APPENDIX B
Alternatives Description and Construction Methods Technical Memorandum

Submitted by:
PARSONS BRINCKERHOFF QUADE & DOUGLAS, INC.

Prepared by:
PARAMETRIX

JULY 2006
SR 99: ALASKAN WAY VIADUCT & SEAWALL REPLACEMENT PROJECT

Supplemental Draft EIS
Alternatives Description and Construction Methods
Technical Memorandum

AGREEMENT NO. Y-7888
FHWA-WA-EIS-04-01-DS

Submitted to:
Washington State Department of Transportation
Alaskan Way Viaduct and Seawall Replacement Project Office
999 Third Avenue, Suite 2424
Seattle, WA 98104

The SR 99: Alaskan Way Viaduct & Seawall Replacement Project is a joint effort between the Washington State Department of Transportation (WSDOT), the City of Seattle, and the Federal Highway Administration (FHWA). To conduct this project, WSDOT contracted with:

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In association with:
BERGER/ABAM Engineers Inc.
BJT Associates
David Evans and Associates, Inc.
Entech Northwest
EnvirolIssues, Inc.
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HDR
Jacobs Civil Inc.
Larson Anthropological Archaeological Services Limited
Mimi Sheridan, AICP
Parametrix
Power Engineers, Inc.
Preston Gates & Ellis LLP
ROMA Design Group
RoseWater Engineering, Inc.
Shannon & Wilson, Inc.
So-Deep, Inc.
Taylor Associates, Inc.
Tom Warne and Associates, LLC
William P. Ott
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<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>AWV</td>
<td>Alaskan Way Viaduct</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practice</td>
</tr>
<tr>
<td>BNSF</td>
<td>Burlington Northern Santa Fe Railway Company</td>
</tr>
<tr>
<td>CEVP</td>
<td>Cost Estimate Validation Process</td>
</tr>
<tr>
<td>EIS</td>
<td>environmental impact statement</td>
</tr>
<tr>
<td>HOV</td>
<td>high-occupancy vehicle</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>kV</td>
<td>kilovolt</td>
</tr>
<tr>
<td>I-5</td>
<td>Interstate 5</td>
</tr>
<tr>
<td>MSE</td>
<td>mechanically stabilized earth</td>
</tr>
<tr>
<td>SIG</td>
<td>Seattle International Gateway</td>
</tr>
<tr>
<td>SODO</td>
<td>South of Downtown</td>
</tr>
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<td>SR</td>
<td>State Route</td>
</tr>
<tr>
<td>WSDOT</td>
<td>Washington State Department of Transportation</td>
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**Preface**

The technical appendices present the detailed analyses of existing conditions and predicted effects of each alternative. The results of these analyses are summarized and presented in the main text of the Supplemental Draft Environmental Impact Statement (EIS).

The Supplemental Draft EIS appendices are intended to add new information and updated analyses to those provided in the Draft EIS, published in March 2004. Information that has not changed since then is not repeated in these appendices. Therefore, to get a complete understanding of the project area conditions and projected effects, you may wish to refer to the appendices that were published with the Draft EIS. These are included on a CD in the Supplemental Draft EIS. To make it easier to understand where there is new information or analyses, the supplemental appendices present information in the same order as it was presented in the Draft EIS appendices.

The Supplemental Draft EIS and the technical appendices evaluate the effects of three construction plans: the shorter plan, the intermediate plan, and the longer plan. These plans vary in how long SR 99 would be completely closed, in how long the periodic closures may be, and in the total construction duration. For the purposes of the analyses in the technical appendices, two construction plans are evaluated with the Tunnel Alternative and one plan is evaluated with the Elevated Structure Alternative. However, each alternative could be built with any of the three plans. The construction durations and the sequencing would not be the same for a particular construction plan if paired with a different alternative; however, the effects would be within the ranges presented by the analyses.

There are several differences in how the information is presented between the main text of the Supplemental Draft EIS and how it is presented in these appendices. The Supplemental Draft EIS text refers to possible variations within the alternatives as “choices” while these appendices use the term “options.” (For example, Reconfigured Whatcom Railyard versus Relocated Whatcom Railyard is referred to as a design choice in the Supplemental Draft EIS and as an option in the appendices.) In either case, the intent is to describe the various configurations that could be selected and the effects for each design.

One design choice in particular is handled very differently between the Supplemental Draft EIS text and the technical appendices. For the Tunnel Alternative in the central waterfront area, there is a choice between a stacked tunnel alignment and a side-by-side tunnel alignment. In the appendices, to simplify the discussion, these two alignments, as well as the Elevated Structure
Alternative, are each paired with a different set of options throughout the corridor and presented as complete sets that are evaluated separately. The Supplemental Draft EIS text communicates this information differently by describing one Tunnel Alternative and one Elevated Structure Alternative and evaluating the effects of the different design choices (or mix-and-match components) separately. While it may appear that there are three alternatives analyzed in the appendices and two in the Supplemental Draft EIS text, there are in fact only two alternatives. Each alternative has many potential components or design choices that can be made throughout the corridor.

The organization of the analysis of the alternatives is also a little different between the main body of the Supplemental Draft EIS and the appendices. In the Supplemental Draft EIS text, we identify two alternatives: a Tunnel Alternative and an Elevated Structure Alternative. The Supplemental Draft EIS text compares these alternatives directly by comparing effects (for example, the effects of both alternatives on water quality are presented together). The appendices present the effects of each alternative separately (for example, all of the effects of the Tunnel Alternative are presented first, followed by all of the effects of the Elevated Structure Alternative). The substance of both discussions is the same. The organization of the Supplemental Draft EIS technical appendices mirrors that of the Draft EIS appendices, allowing you to more easily find comparable information in the Draft EIS appendices.
Chapter 1 INTRODUCTION

This memorandum describes the alternatives and options under consideration for replacing the Alaskan Way Viaduct (AWV) and Alaskan Way Seawall. This document updates and supplements information presented in the Alaskan Way Viaduct and Seawall Replacement Project Draft Environmental Impact Statement (EIS), Appendix B, Alternatives Description and Construction Methods Technical Memorandum, published in March 2004.

The Draft EIS (WSDOT et al. 2004) evaluated five Build Alternatives and a No Build Alternative. In late 2004, the lead agencies narrowed the five alternatives down to two—Tunnel and Rebuild. In December 2004, the project proponents identified the Tunnel Alternative as the Preferred Alternative and carried the Rebuild Alternative forward for analysis as well. Since that time, engineering and design has been updated and refined for the Tunnel and Rebuild Alternatives. Due to the magnitude of the changes in the design of the Rebuild Alternative, it has been renamed the Elevated Structure Alternative. The Elevated Structure Alternative combines elements of the Aerial and Rebuild Alternatives that were evaluated in the Draft EIS.

Chapter 2 describes the Tunnel and Elevated Structure Alternatives and the several mix-and-match features that could form the final alignments for the viaduct and seawall replacement. For description purposes, the Tunnel Alternative’s stacked and side-by-side alignments and the Elevated Structure Alternative have been paired with particular options, although the individual options and design features can be mixed-and-matched. For example, although the stacked tunnel alignment is paired with the Steinbrueck Park Walkway lid option, it could also be built with the full lid option, the Steinbrueck Park Lid. These alternatives and options are described individually from south to north in terms of the proposed alignments, facilities, and mix-and-match features.

Chapter 3 describes the construction plans that are currently proposed for each alternative and option. Three possible construction plans are also under consideration in this supplement. Only one construction plan was considered in the Draft EIS.

Chapter 4 describes the construction methods that would be used to build the elements of the project. These descriptions are intended to provide general information on how the project could be built, allowing leeway through the design and contracting process for other methods and approaches or variations of these methods to be proposed.
Chapter 5 describes the construction activities and estimated durations for each alternative. Two construction plans are evaluated for the Tunnel Alternative, and one plan is evaluated for the Elevated Structure Alternative. However, each alternative could be built with any of the three construction plans. Both alternatives have been broken down into construction stages, and for each construction stage, the estimated duration is reported and the traffic routing plan is described. (The proposed alternate routes for transit and other transportation modes during construction are described in greater detail in Chapter 6 of the 2006 Supplemental Draft EIS Appendix C, Transportation Discipline Report.)

Chapter 6 summarizes the potential cumulative impacts of the AWV Project with other projects that are planned or may be under construction during the same period.

Chapter 7 lists references consulted during the writing of this memorandum.

1.1 Project Purpose and Need

1.1.1 Purpose of the Proposed Project

In April 2005, the lead agencies amended the project’s Purpose and Need Statement to address the need for access and safety improvements to the State Route (SR) 99 corridor north of the Battery Street Tunnel.

The 2005 amended purpose of the project is to provide a transportation facility and seawall with improved earthquake resistance that will maintain or improve mobility, accessibility, and traffic safety for people and goods along the existing AWV Corridor, as well as to improve access to, from, and across SR 99 from the Battery Street Tunnel north to Roy Street.

1.1.2 Reason the Project Is Needed

The viaduct and seawall need to be replaced because they are at risk of failing in an earthquake and are nearing the end of their useful lifespan. The earthquakes in 1965 and 2001 accelerated the deterioration. Improvements are necessary to protect public safety and maintain this vital transportation corridor. In addition to addressing seismic vulnerabilities, improvements on SR 99 are needed to address safety issues related to roadway deficiencies, such as narrow lanes and lack of shoulders. North of the Battery Street Tunnel, improvements are needed to improve safety on SR 99 and to provide better access to, from, and across SR 99 and local street connections.
1.2 Project Limits

As defined in the project’s Purpose and Need Statement, the AWV Corridor’s project limits extend from approximately S. Spokane Street in the south to Roy Street in the north. The Alaskan Way Seawall extends from S. Washington Street to Bay Street along Elliott Bay.

The project’s construction area is slightly different than the project limits, and refers to the areas where construction would occur. The construction area extends from S. Spokane Street in the south to Comstock Street in the north. The construction area has changed slightly from the Draft EIS due to the proposed changes to Aurora Avenue N. north of the Battery Street Tunnel (see Exhibit 1-1). The construction area now extends approximately three blocks farther north than evaluated in the Draft EIS.

For discussion purposes in this report, the project has been broken into the following sections:

- South – S. Spokane Street to S. Dearborn Street
- Central – S. Dearborn Street to the south portal of the Battery Street Tunnel
- North Waterfront – Pine Street to Broad Street
- North – Battery Street Tunnel north to Comstock Street
- Seawall – S. Washington Street up to Broad Street
  - Central Seawall section: Tunnel/seawall from S. Washington Street to Union Street
  - Central and North Waterfront Seawall section: Independent seawall from Union Street to Broad Street

1.3 Existing Conditions

For a complete description of existing conditions for the viaduct, seawall, Battery Street Tunnel, and Alaskan Way surface street, including the operational deficiencies and seismic vulnerabilities of these facilities, refer to Section 1.3 of the 2004 Draft EIS Appendix B. Since the Draft EIS, further deterioration of the eki wood face panels of the seawall and additional structural settlement of the viaduct has been occurring.
A dive survey conducted in January 2005 found that 55 percent of visible ekki wood seawall face panel boards were infested with marine borer organisms (shipworms). Holes in the ekki wood face panels allow the gravel fill below the timber relieving platform that supports the seawall to be lost through tidal action. This gives the marine borers access to the timber-relieving platform and allows the deterioration of this support structure. The 2005 dive survey showed faster deterioration than predicted by the limited previous inspection conducted in 2000.

In March 2006, the Washington State Department of Transportation (WSDOT) conducted a periodic inspection of the viaduct structure. The viaduct has settled a total of 4.5 inches since the 2001 Nisqually earthquake and is about 1.5 inches away from needing emergency interim repairs to shore up the viaduct column footings, according to WSDOT structural engineers. The increase of an additional 3/8 inch in the crack since the October 2005 inspection is evidence of the continued aging and deterioration of the structure. This cracked beam was injected with epoxy and supplemental supports were installed in November 2005. The viaduct is monitored every 3 months, with full inspections conducted every 6 months.

