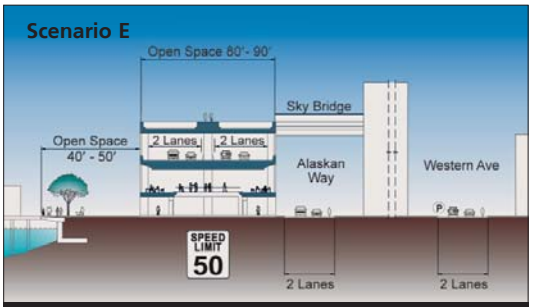
- The total capital cost of this scenario exceeds the State's commitment of $2.8 billion, but SR 99 elements could be

constructed within the commitment. Additional resources would be required for I-5, surface streets, and transit.

Guiding Principle 6 - Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

Scenario E: Integrated Elevated



SR 99 4-Lane Indegrated Elevated
Looking North

Guiding Principle 1 – Improve public safety.

- This principle is not a distinguishing factor among the scenarios.

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

- This elevated scenario, along with Scenarios D and G, most closely mimics the current traffic patterns.
- Travel times for trips through the central waterfront would be closer to current times than with surface scenarios.
- The elevated viaduct would provide a bypass connection through downtown Seattle, with connections to Elliott/Western and Aurora Avenue.
- Flammables or hazardous materials are not expected to be allowed in the integrated elevated structure.

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Construction impacts would be similar to those of the elevated structure in Scenario D and greater than with the surface scenarios. There would be more construction effects, which may produce higher construction mitigation costs.
- The construction period would be ~~2 to 3~~ years longer than with a surface scenario, and it would result in traffic disruptions over a longer period of time.
- There are concerns about the viability of the commercial development under the highway structure; funding for these developments would need to come entirely from as-yet unidentified private sources.
- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of changes in transportation access.

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- There would be more substantial view and shading effects on the waterfront than with Scenario D: Independent Elevated.

- Noise levels at the east-west streets would be similar to the existing viaduct, but quieter in midblock locations.
- This scenario would have the largest quantity of open space, but the space is judged to be of a lower quality compared to the other scenarios. There are ~~concerns~~ about accessibility and safety of the open space located above the highway structure. For example, access for security, emergency response, and large crowd volumes pose concerns.
- The 40-foot-wide promenade on the waterfront would be the smallest provided with any of the scenarios and must serve multiple purposes, such as vehicle access to the piers, which compromises the quality of the open space.
- The elevated structure would divide the historic waterfront from downtown and Pioneer Square.

Guiding Principle 5 – Create solutions that are fiscally responsible.

- Both the entire scenario as well as the SR 99 component of this scenario exceed the ~~S~~State's commitment of $2.8 billion.

Guiding Principle 6 – Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

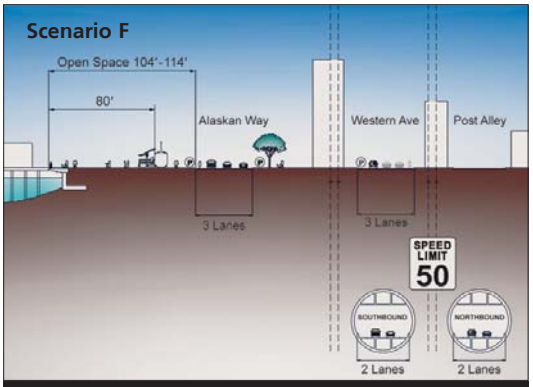
Scenario F: Bored Tunnel

Guiding Principle 1 – Improve public safety.

- This principle is not a distinguishing factor among the scenarios.

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

- The bored tunnel would provide the most efficient SR 99 bypass through downtown of all of the scenarios, and it would provide the shortest travel times for SR 99 corridor trips bypassing downtown.
- The bored tunnel would have travel times short enough that it could draw some traffic from I-5.
- The bored tunnel would not connect directly to Elliott and Western ~~A~~Avenues, as do the other bypass scenarios. Through traffic served by Elliott and Western will need to use the waterfront surface streets or reach the bored tunnel via Mercer Street. Thus, travel times for these trips will be longer than under the other bypass scenarios that include the Elliott and Western ramp connections.
- Transport of flammables or hazardous materials is not expected to be allowed in the bored tunnel.



SR 99 4-Lane Bored Tunnel
Looking North

- This scenario has the least transit investment and thus the fewest transit riders (with 15,000 fewer riders each day than Scenarios B or C and 25,000 fewer riders each day than Scenario A).