1.4 Alternatives and Options Overview

The Draft EIS evaluated five Build Alternatives. In late 2004, the lead agencies narrowed the five alternatives down to two, Tunnel and Rebuild (now called Elevated Structure), in addition to the No Build Alternative, which has remained unchanged since the Draft EIS. Throughout this report, the term “alternatives” refers to the two Build Alternatives (Tunnel and Elevated Structure) that require construction activities. The No Build Alternative is briefly described in Chapter 2 and does not involve unique construction activities.

The Tunnel Alternative (Preferred Alternative) includes two “alignments,” the stacked tunnel alignment and the side-by-side tunnel alignment, which are evaluated in this Supplemental Draft EIS. The stacked tunnel alignment would replace the viaduct with a double-level tunnel with northbound traffic below and southbound traffic above, whereas the side-by-side tunnel alignment would replace the viaduct with northbound and southbound traffic lanes side-by-side in a tunnel. The Elevated Structure Alternative has only one proposed alignment.

Each alternative has many potential components or choices that can be made throughout the corridor which are referred to as “options” in this report. The options are project features that are intended to provide some choices that can be mixed and matched with the proposed Build Alternatives. Exhibit 1-2
shows the options that have been evaluated with the Tunnel and Elevated Structure Alternatives.

### Exhibit 1-2. Tunnel and Elevated Structure Alternatives with Options

<table>
<thead>
<tr>
<th>Options1</th>
<th>Tunnel Alternative</th>
<th>Elevated Structure Alternative</th>
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<tbody>
<tr>
<td><strong>South Section</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconfigured Whatcom Railyard</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Relocated Whatcom Railyard</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Central Section</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steinbrueck Park Lid</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Steinbrueck Park Walkway</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>SR 99 Over Elliott and Western Avenues</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>SR 99 Under Elliott and Western Avenues</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td><strong>North Section</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Street Tunnel Curves Widened</td>
<td>yes</td>
<td>no2</td>
</tr>
<tr>
<td>Battery Street Tunnel Curves Not Widened</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Partially Lowered Aurora</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Lowered Aurora</td>
<td>yes</td>
<td>no2</td>
</tr>
</tbody>
</table>

1 These mix-and-match features are referred to as “choices” in the Supplemental Draft EIS text.
2 These options could be included with the Elevated Structure Alternative; however, they were not evaluated with this alternative in the technical appendices. See the Preface (page vii) for an explanation of differences in the combinations of alternatives and mix-and-match features (choices or options) evaluated in the Supplemental Draft EIS and the technical appendices.

For ease of presentation and analysis, each alternative is described with a specific set of options in this report. Exhibit 1-3 shows the updated Tunnel and Elevated Structure Alternatives and the proposed options that could be mixed-and-matched for each alternative.

### 1.4.1 Tunnel Alternative (Preferred Alternative) and Options

The Tunnel Alternative has various options that can be mixed and matched within the alternative. However, for purposes of evaluating project effects, this technical memorandum evaluates two possible alignments composed of these mix-and-match options for the Tunnel Alternative. The two alignments are referred to as the stacked tunnel alignment (the preferred alignment) and the optional side-by-side tunnel alignment. The components of each tunnel alignment are shown below in Exhibit 1-4. The Tunnel Alternative and options are described in more detail in the text that follows.
Alaskan Way Viaduct & Seawall Replacement Project
UPDATED ALTERNATIVES

**At-Grade**
- **SOUTH**
  - S. Spokane - S. Dearborn
- **CENTRAL**
  - S. Dearborn - Battery St. Tunnel
- **N. WATERFRONT**
  - Pine - Broad
- **NORTH**
  - Battery St. Tunnel - Comstock
- **Seawall**
  - S. Washington - Broad

**Tunnel**
- At-Grade Reconfigured Whatcom Railyard
  - Or
- At-Grade Relocated Whatcom Railyard

**Stacked Tunnel**
- SR 99 under Elliott & Western
  - Steinbrueck Park Walkway
  - Or
- Side-by-Side Tunnel
  - SR 99 over Elliott & Western
  - Steinbrueck Park Lid

**Surface Street Improvements**
- Partially Lowered Aurora & Improved Battery Street Tunnel
  - Or
- Lowered Aurora & Improved Battery Street Tunnel
  - Curves widened both ends

**Elevated Structure**
- At-Grade Reconfigured Whatcom Railyard
  - Or
- At-Grade Relocated Whatcom Railyard

**Stacked Aerial**
- Side-by-side Aerial approaching Battery St. Tunnel

**Surface Street Improvements**
- Partially Lowered Aurora & Improved Battery Street Tunnel

**Rebuild**

**Aerial**
- Stacked Aerial
  - SR 519 at-grade
  - Or
  - SR 519 elevated

**Surface Street Improvements**
- Widened Mercer Underpass
  - Or
  - Frame

**Bypass Tunnel**
- At-Grade SR 519 elevated

**Surface Street Improvements**
- Widened Mercer Underpass

**Tunnel Wall and Rebuild**
- Seawall north and south of Tunnel

**Roadway to Elliott/Western**
- for Ballard/Interbay connection

**At-Grade**
- SR 519 at-grade

**At-Grade**
- SR 519 at-grade

**At-Grade**
- Side-by-side Aerial approaching Battery St. Tunnel

**Surface Street Improvements**
- Widened Mercer Underpass
  - Or

**Existing Aurora/SR 99**
- with signals at Roy, Republican, & Harrison

Exhibit 1-2
The Tunnel Alternative’s preferred alignment (stacked tunnel) includes replacing the existing viaduct and seawall with the following components.

### South – S. Spokane Street to S. Dearborn Street

**Reconfigured Whatcom Railyard** – SR 99 would be a side-by-side at-grade roadway with the elevated South of Downtown (SODO) Ramps at S. Atlantic Street and S. Royal Brougham Way. The Whatcom Railyard would be reconfigured with SR 99 bridging over the connecting tracks between the railyards near S. Massachusetts Street.

A 15-foot-wide shared-use path would accommodate pedestrians and bicycle traffic on the west side of the surface street.

### Central – S. Dearborn Street to Battery Street Tunnel

**Stacked Tunnel Alignment** – The viaduct would be replaced with a stacked (double-level) tunnel with three northbound lanes (below) and three southbound lanes (above) from approximately S. Dearborn Street to Pine Street. From Pine to Virginia Streets, SR 99 would transition from the tunnel to an aerial structure, crossing over the Burlington Northern Santa Fe Railway Company (BNSF) railroad tracks.

**SR 99 Under Elliott and Western Avenues** – Just north of Virginia Street, SR 99 would connect to the Battery Street Tunnel traveling under Elliott and Western Avenues. The existing Elliott and Western Avenue ramps would be replaced.

On the west side of the Alaskan Way surface street, a 70-foot-wide area would include a 10-foot-wide streetside sidewalk, a 40-foot-wide public activity zone, and a 20-foot-wide waterfront promenade. A 20-foot-wide sidewalk...
would run along the east side of the surface street. Bicyclists would travel in dedicated 4- to 5-foot-wide lanes, separated from vehicular traffic by striping.

Steinbrueck Park Walkway – The Steinbrueck Park Walkway would be constructed over SR 99, connecting the north end of the Pike Place Market to the waterfront. The walkway would be 20 feet wide at Steinbrueck Park, widening to become a 150-foot-wide lid over SR 99 where it connects to the waterfront.

There would be no ramps at Pike Street as described for the Tunnel Alternative in the Draft EIS. Instead, the ramps at Elliott and Western Avenues would provide Ballard/Interbay freight connections.

North Waterfront – Pine Street to Broad Street
The Alaskan Way surface street would be rebuilt with two lanes each way. Two waterfront streetcar tracks would be installed in the center lane, with streetcar stops and turn pockets in the center lane at alternating intersections between Pine and Broad Streets. Pedestrians could travel on either a 15-foot-wide sidewalk on the west side of the Alaskan Way surface street or an 8-foot-wide sidewalk on the east side. Bicyclists would use 4-foot-wide dedicated lanes on each side of the surface street.

North – Battery Street Tunnel to Comstock Street
Battery Street Tunnel Improvements – The vertical clearance in the tunnel would be increased to 16.5 feet by lowering the tunnel roadway. The curves on the south and north ends would not be substantially modified. Fire/life safety improvements (including seismic upgrades and access and egress improvements) would be added, as described in the Draft EIS.

Partially Lowered Aurora – Aurora Avenue N. would be lowered in a retained cut between the north portal of the Battery Street Tunnel and Harrison Street with improvements continuing north to Aloha Street. Two new bridges would carry traffic over Aurora at Thomas and Harrison Streets. The bridges would include sidewalks on both sides. Mercer Street would cross under Aurora Avenue N. as it does today but would be widened and converted into a two-way street. Mercer Street would have a sidewalk on its south side and an 18-foot-wide sidewalk-level shared-use path on its north side that would accommodate both pedestrians and bicyclists.

Seawall – S. Washington Street to Broad Street
The seawall would be replaced with the outer wall of the tunnel from S. Washington Street to Union Street. In most areas between Union and Broad Streets, the seawall would be rebuilt with a new face panel and L-wall support structure. Near Pier 66, between Blanchard and Battery Streets, only
soil improvements would be needed. Soil improvements and face paneling would replace the failing bulkhead located between S. Jackson Street and S. Washington Street.

**Tunnel Options**

There are several possible options for the Tunnel Alternative, described below by project section.

**South – S. Spokane Street to S. Dearborn Street**

Relocated Whatcom Railyard – This option would move the at-grade SR 99 roadway to the west of its existing location, adjacent to E. Marginal Way S. where the Whatcom Railyard is now located. The Whatcom Railyard would be shifted to the east to occupy the existing highway right-of-way next to the BNSF Seattle International Gateway (SIG) Railyard, avoiding the need for the bridge over the railroad track connector. The ramps would be much the same with the Relocated Whatcom Railyard Option; however, the Relocated Whatcom Railyard Option would provide one additional ramp southbound to SR 99 from E. Marginal Way (at S. Atlantic Street).

**Central – S. Dearborn Street to Battery Street Tunnel**

Side-by-Side Tunnel Alignment – Under this option, the viaduct would be replaced with a six-lane, side-by-side tunnel from approximately S. Dearborn Street to Pine Street. From Pine Street to the Battery Street Tunnel, the existing aerial structure and the Elliott and Western Avenue ramps would be replaced with new structures.

SR 99 Over Elliott and Western Avenues – The aerial structure between Pine and Virginia Streets would pass over Elliott and Western Avenues and then connect to the Battery Street Tunnel. The existing ramps to Elliott and Western Avenues would be replaced.

Steinbrueck Park Lid – A broad lid would be built over the portion of the SR 99 aerial structure that connects from Pine Street to the Battery Street Tunnel. The lid would support a broad public open space, the majority of which would range from about 120 feet to 130 feet wide. It would provide a pedestrian connection from the north end of Steinbrueck Park to the central waterfront below.

**North – Battery Street Tunnel to Comstock Street**

Battery Street Tunnel Improvements with Curves Widened – The Battery Street Tunnel would be improved as described above, except the curves at both the south and north portals would be widened.

Lowered Aurora – North of the Battery Street Tunnel, the Lowered Aurora Option would extend from the Battery Street Tunnel to Comstock Street. Four
new bridges would be constructed over SR 99 at Thomas, Harrison, Republican, and Roy Streets. Each of these new bridges would include sidewalks on both the north and south sides. Mercer Street would be rebuilt over the top of SR 99. As with the Partially Lowered Aurora Option, Mercer Street would be widened and converted into a two-way street, with a sidewalk on the south side of the street and an 18-foot-wide sidewalk-level shared-use path for pedestrians and bicyclists on the north side.

1.4.2 Elevated Structure Alternative and Options

The Elevated Structure Alternative would replace the existing viaduct and seawall with the following components.

South – S. Spokane Street to S. Dearborn Street
Reconfigured Whatcom Railyard – SR 99 would be an at-grade side-by-side roadway with the elevated SODO Ramps at S. Atlantic Street and S. Royal Brougham Way. The Whatcom Railyard would be reconfigured with SR 99 bridging over the tracks connecting between the railyards. A shared-use path would accommodate pedestrians and bicyclists on the west side of the surface street, and a sidewalk would be located along the east side of the surface street.

Central – S. Dearborn Street to Battery Street Tunnel
Elevated Structure, SR 99 Over Elliott and Western Avenues – The viaduct would be rebuilt with a stacked (double-level) aerial structure; the existing ramps at Seneca and Columbia Streets and Elliott and Western Avenues would also be rebuilt. SR 99 would connect to the Battery Street Tunnel as an aerial structure over Elliott and Western Avenues, similar to the existing configuration. No lid structure would be provided to connect Steinbrueck Park to the waterfront. An approximately 15-foot-wide sidewalk would be built on the west side of Alaskan Way, instead of the 70-foot-wide waterfront sidewalk/public activity zone/promenade included in the Tunnel Alternative. A sidewalk would be located along the east side of Alaskan Way, and 4- to 5-foot-wide bike lanes would be located on each side of the street.

North Waterfront – Pine Street to Broad Street
The Alaskan Way surface street would be reconstructed with two lanes each way and left-turn pockets provided at key intersections. An approximately 15-foot-wide sidewalk would run along the west side of Alaskan Way, narrowing to approximately 13 feet between Stewart Street and Wall Street, where it would widen to approximately 30 feet and continue on to Broad Street. On the east side of the street, a 9-foot-wide sidewalk would run the length of the north waterfront, widening to about 17 feet at crosswalks. A
single streetcar track would be located east of the sidewalk, and a shared-use bicycle/pedestrian path, about 13 feet wide, would be located east of the track, along the west side of buildings that front Alaskan Way.

**North – Battery Street Tunnel to Comstock Street**

Battery Street Tunnel Improvements – The Battery Street Tunnel would be upgraded with fire/life safety improvements, and the tunnel floor would be lowered to increase the vertical clearance to 16.5 feet.

Partially Lowered Aurora – Aurora Avenue N. would be modified from Denny Way to Aloha Street. Two bridges would cross over Aurora Avenue N. at Thomas and Harrison Streets. Mercer Street would be converted into a two-way street and widened to three lanes in each direction with a center left-turn lane. Mercer Street would continue to cross under Aurora Avenue N. as it does today. In addition, Roy Street would be regraded to connect to SR 99. The new bridges would include sidewalks on both sides. Mercer Street would have a sidewalk on its south side, and on the north side an 18-foot-wide shared-use path would accommodate both pedestrians and bicyclists.

**Seawall – S. Washington Street to Broad Street**

The seawall would be rebuilt from S. Washington Street up to Broad Street with a new face panel and L-wall support structure. Near Pier 66, between Blanchard and Battery Streets, only soil improvements would be needed. Soil improvements and face paneling would also replace the failing bulkhead located between S. Jackson Street and S. Washington Street.

**Elevated Structure Options**

The Elevated Structure Alternative includes only one option: in the south section, the Whatcom Railyard could be relocated rather than reconfigured, as described above in Section 1.4.1 under Tunnel Options.

### 1.5 Construction Plans, Durations, and Sequencing

The project team has evaluated three possible construction plans in response to public comment following the issuance of the Draft EIS. The construction plan refers to the total construction duration as well as how long SR 99 would be closed to traffic in either or both directions between S. Spokane Street to Denny Way. Chapter 3 describes the construction plans now proposed for each of the alternatives and their associated options in detail.

The Tunnel and Elevated Structure Alternatives could be built under any of the three construction plans. However, for the Tunnel Alternative, only a side-by-side tunnel could be built under the longer plan. A stacked tunnel would require building transition sections at both ends of the tunnel. To build
these transitions, the existing viaduct would need to be torn down and closed for at least 27 months.

This report does not evaluate in detail all the different ways the alternatives could be built. Instead, the effects of one alternative for each plan were evaluated, as shown in Exhibit 1-5. The combinations were selected because the Tunnel Alternative is more complicated to build than the Elevated Structure Alternative and would therefore benefit more from a full or partial closure of SR 99. The effects on traffic and surrounding areas from closing SR 99 would be similar for either the Tunnel or Elevated Structure Alternatives. Exhibit 1-6 shows the estimated construction durations for each alignment proposed. The construction durations depend on the construction plan and the construction components (which alternative and which options are selected).

**Exhibit 1-5. Construction Plans Fully Evaluated in this Document**

<table>
<thead>
<tr>
<th></th>
<th>Tunnel Alternative</th>
<th>Elevated Structure Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorter Construction Plan</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Intermediate Construction Plan</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Longer Construction Plan</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note: Both alternatives could be built under any of the construction plans.

**Exhibit 1-6. Estimated Construction Durations for Each Proposed Alignment**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Construction Duration (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shorter Plan</td>
</tr>
<tr>
<td>Tunnel (Preferred) Alternative</td>
<td></td>
</tr>
<tr>
<td>Stacked Tunnel Alignment</td>
<td>7.0</td>
</tr>
<tr>
<td>Side-by-Side Tunnel Alignment</td>
<td>7.0</td>
</tr>
<tr>
<td>Elevated Structure Alternative</td>
<td>n/a</td>
</tr>
</tbody>
</table>

n/a means that the construction plan was not evaluated with the alignment or alternative in this document.

The shorter plan evaluated for the Tunnel Alternative assumes that SR 99 would be closed for about 42 consecutive months (3.5 years), but it would have the shortest total construction duration of the plans evaluated.

The intermediate plan evaluated for the Tunnel Alternative would close SR 99 to traffic from S. Spokane Street to Denny Way for 27 consecutive months for the stacked tunnel alignment and 18 consecutive months for the side-by-side tunnel alignment. With either tunnel alignment, there would be times when the southbound lanes would be closed and the northbound lanes would be open, and vice versa.
The longer plan is evaluated for the Elevated Structure Alternative. Under this plan, SR 99 would be closed for approximately 3 consecutive months to all traffic between S. Spokane Street and Denny Way. During the rest of the construction period, at least two lanes of traffic would be maintained on SR 99 or a detour route. However, this plan would have the longest total construction duration.

Each alternative and each construction plan has a series of traffic stages that represent significant changes to traffic flow and routes within the corridor, such as detours or closures. Each traffic stage includes a set of construction activities that must be completed prior to moving into the next traffic stage and the subsequent construction activities. Depending on the alternative and construction plan selected, the construction period would consist of three to seven traffic stages.

In the Draft EIS, Traffic Stage 1 preliminary construction activities were expected to take up to 18 months for the five alternatives evaluated. Based on additional engineering and utility agency coordination, it has been determined that it would take approximately 30 months to relocate utilities in Traffic Stage 1. These construction activities are described in more detail in Chapter 5, Construction Activities and Durations. The preliminary utility relocation (an approximate 30-month duration) is now considered part of the project’s total duration. Traffic Stage 1 is currently scheduled to begin in early 2008.

Most construction activities would take place during the middle construction stages (Traffic Stage 2 for the shorter plan, Traffic Stages 2 through 5 for the intermediate plan, and Traffic Stages 2 through 6 for the longer plan). These include the demolition of existing structures and the construction of the seawall and new roadway structures. The final traffic stages (Traffic Stage 3 for the shorter plan, Traffic Stage 6 for the intermediate plan, and Traffic Stage 7 for the longer plan) would be for restoration of the Alaskan Way surface street and the final relocations of utilities.

Note that these construction durations are estimates based on possible ranges of durations based on WSDOT’s Cost Estimate Validation Process (also known as the CEVP®). This process estimates a construction duration range by examining preliminary engineering plans and the potential construction risks. The durations developed represent an approximate range weighing probability and risk during the construction period.
For example, based on CEVP calculations, it was determined that it would take 6.5 to 8.5 years to build the Tunnel Alternative with the shorter construction plan. These durations represent the 10 to 90 percent probability range for estimated construction duration. This means that there is a 10 percent chance that it would take less than 6.5 years to build the Tunnel Alternative with the shorter construction plan and a 90 percent chance that the construction would take less than 8.5 years. These estimates assume that construction could occur 7 days a week. They also assume that construction activities, specifically utility relocations, would begin in January 2008.
Chapter 2 ALTERNATIVES AND OPTIONS

This chapter describes the Tunnel (Preferred) and Elevated Structure Alternatives, discussed from south to north as in the Draft EIS. There have been no changes to the No Build Alternative, which will be carried forward for analysis in this Supplemental Draft EIS and the Final EIS. Also included in this chapter are updates to the project elements common to both Build Alternatives.

2.1 No Build Alternative

There is no change to the No Build Alternative or the three scenarios that the No Build Alternative analyzed in the Draft EIS:

- Scenario 1 – Continued operation of the viaduct and seawall with continued maintenance.
- Scenario 2 – Sudden unplanned loss of the viaduct and/or seawall but without major collapse or injury.
- Scenario 3 – Catastrophic failure and collapse of the viaduct and/or seawall.

2.2 Common Elements in the Tunnel and Elevated Structure Alternatives

Both Build Alternatives have several project elements in common, and the descriptions of these common elements have changed since the Draft EIS. These elements, which are described in detail below, include:

1. The Construction Transportation Management Plan, described as the Flexible Transportation Package in the Draft EIS.
2. Utilities relocations.
4. Construction of the temporary Colman Dock Ferry Terminal access bridge.
5. Ferry access and ferry holding.
6. Seawall construction and soil improvements at Pier 66 between Blanchard and Battery Streets.
7. Improvements to the Battery Street Tunnel.
8. Improvements north of the Battery Street Tunnel.
2.2.1 Construction Transportation Management Plan

The Construction Transportation Management Plan (refined from the Flexible Transportation Package described in Section 2.2.1 of the 2004 Draft EIS Appendix B, Alternatives Description and Construction Methods Technical Memorandum) is a set of transportation management strategies that would apply to either alternative during construction. These strategies are being developed to help minimize effects to roadway congestion in the project area during the construction period.

Since the issuance of the Draft EIS, development of the Flexible Transportation Package has progressed through ongoing discussions with local transit and other transportation agencies. Changes include refinements to transportation system measures and the addition of new strategies. Some of these include transit priority measures, transit service enhancements, parking services and enhancements, information systems and signage, marketing, truck and commercial vehicle strategies, and new traffic signal operations strategies.

Consistent with the Draft EIS, transportation management strategies (see Section 2.2.1 of the 2004 Draft EIS Appendix B) are to be applied during the construction phase of the project and apply to both the Tunnel and Elevated Structure Alternatives. The scope and level of investment for each of these strategies will be determined after considering each alternative and option during preliminary engineering. There will be a mix of strategies and mitigation measures considered for each alternative and optional feature of the alignments associated with each alternative.

A description of the transportation management strategies currently under consideration for inclusion in the final Construction Transportation Management Plan can be found in Section 6.4.1 of the 2006 Supplemental Draft EIS Appendix C, Transportation Discipline Report. The fully developed plan will accompany the Final EIS mitigation package.

2.2.2 Utilities Relocations

An extensive network of utilities is located in the AWV Corridor. The geographically constrained and densely developed corridor through which SR 99 travels necessitates a highway and utility design solution that thoroughly integrates utility infrastructure in the corridor.

As a result of extensive coordination and input from the utility agencies and private utility purveyors, it is now assumed that approximately 30 months would be necessary for the preliminary utility relocation work in Traffic Stage 1. This is 12 months longer than the 18 months assumed in the Draft EIS when less was known about the potential sequencing constraints.
As noted in the Draft EIS, extensive coordination with utilities agencies has been conducted and will continue throughout the life of the project. Descriptions of the utilities and their service functions is available in Section 5.1 of the 2004 Draft EIS Appendix O, Public Services and Utilities Technical Memorandum. Although coordination and construction sequencing is intended to minimize utility relocation, utility work will continue throughout construction until project completion. Due to space constraints in the central waterfront, overhead poles may be considered for the temporary relocation of transmission lines (either landside or watside). Locations for the temporary and permanent utility relocations vary between the alternatives, but most utilities are expected to remain in the existing AWV Corridor once construction is completed. Due to space constraints, some utilities may have to be relocated out of the SR 99 corridor. The depth of cover over the tunnel has not yet been established, and this may affect where utilities can be relocated within the corridor.