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of changes in transportation access.
- The bored tunnel would require the longest construction time (over 10 years including all the building block elements), but the current SR 99 viaduct could remain in place during construction.
- Construction disruptions to the waterfront would be similar to Scenario C.
- As with Scenarios A, B, and C, property and land values might increase as a result of more attractive conditions on the central waterfront.

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- This scenario would produce the greatest benefits to the central waterfront among all alternatives studied.
- Traffic and transportation system impacts on the central waterfront would be similar to or less than impacts for Scenario C, with the narrowest footprint for Alaskan Way and the lowest traffic volumes of all of the scenarios.
- Depending on the configuration and location of the tunnel's north portal, surface intersections north of the Battery Street Tunnel would improve the urban environment and connectivity in the South Lake Union, Uptown/Queen Anne, and Seattle Center areas.
- Surface intersections south of the Battery Street Tunnel would improve the urban environment and connectivity in Belltown.

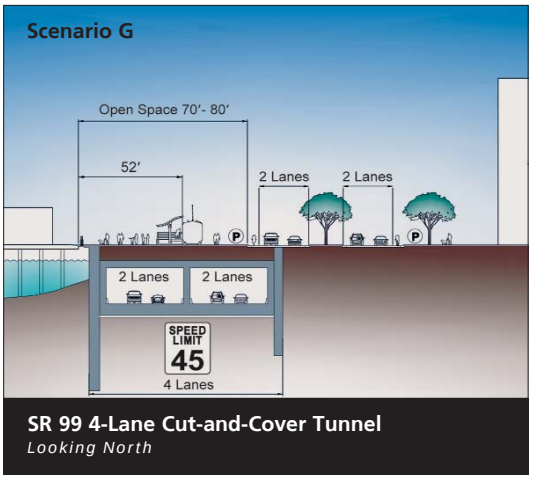
Guiding Principle 5 – Create solutions that are fiscally responsible.

- Alternative design configurations and construction techniques may reduce the cost by several hundred million and save at least 2 years in schedule.
- Both the entire scenario as well as the SR 99 component of this scenario exceed the State's commitment of $2.8 billion.

Guiding Principle 6 – Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

Scenario G: Cut and Cover Tunnel



SR 99 4-Lane Cut-and-Cover Tunnel
Looking North

Guiding Principle 1 – Improve public safety.

- This principle is not a distinguishing factor among the scenarios.

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

- Transportation performance of this scenario would be very similar to Scenario D, and therefore much like the current viaduct but without the downtown access ramps.
- Flammables or hazardous materials are not expected to be allowed in the cut-and-cover tunnel.

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Construction disruptions on the waterfront would be the most significant with the cut-and-cover tunnel, taking ~~2 to 3~~ years longer than surface and transit scenarios. Overall traffic disruption during construction would be the most severe among all of the scenarios.
- The cut-and-cover tunnel would have the highest construction risk.
- Property and land values might increase as a result of more attractive conditions on the central waterfront.
- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of changes in transportation access.

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- Scenario G includes a four-lane boulevard with an open space approximately 76 feet wide directly adjacent to the waterfront. While the street width is similar to that in Scenarios A and B, traffic volumes would be less.
- With SR 99 under Elliott and Western Avenues, the urban environment and the connectivity in Belltown would be improved with this scenario.
- The north and south portals of the tunnel would restrict pedestrian movements (two blocks on each end).
- The west wall of the tunnel would serve as the new seawall, which would preclude seasonal construction.
- This scenario would improve open space, views, shading, and noise.

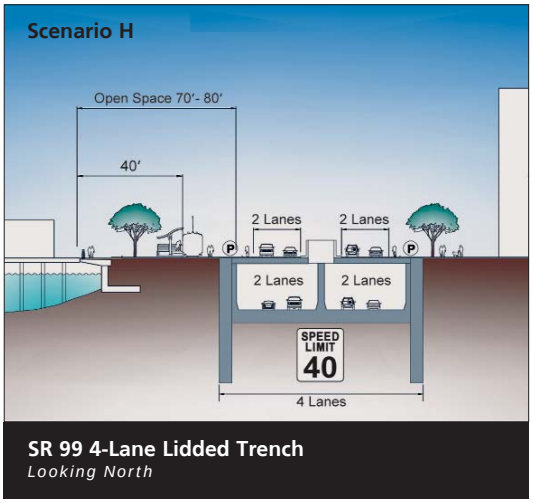
Guiding Principle 5 – Create solutions that are fiscally responsible.

- Both the entire scenario as well as the SR 99 component of this scenario exceed the State's commitment of $2.8 billion.

Guiding Principle 6 – Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

Scenario H: Lidded Trench



SR 99 4-Lane Lidded Trench
Looking North

Guiding Principle 1 – Improve public safety.