2.2.3 Relocation of the Washington Street Boat Landing

The Washington Street Boat Landing would be relocated under both alternatives. The Tunnel Alternative would relocate the Washington Street Boat Landing west of its current location. The stacked tunnel alignment would relocate the pergola approximately 16 feet west of its current location, and the side-by-side tunnel alignment would relocate the pergola about 27 feet over the tunnel on the seaward edge of the new promenade. The Elevated Structure Alternative would locate the Washington Street Boat Landing slightly farther to the west, about 35 feet, than today’s location. However, the pergola would overhang the water as it does today.

2.2.4 Temporary Ferry Access Bridge

The AWV Project includes building a temporary over-water ferry access bridge between Pier 48 and Colman Dock (this area is between S. Washington Street and Yesler Way). The temporary ferry access bridge would be needed for either alternative during construction to maintain access and egress for ferry operations. Once AWV construction is completed, this over-water bridge would be removed. See Exhibit 4-1 for an illustration of the temporary over-water ferry access bridge connecting from the Port of Seattle’s Pier 48 to Colman Dock.

The temporary ferry access bridge would not preclude the Washington State Ferries’ planned expansion of the Colman Dock Ferry Terminal. The temporary ferry access bridge would accommodate a range of potential ferry expansion plans and would not rely on any of these plans to be constructed prior to viaduct and seawall construction. The temporary ferry access bridge could accommodate the existing or expanded (1,000- to 1,300-car capacity).
Colman Dock. Under both the Tunnel and Elevated Structure Alternatives, this over-water crossing would connect to ferry holding east of SR 99. See the 2006 Supplemental Draft EIS Appendix C, Transportation Discipline Report, Section 5.6 for updated details on surface street movements to accommodate ferry terminal access and egress.

2.2.5 Ferry Access and Ferry Holding

For both the Tunnel and Elevated Structure Alternatives, the ferry holding would be relocated to a site east of SR 99. The access to ferry holding has not been determined by Washington State Ferries, but is currently expected to be on the east side of SR 99 and south of S. King Street.

As in the Draft EIS, pedestrian access will be maintained during construction. Pedestrian bridges from Colman Dock Ferry Terminal to downtown Seattle would be reconstructed at Marion Street, with a second pedestrian bridge potentially added at Madison Street (although this may change as the Washington State Ferries continues its planning process for the Colman Dock Ferry Terminal Expansion project).

2.2.6 Planned Seawall Soil Improvements at Pier 66

In the Draft EIS, no seawall work was proposed for any of the Build Alternatives between Blanchard and Battery Streets adjacent to the Bell Harbor International Conference Center (Pier 66), as this portion had been upgraded when the Bell Harbor Conference Center and marina were built by the Port of Seattle in the mid-1990s. However, for both the Tunnel and Elevated Structure Alternatives, it has now been determined that soil improvements would be necessary in front of Pier 66, from Blanchard Street to halfway between Battery and Bell Streets.

2.2.7 Improvements to the Battery Street Tunnel

For both the Tunnel and Elevated Structure Alternatives, the vertical clearance of the Battery Street Tunnel would be increased to 16.5 feet by lowering the tunnel floor. Fire/life safety improvements would be made as described in the Draft EIS. The curves on the south and north ends would be widened only as an option with the Tunnel Alternative.

2.2.8 Improvements North of the Battery Street Tunnel

In the Draft EIS, three possible north end options were evaluated. One of these options, Lowered Aurora, has been revised and is carried forward in the Supplemental Draft EIS as an option evaluated with the updated Tunnel Alternative, along with the Partially Lowered Aurora Option being evaluated for both Build Alternatives.
2.3 Tunnel Alternative (Preferred Alternative)

The Tunnel Alternative is described below from south to north for the stacked tunnel alignment (Exhibit 2-1). The stacked tunnel alignment begins in the south as an at-grade roadway and includes the Reconfigured Whatcom Railyard. A short bridge would be built to carry SR 99 over the connector track between the Whatcom and BNSF SIG Railyards, and then SR 99 would return to grade. Parallel elevated ramps (SODO Ramps) would connect SR 99 to SR 519, Alaskan Way, and First Avenue S. at S. Atlantic Street and S. Royal Brougham Way. At S. Dearborn Street, SR 99 would transition to a stacked tunnel north to Pine Street, where SR 99 would transition to an aerial side-by-side structure crossing over the railroad tracks before traveling under Elliott and Western Avenues to approach the existing Battery Street Tunnel. The Steinbrueck Park Walkway would be a 20-foot-wide walkway connecting from just north of Pike Place Market down to the waterfront. The walkway would widen into a broad open space lidding over the tunnel portal in the area between Pine Street and just north of Virginia Street. It would provide a new pedestrian connection between Steinbrueck Park and the waterfront.

Along with the fire/life safety improvements, the Battery Street Tunnel’s vertical clearance would be increased to 16.5 feet by lowering the tunnel’s floor. At the north end of the tunnel, Aurora Avenue N. would be lowered in a retained cut to Republican Street, with roadway improvements and widening up to Aloha Street (referred to as the Partially Lowered Aurora Option). Two local streets, Thomas and Harrison Streets, would be connected over Aurora with bridges, and Mercer Street would be widened and converted into a two-way street crossing under Aurora Avenue N.

2.3.1 South – S. Spokane Street to S. Dearborn Street

SR 99 At-Grade, Reconfigured Whatcom Railyard

Both the side-by-side and the stacked tunnel alignments would be at-grade in the south section, with a new six-lane roadway (three lanes each way) from S. Walker Street to S. Dearborn Street. The new roadway would be located generally in the existing SR 99 footprint. The at-grade SR 99 would begin to rise at S. Walker Street to become a short, side-by-side, aerial structure at about S. Massachusetts Street that would carry SR 99 above the railroad track that connects the Whatcom and BNSF SIG Railyards. The roadway would return to grade just south of S. Atlantic Street.
The existing ramps at First Avenue S. would be replaced with the new elevated SODO Ramps that would connect SR 99 to SR 519 at S. Atlantic Street and S. Royal Brougham Way. The elevated SODO Ramps would be very similar to the SR 519 elevated ramps described in the Draft EIS (see Exhibit 2-2). These streets would pass over SR 99 on elevated structures in an east-west direction and would include sidewalks on both sides.

Ramp movements at this interchange would include the following:

- Northbound off from SR 99 to S. Atlantic Street with frontage road connections to S. Royal Brougham Way
- Northbound off from SR 99 to Alaskan Way at S. King Street
- Northbound on to SR 99 from S. Royal Brougham Way with frontage road connections from S. Atlantic Street
- Southbound on to SR 99 from Alaskan Way surface street near S. King Street
- Southbound on to SR 99 from Alaskan Way surface street to S. Royal Brougham Way with frontage road connections to S. Atlantic Street

A new loop ramp added west of First Avenue S. would carry two-way traffic from S. Atlantic Street under the east side of the elevated S. Atlantic Street, to connect to S. Colorado Street southbound.

Access to and from these ramps would be facilitated by northbound and southbound frontage roads on both the east and west sides of SR 99. The frontage roads would also facilitate access to local surface streets for general purpose traffic and for freight movements to and from the Terminal 46 entrance and exit, just south of S. Atlantic Street. Between S. Royal Brougham Way and S. Dearborn Street, SR 99 would transition from an at-grade roadway to a tunnel, and ramps would be provided to S. King Street.

### 2.3.2 Central – S. Dearborn Street to Battery Street Tunnel

**Stacked Tunnel**

The stacked tunnel alignment (see Exhibits T-05 and T-06 in the 2006 Supplemental Draft EIS Appendix W, Alternatives and Options Drawings) would transition from a side-by-side to a double-level configuration between Railroad Way S. and S. Main Street. It would be about 79 feet wide and 70 feet deep. The alignment would extend 42 feet into Elliott Bay at S. Washington Street, transitioning to meet the existing seawall near the north side of S. Washington Street. The stacked tunnel alignment would transition from a double-level configuration to a side-by-side configuration between Seneca Street and Union Street as it continues to the north, and it would drop a lane in each direction at Elliott and Western Avenues, similar to the existing configuration.
Tunnel South Section Options
with SODO Ramps

WHATCOM RAILYARD RECONFIGURED

WHATCOM RAILYARD RELOCATED

Exhibit 2-2
Emergency egress to surface streets would be provided on both the east and west sides of the tunnel in the vicinity of Pine Street (near the Seattle Aquarium) in the north and Madison Street in the south.

**Ramps**

Although no midtown ramps would be provided for either of the tunnel alignments, ramps in the south would be provided to connect to Alaskan Way surface street at S. King Street, which would provide access in and out of downtown.

The existing Columbia and Seneca Street ramps would not be replaced, but new ramps with improved geometric design would provide access to and from downtown and also facilitate freight travel to and from the Ballard/Interbay manufacturing and industrial area. The new ramps would provide northbound access off to Western Avenue and southbound access on at Western Avenue from Elliott Avenue in the north section.

Emergency vehicle access to SR 99 would be provided at Bell Street and at Western Avenue using the existing ramps, which would be closed to general traffic use.

**Alaskan Way Surface Street**

With the stacked tunnel alignment, the Alaskan Way Viaduct would be removed, and the surface street would be rebuilt to the east of the existing roadway. North of Yesler Way, two lanes in each direction would be provided with turn pockets at intersections up to about Pine Street. Two streetcar tracks would be installed (one track in each direction). Vehicles would share the travel lanes with the streetcar. Alaskan Way would also be rebuilt with a 70-foot-wide area on the west consisting of a 10-foot-wide streetside sidewalk, a 40-foot-wide public activity zone, and a 20-foot-wide waterfront promenade. On the east side, a 20-foot-wide sidewalk would run along the street between Dearborn and Pine Streets. The surface street design would also include landscaping, 4- to 5-foot-wide bike lanes on each side of the street, and a 10-foot-wide parking lane on each side of the roadway.

**Ferry Access and Holding**

Ferry traffic access to Colman Dock would be at Yesler Way, with ferry egress provided at both Yesler Way and Marion Street. During construction, remote holding for the Colman Dock Ferry Terminal would be provided on the east side of Alaskan Way surface street and SR 99.
SR 99 Under Elliott and Western
The stacked tunnel structure would transition into a side-by-side roadway over the BNSF rail line and continue under Elliott and Western Avenues in a retained cut roadway.

Steinbrueck Park Walkway
The walkway structure would be about 560 feet in length. Beginning at Steinbrueck Park as an approximately 20-foot-wide walkway, this structure would be above the aerial section of the SR 99 roadway and would widen into a broad public open space lidding over SR 99 in the area between Pine Street and just north of Virginia Street. It would provide a new pedestrian connection from the north end of the Pike Place Market to the central waterfront near the Seattle Aquarium and Waterfront Park.

Seawall
Soil improvements and face paneling would replace the failing bulkhead located between S. Jackson Street and S. Washington Street. Between S. Washington and Union Streets, the existing seawall would be replaced by the outer wall of the tunnel. With the stacked tunnel alignment, the seawall would extend out approximately 42 feet into Elliott Bay beyond the existing seawall in the Colman Curve area between S. Washington Street and Yesler Way.

2.3.3 North Waterfront – Pine Street to Broad Street

Alaskan Way Surface Street
The Alaskan Way surface street would be rebuilt with two lanes each way. Two waterfront streetcar tracks would be installed in the center lane, with streetcar stops and turn pockets in the center lane at alternating intersections between Pine and Broad Streets. Pedestrians could travel on either a 15-foot-wide sidewalk on the west side of the Alaskan Way surface street or an 8-foot-wide sidewalk on the east side. Bicyclists would use 4-foot-wide dedicated lanes on each side of the surface street.