- This principle is not a distinguishing factor among the scenarios.

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

- As configured, this scenario would not provide significant bypass capacity. If lengthened to provide bypass capacity, transportation performance and costs approach the costs of a cut-and-cover tunnel.
- Travel times in the SR 99 corridor would be similar to the surface scenarios (5 to 10 minutes slower than with the bypass scenarios). This could be improved by removing signalized intersections in the north.
- Flammables or hazardous materials are not expected to be allowed in the lidded trench.

Guiding Principle 3 – Maintain or improve downtown Seattle, regional, the port, and state economies.

- Construction disruptions on the waterfront will be similar to disruptions with the cut-and-cover tunnel, taking ~~2 to 3~~ years longer than surface and transit scenarios.
- Property and land values might increase as a result of more attractive conditions on the central waterfront.
- Overall, the regional and local economy would grow. However, there would likely be changes to local businesses as a result of changes in transportation access.

Guiding Principle 4 – Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.

- The open space, pedestrian crossings, and views would be similar to the surface boulevard, but noise levels would be slightly higher.
- The north and south portals of the tunnel would restrict pedestrian movements (two blocks on each end).

Guiding Principle 5 – Create solutions that are fiscally responsible.

- Both the entire scenario as well as the SR 99 component of this scenario exceed the State's commitment of $2.8 billion.

Guiding Principle 6 - Improve the health of the environment.

- This principle is not a distinguishing factor among the scenarios.

CHAPTER 7 - HYBRID SCENARIOS

Basis for Hybrid Development

The ~~Independent Project Manager~~, 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 scenarios based on the findings of the evaluation conducted on the six guiding principles and 28 evaluation measures. Given the evaluation conclusions presented in Section 6, 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. 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 all 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 the potential effects on the local economy. As a result, the team felt it useful 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 to the development of hybrids was chosen to help focus the decision-making and highlight the major tradeoffs among the choices.

~~The following additional~~ key findings of the evaluation of the systems-level scenarios were useful in the development of the hybrid scenarios:

- Of the surface scenarios for SR 99, the Alaskan Way and Western Avenue one-way pair was the most efficient from a transportation standpoint.
- 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 improvements, policies, and 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 tend to be less effective in enhancing mobility for travel through downtown.

- The bypass scenarios (elevated structures, tunnels, and the 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 bypass scenarios (particularly the cut-and-cover tunnel and lidded trench and to a lesser extent the integrated elevated and independent elevated scenarios) are substantial and will be challenging to mitigate. Impacts are much less with the SR 99 surface scenarios (boulevard and couplet) and the bored tunnel.
- From an urban design and environmental perspective, the elevated bypass scenarios present serious challenges that are difficult to overcome and mitigate. In this regard, the integrated elevated scenario is the most challenging as a result 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 of all of the scenarios exceed the State's commitment of $2.8 billion, and only the surface boulevard, surface couplet, and independent elevated SR 99 elements can be constructed within the commitment. As a result, additional resources would be required to build the integrated elevated, cut-and-cover tunnel, lidded trench, or bored tunnel elements.

Approach to Hybrid Development

The development of hybrids was not easy. As noted earlier, the scenarios analysis made clear the inevitable tradeoffs among different approaches and designs. No one approach was a clear winner on all six guiding principles. The team started with four hybrids that it felt maximized benefits and/or highlighted the inherent tradeoffs and eventually winnowed these to three that were recommended to the Tri-Agency Partnership. Below is a synopsis of the team's approach.

- As a result of these findings, the 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 provides better transportation performance for through trips and the smallest possible Alaskan Way road-

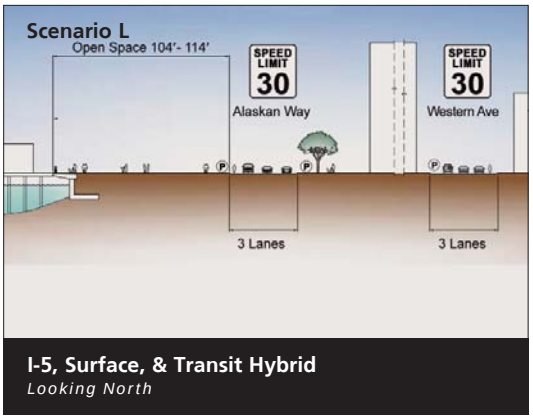
way cross section but alters the character of Western Avenue.