Seawall
The seawall would be rebuilt north of where it diverges from the tunnel wall near Union Street. In most areas between Union and Broad Streets, the seawall would be rebuilt with a new face panel and L-wall support structure, and the soil would be strengthened. Near Pier 66, between Blanchard and Battery Streets, only soil improvements would be needed.
2.3.4 North – Battery Street Tunnel to Comstock Street

Battery Street Tunnel
The Battery Street Tunnel would be improved by increasing the vertical clearance to 16.5 feet by lowering the tunnel floor. Fire/life safety improvements, including emergency access/egress and ventilation improvements, would also be added, and the existing curves at both tunnel portals would be retained.

Battery Street Flyover Detour
The Battery Street Flyover Detour that was described in the Draft EIS is no longer being considered for the Tunnel Alternative.

North of Battery Street Tunnel Improvements
Both the Partially Lowered Aurora and Lowered Aurora Options could be matched with the Tunnel Alternative.

Partially Lowered Aurora
The roadway profile of SR 99/Aurora Avenue N. would be lowered into a side-by-side retained cut between the north portal of the Battery Street Tunnel and about Republican Street, where it would begin to gradually rise again to reach grade at Mercer Street. Ramps to and from Denny Way would provide access to and from SR 99 similar to today. The street grid would be reconnected over the top of Aurora Avenue N. by building two new bridges at Thomas and Harrison Streets. These bridges would have two lanes in each direction with 8-foot-wide sidewalks on both sides. Mercer Street would be widened and converted into a two-way street with three lanes in each direction and a center turn lane. It would continue to cross under Aurora Avenue N. as it does today. A 12-foot-wide sidewalk would run along the south side of Mercer Street, and bicyclists and pedestrians would share an 18-foot-wide shared-use path on the north side. Broad Street would be closed and backfilled to grade from approximately Fifth Avenue N. to Ninth Avenue N. These improvements are shown in Exhibit 2-3.

Access to and from SR 99 would be provided at the following locations:

- Northbound on-ramp from Denny Way.
- Southbound off-ramp to Denny Way.
- Northbound right-turn access off to Republican Street with turn lane provided.
- Northbound right-turn access on from Roy Street with acceleration lane provided.
- Northbound and southbound right-turn access off to Roy Street with turn lane provided.
- Southbound right-turn access on from Roy Street.
Battery Street Tunnel Improvements

Exhibit 2-3
The local street improvements and revisions would include the following:

- Thomas Street would be rebuilt over Aurora Avenue N.
- Harrison Street would be rebuilt over Aurora Avenue N. and across Broad Street between Fifth and Sixth Avenues N.
- Taylor Avenue N. would be rebuilt across Broad Street to connect to Harrison Street.
- Mercer Street would be widened and rebuilt from about Fourth Avenue N. to Dexter Avenue N.
- A new Sixth Avenue N. would be provided between Harrison and Roy Streets.

2.3.5 Tunnel Options

The optional alignment, the side-by-side tunnel, is shown in Exhibit 2-4. While the options can be mixed-and-matched in various ways as described in Section 1.4, for description purposes, this optional alignment is paired with the Relocated Whatcom Railyard and the side-by-side tunnel with ramps over Elliott and Western Avenues. A full lid covering the SR 99 roadway (referred to as the Steinbrueck Park Lid) would connect Steinbrueck Park to the central waterfront.

South – S. Spokane Street to S. Dearborn Street

SR 99 At-Grade, Relocated Whatcom Railyard

The SR 99 roadway would be maintained at-grade, but the alignment would be relocated to the west of the current SR 99 onto the site of the existing Whatcom Railyard between S. Hanford and S. Holgate Streets. The Whatcom Railyard would be relocated to the east and combined with the existing BNSF SIG Railyard. The tail track would be relocated from its planned location on Terminal 46 to the east side of SR 99. Once constructed, the tail track would extend from the reconfigured BNSF SIG Railyard to just south of S. King Street. The Whatcom Railyard and tail track relocated to the east would eliminate the need for SR 99 to cross over the lead railroad track with a short bridge.

From south of S. Atlantic Street, SR 99 would continue north as a six-lane at-grade roadway to a tunnel portal near S. Dearborn Street.

The SODO Ramps with elevated streets would be the same for either tunnel alignment and for the Elevated Structure Alternative and were described in detail above in Section 2.3.1 under SR 99 At-Grade, Reconfigured Whatcom Railyard. The ramps would be much the same with the Relocated Whatcom Railyard Option; however, the Relocated Whatcom Railyard Option would provide one additional ramp southbound to SR 99 from E. Marginal Way (at S. Atlantic Street).
Side-by-Side Tunnel
Conceptual Cross-Section at Seneca Street

Promenade

Public Activity Area

Parking/Loading

Sidewalk

Bicycle Lane

Alaskan Way Southbound Lanes

Alaskan Way Northbound Lanes

Streetcar Stops

Parking/Loading

Bicycle Lane

Sidewalk

Existing Building

Soft and Liquifiable Soil

Competent Soil

Utility Corridor

SR 99 Southbound

SR 99 Northbound

Exhibit 2-4
Central – S. Dearborn Street to Battery Street Tunnel

Side-by-Side Tunnel Alignment
The side-by-side tunnel would continue north with two side-by-side tunnel sections (see Exhibit T-13 in the 2006 Supplemental Draft EIS Appendix W, Alternatives and Options Drawings). The tunnel would be approximately 122 feet wide and 60 feet deep. To accommodate higher design speed, the curve between S. Jackson Street and Columbia Street would be broadened. This would extend the alignment about 53 feet seaward between Pier 48 and Colman Dock (between S. Washington Street and Yesler Way). The proposed outer tunnel wall would extend north to the Colman Dock area where the outer tunnel wall would cross to the landward side of the existing gravity seawall.

SR 99 Over Elliott and Western Avenues
The underground tunnel would transition to an aerial roadway that would cross over Elliott and Western Avenues. The aerial structure would transition to four lanes as it enters the Battery Street Tunnel by dropping a northbound lane to Western Avenue and adding a southbound lane from Elliott Avenue.

Steinbrueck Park Lid
A full lid structure would be built over the elevated portion of the SR 99 aerial roadway, starting at about Pine Street and extending to the north end of Victor Steinbrueck Park. The lid would be about 560 feet in length and generally range from 120 feet to 130 feet wide. The lid would provide a new public open space and a pedestrian connection from the north end of Pike Place Market down to the central waterfront near the Seattle Aquarium and Waterfront Park.

Seawall
The same as described for the stacked tunnel alignment, the seawall would be replaced with the tunnel wall for the side-by-side tunnel alignment. However, the new wall would extend about 53 feet out into Elliott Bay in the Colman Curve area between S. Washington Street and Yesler Way.

North Waterfront – Pine Street to Broad Street

Alaskan Way Surface Street
The Alaskan Way surface street would be rebuilt with two lanes each way. Two waterfront streetcar tracks would be installed in the center lane, with streetcar stops and turn pockets in the center lane at alternating intersections between Pine and Broad Streets. Pedestrians could travel on either a 15-foot wide sidewalk on the west side of the Alaskan Way surface street (narrowing
to about 13 feet between Pike and Pine Streets) or an 8-foot-wide sidewalk on the east side. Bicyclists would use 4-foot-wide dedicated lanes on each side of the surface street.

**Seawall**

As with the stacked tunnel alignment, the seawall would diverge from the tunnel wall at about Union Street and be rebuilt from Pine Street to Broad Street. The seawall replacement from Union to Broad Streets would be the same as described above for the stacked tunnel alignment (see Section 2.3.3).

**North – Battery Street Tunnel to Comstock Street**

**Battery Street Tunnel Improvements**

The Battery Street Tunnel would be enhanced with increased vertical clearance and fire/life safety improvements, as described above in Section 2.3.4, but the curves would also be widened at both the north and south tunnel portals.

**Lowered Aurora**

North of the Battery Street Tunnel, SR 99 would be lowered in a retained cut all the way from the north portal of the Battery Street Tunnel to Comstock Street (Exhibit 2-5). Four new bridges would be constructed over SR 99 at Thomas, Harrison, Republican, and Roy Streets. Each of these new bridges would include sidewalks on both the north and south sides. Mercer Street would be rebuilt over the top of SR 99. As with the Partially Lowered Aurora Option, Mercer Street would be widened and converted into a two-way street, with a sidewalk on the south side of the street and an 18-foot-wide sidewalk-level shared-use path for pedestrians and bicyclists on the north side.

Also included in the Lowered Aurora Option are new ramps and local street improvements and revisions. New ramps provided to and from SR 99 would include the following:

- Northbound off to Republican Street
- Northbound on from Denny Way and Republican Street
- Southbound off to Roy Street and Denny Way
- Southbound on from Roy Street and Republican Street

The local street improvements and revisions would be the same as described in Section 2.3.4 for the Partially Lowered Aurora Option.
2.4 Elevated Structure Alternative

The Elevated Structure Alternative (Exhibit 2-6) is similar to the Aerial Alternative’s configuration described in the Draft EIS. It is described below from south to north. The mix-and-match options evaluated with the Elevated Structure Alternative are discussed in Section 2.4.5.

As in the Tunnel Alternative, SR 99 would begin in the south as an at-grade roadway with the Reconfigured Whatcom Railyard. The elevated SODO Ramps at S. Royal Brougham Way and S. Atlantic Street would connect SR 99 and SR 519. The Elevated Structure Alternative’s alignment would then transition to a stacked aerial structure near Railroad Way S., continuing up to the Battery Street Tunnel, with three lanes in each direction and wider lanes and shoulders than the existing viaduct. The Battery Street Tunnel would be upgraded with fire/life safety improvements and the vertical clearance would be increased to 16.5 feet by lowering the tunnel floor. North of the Battery Street Tunnel, the Partially Lowered Aurora improvements would be made. These would include lowering Aurora Avenue N. to about Republican Street, where the roadway would begin to climb again toward Aloha Street, where the SR 99 widening and improvements would end. Two local streets, Thomas and Harrison Streets, would bridge over SR 99, and Mercer Street would be widened and converted into a two-way street crossing under Aurora Avenue N.

2.4.1 South – S. Spokane Street to S. Dearborn Street

SR 99 At-Grade/Reconfigured Whatcom Railyard
The Whatcom Railyard would remain in its current location but would be reconfigured to provide a track connection to the north to connect with the tail track, which would then be shared by both the BNSF SIG and Whatcom Railyards. SR 99 would rise at about S. Walker Street to cross over the lead connector track on a short bridge at about S. Massachusetts Street. SR 99 would come back to grade between S. Massachusetts and S. Atlantic Streets.

SODO Ramps at S. Atlantic Street and S. Royal Brougham Way
Very similar to the SR 519 Elevated Ramps described in the Draft EIS, S. Atlantic Street and S. Royal Brougham Way would be constructed as aerial streets on the east and west sides of SR 99. The elevated SODO Ramps would provide grade separation between SR 99, S. Atlantic Street, S. Royal Brougham Way, and the BNSF SIG Railyard (see Exhibit 2-7). Sidewalks would be provided on both sides of S. Atlantic Street and S. Royal Brougham Way.
SR 99 would run through this area at-grade, passing between aerial structures located on the east and west side. (Refer to Exhibit R-03 of the 2006 Supplemental Draft EIS Appendix W, Alternatives and Options Drawings, which shows the SODO Ramps at S. Atlantic Street and S. Royal Brougham Way.)

The ramp movements would be the same as described above under the Tunnel Alternative in Section 2.4.1.