- In addition, 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 one of the SR 99 bypass elements 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 inability to meet the urban design and environmental guiding principles, the team concluded that an ~~additional~~ bypass hybrid should be considered. While it was recognized that all of the ~~other 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 had the greatest potential to satisfy the other guiding principles, but all failed the fiscal responsibility guiding principle~~, and~~ 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 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 any advantages over the cut-and-cover tunnel.
- The bored tunnel, while the most expensive and taking the longest time to build 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. In addition, the bored tunnel was the least disruptive from a construction standpoint, both to the central waterfront and to 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. The use of a single large bore might produce cost savings and reduce 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. A possible drawback to the bored tunnel is that it does not serve travel in the Elliott and Western Avenue corridor since it does not include the ramp connections contained in the other bypass scenarios. As a result of all of these considerations, a decision was made to develop a second bypass hybrid using the bored tunnel as the basis.

The sections that follow, along with the accompanying Figure 7-1, 7-2, and 7-3, summarize the descriptions and relative performance of each of the three hybrid scenarios.

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



I-5, Surface, & Transit Hybrid
Looking North

The SR 99 configuration in the I-5, Surface, and Transit Hybrid would resemble 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 connect back to Alaskan Way just south of Pike Place Market. The street grid north of the Battery Street Tunnel would be reconnected with signalized intersections on Aurora Avenue. This scenario would offer an open space 80 to 114 feet wide along the central waterfront. The bus rapid transit system would be extended with lines for Delridge and Lake City Way. This service would be in addition to planned new lines serving Ballard, West Seattle, and Aurora Avenue. 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.

The total cost of this scenario was estimated to be $3.3 billion in escalated year of expenditure dollars, of which $930 million is associated with the central waterfront SR 99 elements. The overall performance of this scenario on the other guiding principles is estimated to be similar to that for Scenario C. Major issues to be considered with this scenario include the tradeoffs involved between longer travel times and reduced

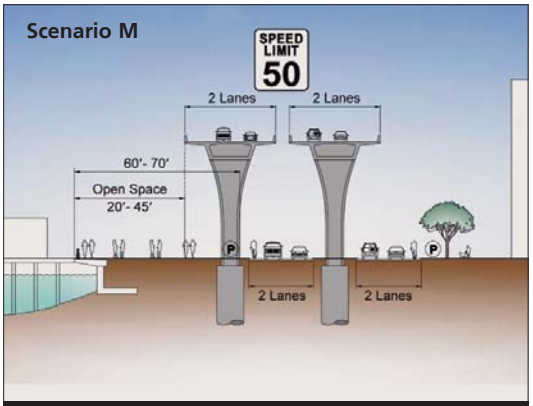
vehicle capacity in the SR 99 corridor and related economic implications and the significant urban design and environmental benefits. In addition, Scenario L was expected to be the least costly of the hybrid scenarios.

If the I-5, Surface, and Transit Hybrid were to be moved forward as the preferred alternative, further study and consideration would be needed to resolve a number of 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 needs to be paid to the north end through the Pike Place Market and to the south end through Pioneer Square. As an alternative, it may be useful to develop in more detail a comparison of all of the tradeoffs of the couplet and a two-way boulevard on Alaskan Way and use this work as the basis for reaching a final decision. As well, work is needed to find additional funds to fill the gap between the State's $2.8 billion in committed funds and the total ~~program~~ cost of $3.3 billion.

Scenario M: Elevated Bypass Hybrid

The SR 99 configuration in the Elevated Bypass Hybrid would resemble 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. The bus rapid transit system would be extended with lines for Delridge and Lake City Way. This service would be in addition to planned new lines serving Ballard, West Seattle, and Aurora Avenue. 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 is associated with the central waterfront SR 99 elements. The overall performance of this scenario on the other guiding



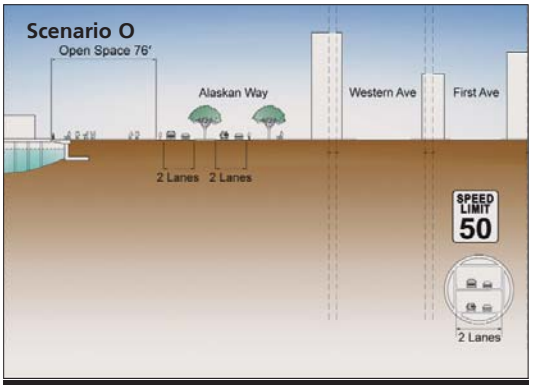
Elevated Bypass Hybrid
Looking North

principles is estimated to be similar to that for Scenario D. Major issues to be considered with this scenario include 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 is more costly than the I-5, Surface, and Transit Hybrid but less expensive than the Bored Tunnel Hybrid.

If the Elevated Hybrid were to be moved forward as the preferred alternative, further study and consideration would be needed to explore ways to 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 needs to be undertaken. These studies should consider visual and urban design as well as cost tradeoffs in reaching a final configuration, with the goal of developing a structure that can come closest to meeting the guiding principles identified for the affected central waterfront and adjacent downtown neighborhoods. While certainly a challenge, it should nonetheless be possible to develop a solution that is a significant improvement compared to the existing structure. Work also is needed to find additional funds to fill the gap between the State's $2.8 billion in committed funds and the total ~~program~~ cost of $3.5 billion.

Scenario O: Bored Tunnel Hybrid

The SR 99 configuration in the Bored Tunnel Hybrid would resemble Scenario F, except it would consist of a single large (approximately 54-foot-diameter) structure, carrying two lanes of traffic on both an upper- and lower-level roadway. While further work is needed to substantiate early conclusions that the larger tunnel is more economical and faster to build and can meet the design requirements, this approach is preferable from many standpoints. The tunnel would extend from approximately S. Royal Brougham Way to Harrison Street. After removal of the viaduct, a boulevard similar to that included in Scenario B would be developed between Western Avenue and Battery Street down to the waterfront and continuing south. 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



Bored Tunne Hybrid
Looking North

tunnel portal and access, as well as access to downtown from the north. The bus rapid transit system would be extended with lines for Delridge and Lake City Way. This service would be in addition to planned new lines serving Ballard, West Seattle, and Aurora Avenue. 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 is 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 are estimated to be $4.2 billion in escalated year of expenditure dollars, of which $2.2 billion is associated with the central waterfront SR 99 elements. The overall performance of this scenario on the other guiding principles is estimated to be similar to that for Scenario F. The major tradeoffs with Scenario O are its 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 performs best. The longer travel times for bypass trips in the Elliott and Western Avenue corridor is the only area where the other bypass scenarios perform better from a mobility standpoint. The biggest challenge of the bored tunnel is that it has costs that will require funding sources ~~substantially~~ beyond the State's commitment of $2.8 billion.

If the Bored Tunnel Hybrid is moved forward as the preferred alternative, further study and consideration is needed of ways to reduce costs and risks and find additional sources of funding to meet the gap between the State's $2.8 billion in committed funds and the total program cost of $4.2 billion.

Additional work is 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 is 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 need to be addressed and could have signifi-

cant cost and performance impacts. Also, further work is needed to explore ways to limit any impacts to trips in the Western and Elliot Avenue corridor. Finally, work needs to be done to look at ways that the time to construct the tunnel might be shortened and construction impacts minimized. This work should include consideration of a variety of project delivery options, including the possibility of using a design/build approach.

3 Hybrid Scenario Maps Here

CHAPTER 8 - CONCLUSIONS & NEXT STEPS

Not surprisingly, there are no easy answers for the replacement of the Alaskan Way Viaduct. The challenges in satisfying the multiple and diverse mobility needs in the sensitive and dense urban environment of Seattle's core are quite large, and there is a long history of debate surrounding many of the most fundamental issues. The analysis makes clear that there is no single solution that can address all interests or fully satisfy all six guiding principles. Compromises will be needed to move forward.

Compounding this are the uncertainties surrounding future changes in the cost of travel, vehicle technology, and public policy related to climate change, as well as the future health of the local, national, and global economies. Will the forces shaping the demand for vehicle travel over the next 50 years look like the past 50 years, or will major changes in one or more of these areas result in substantial changes in the way people travel? At no time in recent memory have these factors and the resulting impacts been more difficult to predict.

Still, it is the ~~Independent Project Manager's~~ strong assessment that the year-long analysis made ~~great headway~~ in analyzing options and creating a common understanding among decision-makers and stakeholders regarding the likely impacts. Most importantly, the evaluation has sharpened the focus on a discreet number of alternatives and made clear both the trade-offs and possible strategies for moving forward.

The information documented in this report and the associated and appendices, as well as the inputs from the SAC and broader public outreach effort, is the basis for the recommendation developed by the Tri-Agency Partnership and the three executives. This final recommendation and the summary rationale for it are contained in the Executives Recommendation. The three hybrid scenarios presented in this report all have advantages and disadvantages-developing a recommendation based on these hybrid scenarios will require policy makers to make a

number of critical tradeoffs. In the end, there is no wrong approach other than inaction.

Following the executives' recommendation, the key steps include resolution of the major design and implementation issues raised in this report, development of a strategy to complete the necessary environmental reviews, development of a finance plan, and development of a process to monitor and coordinate the actions of the three partnership agencies in carrying out the recommendations.