### 2.4.2 Central – S. Dearborn Street to Battery Street Tunnel

The existing viaduct structure would be replaced with a structure that would be wider along its entire length to accommodate modern lane and shoulder dimensions. In the section from near S. King Street to just south of S. Main Street, the new elevated structure would be 54 to 74 feet wider than the existing viaduct as SR 99 transitions from a side-by-side at-grade roadway in the south to a new double-level elevated structure. At its widest point between S. King Street and S. Jackson Street, the elevated structure’s width would vary between 105 feet and 125 feet. Between just south of S. Main Street up to Union Street, the new double-level structure would be between 11.5 and 35 feet wider than the existing viaduct.

**Rebuild Ramps at Columbia and Seneca Streets**

The existing southbound Columbia Street on-ramp and Seneca Street off-ramp would be replaced with new ramps in the same location. The existing ramp alignment and lane widths would remain the same at about 27 feet each.

**Alaskan Way Surface Street**

The Elevated Structure Alternative’s Alaskan Way surface street would be rebuilt in the same location as the existing roadway. From Railroad Way S. to Yesler Way, Alaskan Way would have three northbound lanes and two southbound lanes. North of Yesler Way, Alaskan Way would primarily be a four-lane roadway with two lanes in each direction. Along the waterfront, turn pockets would be provided in the center of the roadway. A single waterfront streetcar track would be rebuilt on the east side of Alaskan Way. With the Elevated Structure Alternative, the existing 20-foot-wide sidewalk between S. Washington and Pike Streets would be narrowed to about 15 feet to accommodate the width of the new viaduct, and there would be no additional public activity space. On the east side of Alaskan Way, the sidewalk between Yesler Way and Union Street would be 12 feet wide, broadening to about 20 feet at crosswalks and at some streetcar stops. However, the bases of the elevated structure’s support columns would be located partially within the sidewalk, effectively narrowing the sidewalk width next to the columns to about 8 feet. On-street parking and 4- to 5-foot-wide bike lanes would also be provided on each side of the street.
Elevated Structure South Section Options
with SODO Ramps

WHATCOM RAILYARD RECONFIGURED

- Surface
- Tunnel
- Lowered Roadway
- Aerial
- Elevated Roadway

Reconfigured North Whatcom Lead Tracks
SR 99  Proposed SR 99

BNSF/SIG RAILYARD

Realigned E. Marginal Way

WHATCOM RAILYARD RELocATED

Proposed SR 99

Realigned E. Marginal Way

SB On from E Marginal Way

Proposed SR 99

Relocated Whatcom Railyard

BNSF/SIG RAILYARD

Relocated BNSF/SIG Railyard Tracks

Relocated BNSF/SIG Railyard

Relocated Tail Track

T-46 Exit

T-46 Entrance

NB Frontage Rd

NB Off to Atlantic St

NB On from Royal Brougham

Exhibit 2-7
Western Avenue and Elliott Avenue Ramps
The existing northbound Western Avenue off-ramp and southbound Elliott Avenue on-ramp would be rebuilt. In the new configuration, Elliott Avenue would be an add lane, and Western Avenue would be a drop lane. The existing Battery Street ramps would be used for emergency access only.

Lid Structure
For the Elevated Structure Alternative, no lid would be provided to connect Victor Steinbrueck Park with the waterfront.

Seawall
Between Yesler Way and Pine Street, the seawall would be rebuilt directly behind the existing seawall, tapering back to the existing wall at the existing Colman Dock access at Yesler Way. At Pier 48, soil improvements would be required to support the seawall. The proposed seawall would extend about 35 feet into the water between S. Washington Street and Yesler Way. In addition, approximately 7.5 feet of sidewalk would be cantilevered over the water from the top of the seawall for a total of about 42 feet extending over the water.

2.4.3 North Waterfront – Pine Street to Broad Street
Alaskan Way Surface Street
The Alaskan Way surface street would be rebuilt with four lanes (two lanes in each direction). A 15-foot-wide sidewalk would run along the west side of Alaskan Way, narrowing to approximately 13 feet between Stewart Street and Wall Street, where it would widen to approximately 30 feet and continue on to Broad Street. On the east side of Alaskan Way, a 9-foot-wide sidewalk would run along the east side of the street, widening to about 17 feet at crosswalks. A single streetcar track would be located east of the sidewalk, and a shared-use bicycle/pedestrian path, about 13 feet wide, would be located east of the track, on the west side of buildings that front Alaskan Way. On-street parking would be located on both sides of Alaskan Way.

Seawall
The Elevated Structure Alternative would replace the seawall from S. Washington Street up to Broad Street. The seawall would be rebuilt using soil strengthening methods and replacing the existing seawall with a new face panel and L-wall support structure. In the north waterfront section, at Pier 66 (between Blanchard and Battery Streets), only soil improvements would be necessary since other improvements were made in the early 1990s when the Bell Harbor Conference Center was built.
2.4.4 North – Battery Street Tunnel to Comstock Street

In the north section, the Elevated Structure Alternative would be the same as the stacked tunnel alignment from the Battery Street Tunnel north.

SR 99 would transition from the double-level viaduct to a single-level aerial structure at about Elliott Avenue. This section would be six lanes that would transition to four lanes going into the Battery Street Tunnel by adding and dropping lanes to and from Elliott and Western Avenues. The typical lane configuration would be 12-foot-wide travel lanes, 10-foot-wide right shoulders, and 2-foot-wide left shoulders.

Battery Street Tunnel

The Battery Street Tunnel would receive seismic and fire/life safety upgrades, including improvements to meet current seismic standards. The vertical clearance would be increased to 16.5 feet by lowering the tunnel floor, and the curves at both the north and south portals would remain the same.

Partially Lowered Aurora/SR 99

North of the Battery Street Tunnel, the roadway profile of SR 99/Aurora Avenue N. would be lowered into a side-by-side retained cut between the north portal of the Battery Street Tunnel and about Republican Street, with roadway improvements and widening continuing up to Aloha Street. The street grid would be connected over the top of Aurora Avenue N. by building two new bridges at Thomas and Harrison Streets. These bridges would have two lanes in each direction with 8-foot-wide sidewalks on both sides. Mercer Street would be widened and converted into a two-way street with three lanes in each direction and a center turn lane. It would continue to cross under Aurora Avenue N. as it does today. A 12-foot-wide sidewalk would run along the south side of Mercer Street, and bicyclists and pedestrians would share an 18-foot-wide shared-use path on the north side. Broad Street would be closed and backfilled to grade from approximately Fifth Avenue N. to Ninth Avenue N.

Access to and from SR 99 would be provided at the following locations:

- Northbound on-ramp from Denny Way.
- Southbound off-ramp to Denny Way.
- Northbound right-turn access off to Republican Street with turn lane provided.
- Northbound right-turn access on from Roy Street with acceleration lane provided.
- Northbound and southbound right-turn access off to Roy Street with turn lane provided.
- Southbound right-turn access on from Roy Street.
The local street improvements and revisions would include the following:

- Thomas Street would be rebuilt over Aurora Avenue N.
- Harrison Street would be rebuilt over Aurora Avenue N. and across Broad Street between Fifth and Sixth Avenues N.
- Taylor Avenue N. would be rebuilt across Broad Street to connect to Harrison Street.
- Mercer Street would be widened and rebuilt from about Fourth Avenue N. to Dexter Avenue N.
- A new Sixth Avenue N. would be provided between Harrison and Roy Streets.

### 2.4.5 Elevated Structure Option

The only option being evaluated with the Elevated Structure Alternative is the Relocated Whatcom Railyard Option in the south. This option was described above under the Tunnel Options (see Section 2.3.5).
Chapter 3 CONSTRUCTION PLANS AND DETOURS

This chapter describes the construction plans being considered, as well as traffic detours that would be required for each plan.

3.1 Construction Plans

The project team has evaluated three possible construction plans in response to public comment following the issuance of the Draft EIS. The construction plan refers to the total construction duration as well as how long the AWV Corridor from S. Spokane Street to Denny Way would be closed to SR 99 traffic in either or both directions, although cross-corridor traffic would be maintained.

The Tunnel (Preferred) and Elevated Structure Alternatives could be built under any of the three construction plans. However, for the Tunnel Alternative, only a side-by-side tunnel could be built under the longer plan. A stacked tunnel would require building transition sections at both ends of the tunnel where it would convert from a stacked tunnel to a side-by-side tunnel. To build these transitions, the existing viaduct would need to be torn down and closed for at least 27 months. As discussed in Section 1.5, we’ve evaluated the effects of each construction plan paired with one alternative: the intermediate plan and the shorter plan are evaluated with the Tunnel Alternative, and the longer plan is evaluated with the Elevated Structure Alternative.

For each construction plan, two durations are reported: the corridor closure and the duration of overall construction. All construction plans include construction activities that would not require SR 99 traffic disruptions, such as the initial utility relocations and the early site work (approximately 30 months) plus the surface restoration activities (approximately 12 months for the shorter or intermediate plan and 6 months for the longer plan) that would be performed outside the corridor closure period. These activities are included in the overall construction duration.

3.1.1 Shorter Plan

The shorter plan would completely close SR 99 for a longer duration than the other plans, but would have a shorter total construction duration. The shorter plan would close SR 99 to traffic in both directions from S. Spokane Street to Denny Way for approximately 42 months (3.5 years). The majority of significant construction activities that would affect SR 99 traffic would occur during the corridor closure. The duration of construction with the shorter plan would be approximately 7 years for either tunnel alignment.
3.1.2 Intermediate Plan

The intermediate plan would close SR 99 in both directions from S. Spokane Street to Denny Way for approximately 27 months for the stacked tunnel alignment and 18 months for the side-by-side tunnel alignment. In addition, the intermediate plan assumes periods of time when the northbound lanes would be closed and southbound lanes would be open, and vice versa. These partially closed periods would total another 27 months. This would be true with either tunnel alignment. For either tunnel alignment, the overall construction duration for the intermediate plan would be approximately 8 to 8.75 years.

3.1.3 Longer Plan

The longer plan is similar to the construction plan described in the Draft EIS. In the Draft EIS, the primary construction assumption for all five Build Alternatives was that two lanes of SR 99 traffic in each direction would remain open for the majority of the construction period through the use of detour routes. In the updated longer plan for the Elevated Structure Alternative, the corridor would be closed for approximately 3 months, during which time the traffic would be routed on detours. The overall construction duration for the Elevated Structure Alternative’s longer plan would be about 10 years.

The construction assumptions for the longer plan (evaluated with the Elevated Structure Alternative) are as follows:

- Two lanes in each direction would be maintained at all times except for a 3-month complete closure.
- The Broad Street Detour would be used for southbound traffic in the north.
- First Avenue S. would be used for southbound traffic in the south to facilitate the earlier construction of the east half of the SODO Ramps.
- On Alaskan Way, one lane would be maintained in each direction by moving temporary detour alignments along the corridor as needed to accommodate construction activities and to provide access to waterfront businesses.
- The Battery Street Tunnel may be reopened prior to an operational ventilation system.

3.1.4 Construction Assumptions

In each construction plan, access to the Colman Dock Ferry Terminal would be continuously provided. East-west access (across the corridor) for vehicles and pedestrians to the waterfront businesses between Piers 52 and 70 would
be provided, except for short durations when construction activities would preclude vehicle access.

For all construction plans, the estimated durations and sequencing of construction activities assume that construction could occur 24 hours a day, 7 days a week throughout the construction period. This continuous construction schedule is required to minimize overall project costs, to reduce the corridor closure periods as much as possible, and to shorten the overall time it takes to build the project.

Although these are the current working assumptions used to estimate construction costs and construction activity durations for each alternative, it must be noted that as the engineering design proceeds and more information is known, there may be changes to the construction plans, and these will be described in the Final EIS.

### 3.2 Construction Detours

For either alternative with any construction plan, ramp and lane closures would be necessary. In most cases, these would change over time, varying by traffic stage. In some cases, specific detour routes may be established (e.g., Broad Street Detour or First Avenue S. Detour), while in others, drivers would shift to available alternate routes (e.g., I-5, Second Avenue). Construction detours are also detailed in Chapter 5’s construction staging and sequencing by traffic stage for each alternative. See also Section 6.4 in the 2006 Appendix C, Transportation Discipline Report, which details the Construction Transportation Management Plan. This plan outlines a core set of strategies for maintaining reliable transit service to retain and increase transit use, as well as other transportation demand management strategies.

#### 3.2.1 First Avenue S. Detour

The First Avenue S. Detour would be used with the Elevated Structure Alternative and the side-by-side tunnel alignment (for southbound SR 99 only), whereas with the stacked tunnel alignment, work south of Railroad Way would be accomplished during complete SR 99 closure. The First Avenue S. detour would accommodate up to two lanes of traffic in each direction and would allow the construction activities in the south section, such as the construction of the west half of the SODO Ramps (from S. Holgate to S. King Streets), to take place without closing the full length of the existing Alaskan Way Viaduct.

For the Reconfigured Whatcom Railyard, only the southbound lanes of SR 99 would require this detour, whereas the Relocated Whatcom Railyard Option would require this detour for both northbound and southbound SR 99.
This detour would be used for 27 months (2.25 years) for the Elevated Structure Alternative with the longer plan, whether the Reconfigured Whatcom Railyard or the Relocated Whatcom Railyard Option is selected.

### 3.2.2 Broad Street Detour

The Broad Street Detour would be used with the Elevated Structure Alternative. This detour would provide a route around the Battery Street Tunnel and the section of the corridor between Pike Street and the Battery Street Tunnel.

The Broad Street Detour would maintain two lanes of southbound SR 99 traffic during the closure of the southbound Battery Street Tunnel and the existing southbound viaduct between Pike Street and Denny Way. This would allow for the removal and replacement of the existing southbound viaduct between Pike Street and the Battery Street Tunnel, as well as the improvements to the Battery Street Tunnel.

Southbound SR 99 would be reduced to two lanes and diverted off Aurora Avenue N. onto Broad Street and would continue west to the waterfront, where the detour would turn south onto Alaskan Way surface street. A temporary two-lane structure would be built to carry the Broad Street Detour (southbound SR 99) over the existing BNSF mainline railroad tracks between Western Avenue and Alaskan Way surface street. The at-grade detour would continue south on Alaskan Way to approximately Pine Street, where an additional temporary two-lane ramp would connect the Alaskan Way surface street up to the existing southbound (lower) level of the Alaskan Way Viaduct. Southbound SR 99 traffic would continue south on the existing Alaskan Way Viaduct.

With the Elevated Structure Alternative, the improvements north of the Battery Street Tunnel (Partially Lowered Aurora) would allow the existing Broad Street to remain open between Sixth and Ninth Avenues N., where the Broad Street passes under Dexter and Aurora Avenues N. The duration of the Broad Street Detour is expected to be 54 months (4.5 years).

### 3.2.3 Changes to SR 99 Traffic

**Intermediate Plan**

During Traffic Stage 3 with the intermediate plan, southbound traffic on SR 99 would detour out of the existing corridor between Denny Way and Roy Street and onto the existing city streets, since no dedicated detour routes have been designated for the stacked tunnel construction. The southbound traffic would filter through the city streets using the existing south-north streets or Interstate 5 (I-5). South of S. Spokane Street, the southbound SR 99 traffic could enter back onto the existing SR 99 route.
During Traffic Stage 3 with the intermediate plan, northbound SR 99 traffic would detour out of the existing corridor south of S. Spokane Street and onto the existing city streets. The northbound traffic would use the existing north-south streets or I-5. No dedicated detour routes have been determined at this time for the stacked tunnel, although the northbound traffic would use the existing viaduct and the Bell Street Overpass in Traffic Stage 3. North of the Battery Street Tunnel at Denny Way, the northbound SR 99 traffic could enter back onto the existing SR 99 (Aurora Avenue N.).

**Shorter Plan**

No dedicated detours have been identified for the shorter plan. This plan would close SR 99 to all traffic in Traffic Stage 2. The northbound and southbound SR 99 traffic would filter through the city using the surface streets or I-5.

**Longer Plan**

For the longer plan, through trips on SR 99 would be most affected for 75 months during Traffic Stages 3 through 6.

During Traffic Stage 3 (27 months), southbound traffic would be reduced to two lanes and detoured to Broad Street and Alaskan Way between the South Lake Union area and Pike Street, and again to First Avenue S. by the existing off-ramp. The Broad Street Detour would provide a temporary overpass over the BNSF railroad tracks between Western Avenue and Alaskan Way surface street, as well as another temporary structure (the Bell Street Overpass) on Alaskan Way near Pike Street to reconnect the detour route to the viaduct. Access in the South Lake Union Area would also be maintained by a ramp to Denny Way and other connections (likely at Roy Street and/or Valley Street). Northbound, SR 99 would be restricted to two lanes for the entire length of the viaduct and through the South Lake Union area. The Western Avenue off-ramp would be closed.

During Traffic Stage 4 (3 months), SR 99 would be closed, so all northbound and southbound traffic would need to use alternate routes similar to the periods when SR 99 is closed under other construction plans. During Traffic Stages 5 (24 months) and 6 (21 months), SR 99 would have two lanes open to through trips in each direction.
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Chapter 4 CONSTRUCTION OF THE ALTERNATIVES

This chapter describes the construction process, including the anticipated methods and equipment for the two alternatives for the replacement of the Alaskan Way Viaduct and the Alaskan Way Seawall. Note that this memorandum is intended to be a general description of how this project might be constructed, while allowing for new information through the continuing design process for additional methods and approaches to be considered.

4.1 Construction Elements Common to the Tunnel and Elevated Structure Alternatives

There are several construction elements common to both the Tunnel (Preferred) and Elevated Structure Alternatives and options. The following describes common elements of the proposed actions and improvements discussed throughout Chapters 4 and 5.

4.1.1 Construction Staging Areas

The construction staging areas have changed somewhat from the areas identified in the Draft EIS. The proposed construction staging areas are the same for both the Tunnel and Elevated Structure Alternatives, including the stacked and the side-by-side tunnel alignments. Following is a general description of the potential staging areas currently proposed. These staging areas are primarily planned to use either the existing AWV or local street rights-of-way or rights-of-way that would be needed for construction of the alternative.

South – S. Spokane Street to S. Dearborn Street

- Multiple staging sites would be needed for construction staging in the south.

Central – S. Dearborn Street to Battery Street Tunnel

- A portion of Pier 48 uplands may be used for ferry holding with a temporary over-water connection to Colman Dock. Other portions may be used for barge loading and storage and electrical hook-ups. Rebuilding of the pier would be required if the pier is used as a staging site.
- Pier 62/63 could be used as barge tie-up and laydown areas.
- A construction zone near Blanchard Street and Western Avenue would be needed.
North Waterfront – Pine Street to Broad Street

- For the Elevated Structure Alternative, a temporary construction zone for the Broad Street Detour from Pier 70 east to Aurora Avenue N. would be needed.

North – Battery Street Tunnel to Comstock Street

- A site near the Battery Street Tunnel north portal would be needed for Battery Street Tunnel construction staging. City-owned property between Republican and Harrison Streets may be available for this purpose.
- The half- or full-block sections along Aurora Avenue N. that would be acquired for the new right-of-way for the Lowered Aurora improvements could also be used for construction staging.
- Broad Street from Fifth Avenue N. to Ninth Avenue N. could be closed and used for construction staging.

4.1.2 Construction Haul Routes

Trucks

For both alternatives and options, trucks would likely be the primary mode for transport of materials either into or out of the project area. The proposed truck haul routes are assumed to be the primary routes, and these are the same as described in the Draft EIS. However, the City and/or WSDOT will determine actual routes as part of final project design and project permitting. Trucks may be used to transport excavated soils or demolition materials; however, potential disposal sites have not yet been identified.

- **South** – Haul routes would generally use existing established truck routes such as E. Marginal Way S., SR 99, S. Michigan Street, S. Spokane Street, and I-5.
- **Central** – Truck access to the central section would also be provided by established routes on the south and north ends.
- **North** – Project haul routes in the north end have not yet been identified; however, established truck routes between I-5 and Elliott Avenue/15th Avenue would most likely be used.

Barges

Construction barges may also be used to haul excavated soils or demolition materials out of the area. Potential disposal sites have not been identified.

Construction barge tie-up areas at a waterfront pier location were included in the construction staging areas described above.
Rail

Rail may be used for construction material transport along with trucks. Further investigation is needed to determine if it is feasible to use rail cars for transporting excavated and demolition materials from the area. Potential disposal sites have not been identified.

4.1.3 Construction Equipment

A wide variety of construction equipment would be needed to build the project. Throughout construction, contractors would store materials and equipment within the project area and existing road right-of-way. Throughout construction, crews would use:

- Trucks
- Cranes
- Backhoes
- Excavators
- Drilling rigs
- Loaders
- Forklifts and manlifts
- Jackhammers
- Various pumps
- Grading and paving equipment
- Compressors
- Generators
- Welding equipment

For viaduct and seawall demolition activities, crews would most likely use:

- Crunching/shearing attachments
- Concrete saws and concrete splitters
- Cutting torches

For soil improvements, work crews would need specialty equipment such as drilling rigs for tunnel wall work, drilling rigs with mixing augers, and slurry processing equipment.

Crews may also require additional equipment such as pile drivers, barges, and conveyor belts.

The size and quantity of equipment required would vary somewhat for the alternatives. For example, more excavators would likely be used to build the Tunnel Alternative than the Elevated Structure Alternative. In contrast, the Elevated Structure Alternative may require more cranes than the Tunnel Alternative.
4.1.4 Utility Relocation

Both alternatives would require the extensive network of existing utilities to be temporarily or permanently relocated for construction activities. Utility relocations will be necessary in all sections of the project corridor—south, central, and north. More utilities are located in the central section, however. The following are the utility design assumptions that have been incorporated into the utility relocations preliminary design. Close coordination between the AWV project staff and the City’s utilities as well as the private utility providers has been continuous and will be maintained throughout the project.

The utility design assumptions have changed somewhat from those described in the Draft EIS. Although utilities would be moved during all stages of construction, the major portion of this work would be done during Traffic Stage 1, the first 30 months of construction. This has changed since the Draft EIS, which estimated that this early utility relocation work would take 18 months. Also, future locations may change from the final locations described in the Draft EIS. Below is a list of the updated general utilities design assumptions for the project:

- Relocating utilities to temporary or permanent locations (during Traffic Stage 1) prior to construction is anticipated to take approximately 30 months.
- Utilities will be relocated the minimum number of times possible through ongoing planning and coordination with the utilities agencies. The initial move of the utilities would generally be to the permanent location, though some utilities would require temporary relocation and may need to be moved again to their final locations. It is anticipated that the major utilities would not need to be moved more than two times.
- Major utilities, such as combined sewer outfalls that are transverse to the alignment, in general would not be relocated but would be protected and maintained in service during construction.
- In order to relocate the major electrical transmission lines, it may take up to 1 year to obtain the approval for each shutdown period. Utility relocation will require close coordination among all utilities involved (both public agency and private providers) to minimize the frequency and degree of disruption. Coordination efforts among agencies have been ongoing and will continue throughout the project.

In addition, some utilities would be upgraded during the relocation process, which would require additional coordination with the utility providers during design and construction through to the completion of the utility relocation. For additional details on utility design and construction activities,
refer to the 2006 Supplemental Draft EIS Appendix O, Public Services and Utilities Technical Memorandum.

In Traffic Stage 1, utilities would be moved from their existing locations under Alaskan Way to the east, under the existing viaduct or east of the existing viaduct. Due to space constraints in the central waterfront, overhead poles may be considered for the temporary relocation of transmission lines (either landside or waterside). Throughout the first 30 months of construction, a single waterfront pier could expect construction crews to pass by up to 12 times for a period of 1 to 5 weeks for each pass. Activities could occur up to 24 hours a day, 7 days a week. Over the entire 30-month period, crews would be working directly in front of a fixed point for a total period of about 6 to 12 months. During this construction stage, noise and disruptions to pedestrians and traffic on Alaskan Way would be localized and considerably less than in future construction stages.

### 4.1.5 Temporary Ferry Access Bridge

Both alternatives propose a temporary over-water ferry access bridge to get traffic to and from the Colman Dock Ferry Terminal during construction. This temporary over-water ferry access bridge would extend from the north edge of the Pier 48 uplands area over Elliott Bay to connect to the Colman Dock (see Exhibit 4-1). In the Draft EIS, a permanent pier was proposed in this location to provide ferry access instead of a temporary bridge.

The temporary ferry access bridge would be constructed by placing steel or precast concrete piles and by placing a precast or cast-in-place over-water roadway deck on the pilings. It would take approximately 3 months to build this temporary bridge along with the temporary ferry holding area (east of SR 99). Once project construction is completed, the temporary bridge would be removed, and ferry traffic would access Colman Dock from the completed Alaskan Way.

### 4.1.6 Relocation of the Washington Street Boat Landing

Both alternatives would require the relocation of the Washington Street Boat Landing to the west of its current location. In the Draft EIS, the design plans moved the boat landing about 125 feet to the west of the existing seawall at the edge of the new over-water pier. With the updated alternatives, the boat landing would remain closer to the existing location than proposed in the Draft EIS. The stacked tunnel alignment would move the Washington Street Boat Landing about 16 feet west of its current site. The pergola would be placed above the tunnel at the edge of the new seawall but would not hang over the water as it does today.
Exhibit 4-1. Elevated Structure Alternative – Pier 48 to Colman Dock
The side-by-side tunnel alignment would relocate the boat landing approximately 27 feet west of its current site, and the structure would similarly be placed on the edge of the new seawall.

With the Elevated Structure Alternative, the Washington Street Boat Landing would be relocated approximately 35 feet farther west of the existing seawall. It would be supported by pilings, and the pergola would hang over the water by approximately 26 feet as it does today.

4.1.7 Removal of the Alaskan Way Viaduct

With either of the proposed alternatives, the viaduct would be demolished. The timing for removing the viaduct and the amount of material removed varies somewhat between the alternatives; however, similar removal methods are anticipated. It would take about 6 months to remove the viaduct in the south section. Various methods of concrete removal, such as saw-cutting, concrete pulverizers, and shears mounted on excavators, were described in detail in Section 3.1.7 of the 2004 Draft EIS Appendix B, Alternatives Description and Construction Methods Technical Memorandum.

The demolition activities would include a combination of cutting and lifting segments out of the structure, pulverizing and shearing the structure, and jackhammering and core drilling to break up the concrete. Concrete from the viaduct could be ground into aggregate to be reused on-site as part of the construction operation, though it would most likely be hauled to an off-site location for processing. Rebar in the existing structure may be separated and recycled. The old viaduct material would be hauled away by truck, rail, or barge. The transport method has not yet been determined.

For either the Tunnel or the Elevated Structure Alternative, the quantity of concrete expected to be demolished and removed from the existing viaduct is roughly estimated to be approximately 100,000 cubic yards, plus an additional 5,000 cubic yards of concrete removal from the temporary trestles (for the Elevated Structure Alternative only).

4.2 Tunnel Alternative (Preferred Alternative)

Construction activities for the Tunnel Alternative and its associated options are described below. For comparison, construction activities and durations for the Elevated Structure under the longer plan are shown in Exhibits 4-2, 4-4, and 4-9 and are described in Section 4.3.

4.2.1 South – S. Spokane Street to S. Dearborn Street

The Reconfigured or Relocated Whatcom Railyard Options have similar construction components, but the length of time it would take to build these
components would vary depending on the alternative and construction plan selected, as shown in Exhibit 4-2.

**Exhibit 4-2. South Section Construction Activities and Durations**

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve soils</td>
<td>15 months</td>
<td>15 months</td>
<td>15 months</td>
<td>15 months</td>
</tr>
<tr>
<td>Construct SODO Ramps</td>
<td>24 months</td>
<td>39 months</td>
<td>36 months</td>
<td>36 months</td>
</tr>
<tr>
<td>Construct bridge over the tail track</td>
<td>9 months</td>
<td>9 months</td>
<td>Not applicable</td>
<td>18 months</td>
</tr>
<tr>
<td>Remove the existing viaduct</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Build at-grade roadway</td>
<td>9 months</td>
<td>9 months</td>
<td>12 months</td>
<td>12 months</td>
</tr>
<tr>
<td>Total construction time</td>
<td>39 months</td>
<td>57 months</td>
<td>48 months</td>
<td>59 months</td>
</tr>
</tbody>
</table>

**Reconfigured Whatcom Railyard**

As part of the stacked tunnel alignment, the reconfiguration of the Whatcom Railyard would require less construction work than the Relocated Whatcom Railyard. The reconfiguration of the Whatcom Railyard would tie into the existing facilities near S. Stacy Street. This reconfiguration would require a connection to the tail track, which would be relocated to the east of SR 99 and would provide a tail track (approximately 3,000 feet) that extends to about S. King Street. This would also require additional utility work along SR 99, E. Marginal Way S., and in the Whatcom Railyard. The reconfiguration concept would not require two additional parallel tracks in the Whatcom Railyard or additional track to be installed in the BNSF SIG/Stacy Railyards, as the Relocated Whatcom Railyard Option would. However, the Reconfigured Whatcom Railyard Option would require an overpass over the lead rail connector track (at S. Massachusetts Street) and bridge approaches to be built within close proximity to the working railyards.

The bulk of this construction work would take approximately 6 months in Traffic Stage 3, roughly concurrent with the 6 months needed for the tail track relocation.

Excavation would be needed, and heavy earth-moving equipment would be used to remove and replace the rail materials. Excavated materials and new railroad ties, ballast, and rails would be transported to and from the site by
trucks, rail, and/or barges. The means of transport has not yet been determined.

**SR 99 At-Grade with SODO Ramps**

Near Safeco Field and Qwest Field, aerial streets with retained fill sections would be constructed to provide full access to SR 519. Construction of the roadway would involve removing the existing viaduct and replacing it with a surface roadway. Construction methods would include clearing, grading, utility relocation, soil improvement, laying the roadway foundation, and constructing the roadway pavement.

Retained fill sections would be built to transition between the at-grade SR 99 and SR 519 roadways and the elevated streets that would be constructed with drilled shafts, cast-in-place concrete columns, and support beams. Most of the concrete for the elevated structures would be cast in place. However, precast components (such as precast, prestressed girders) could be used.

**Soil Improvements**

Soil (or ground) improvements would be required in the south where aerial structures and retained fills are proposed. Soil improvements could consist of a combination of deep soil mixing, jet grouting, and vibro-replacement (stone columns).

As described in the 2004 Draft EIS Appendix B, Section 3.2.1, deep soil mixing involves strengthening soil through mixing it with cement grout injected under pressure. As the soil is mixed, it creates overlapping columns of improved or strengthened soils. (See Exhibit 4-3 for an illustration of the deep soil mixing method).

As described in the 2004 Draft EIS Appendix B, Section 3.2.5, jet grouting is a process by which cement grout is injected into weak soils and then mixed to strengthen and stabilize the soil (see Exhibit 4-3). Jet grouting would create a solid block of improved soil behind the existing seawall that is embedded into the competent soil layer of glacial till that underlies the waterfront area.

These soil improvements, with deep soil mixing one of the most likely methods, would be required to support the new aerial structures for northbound and southbound frontage road elevated structures located on either side of the SR 99 mainline. Deep soil mixing would also be used for the retained fills needed to adequately support the aerial structures.

These soil improvements are planned from just north of S. Holgate Street to just north of S. Royal Brougham Way. The footprint of the soil improvements would range from 170 to 260 feet wide and extend approximately 70 to 80 feet below the ground surface.
Soil Improvement Methods

Deep Soil Mixing

Jet Grouting
**Aerial Structure Construction**

The Tunnel Alternative would construct new aerial structures in various locations throughout the project area. In those areas where there is a need to extend up and over existing facilities such as railroad tracks or roadways, bridges would be supported by drilled shafts or piles, columns, and crossbeams. In other areas, aerial structures may be supported by retaining walls and fill dirt.

In the Draft EIS, the aerial structures proposed in the south section were mostly bridges. With the updated alternatives, the two south section options (the Reconfigured or Relocated Whatcom Railyard Options) propose a combination of bridges and aerial structures built on retained fill.

As described above, the Reconfigured Whatcom Railyard Option would require the construction of two bridges, one for the northbound lanes and one for the southbound lanes. These would be built over the railroad track connecting the Whatcom and BSNF SIG Railyards between S. Holgate and S. Atlantic Streets. Most of this bridge section would be elevated by building retaining walls and using fill, though a small section spanning the railroad track would be supported by aerial structures.

Near the Qwest and Safeco Fields, both options propose to build on- and off-ramps to SR 99. These ramps would be built using a combination of retained fill and aerial structures. The aerial structures would be constructed of reinforced concrete columns, crossbeams, girders, roadway decks, and traffic rail. Most of the concrete for the aerial structures would be cast in place, though precast components could be used. A general description of aerial structure components and construction activities is provided in the text that follows.

**Drilled Shafts**

The elevated SODO Ramps would be supported by drilled shafts, which would vary in diameter from 8 to 14 feet and would extend between 60 and 150 feet into the soil.

As described in the Draft EIS (and Section 3.2.1 in the 2004 Draft EIS Appendix B), new aerial structures would be supported underground by drilled shafts or driven piles. In general, drilled shafts are built by drilling soil out to the desired circumference and depth, installing rebar (reinforcing bars of steel), and filling the hole with the concrete that forms the new drilled shaft. The stability of the excavated hole may be maintained either by keeping the hole continuously filled with a sealing mixture or by advancing a steel casing while drilling. Typically, contractors can construct one drilled shaft each day per drilling crew, though it may be possible to increase production if conditions are favorable.
**Driven Piles**

In areas where the soil conditions allow, driven piles may be used instead of drilled shafts to support aerial structures. As described in the Draft EIS, driven piles could be used for construction of new aerial structures south of S. Atlantic Street and for rebuilding the existing viaduct foundations in the central section. Pile driving activities are disruptive, increasing noise substantially in areas where this activity occurs.

Piles can be constructed in various sizes using several different materials. At this time, it is expected that 30-inch-diameter piles would be constructed of steel casings filled with reinforced concrete. A cluster of several piles would be driven into the ground to support one column of the aerial structure.

Cast-in-place piles are typically installed in one of two ways:

- **Closed End** – A steel plate is welded onto the tip of the outer shell or casing of the pile, and the casing is driven into the ground. This provides a dry, clean hole, which is filled with reinforced concrete to create the finished pile.

- **Open End** – If the pile casing is driven without a tip so the end is open, the soil and water in the casing is augured out and the bottom of the empty casing is filled with concrete to create an impervious plug. The casing is then filled with reinforced concrete to create the finished pile.

**Pile Caps (Required for Driven Piles)**

Once the required number of piles is driven, a reinforced concrete pile cap is built to connect the piles together and support the load from the column of the aerial structure. Pile caps are built by excavating soil and placing a concrete form prior to driving the piling. After the pilings are driven, the excavated hole is stabilized, reinforcing steel is installed, and concrete is placed inside the pile cap forms.

**Columns and Crossbeams (Caps)**

After the foundation of the aerial structure is built, construction of the aboveground columns and crossbeams proceeds. The columns and crossbeams are typically cast in place using concrete forms.

**Superstructure (Girders, Roadway Deck, and Railing)**

Girders would most likely be constructed off-site and delivered to the project area; however, they could be cast in place if a more aesthetically pleasing superstructure is used in the design. Roadway deck and bridge railing would be cast in place using concrete.
At-Grade Roadway Construction

Both alternatives would require the construction of sections of at-grade roadway. As described in the Draft EIS, at-grade roadways would be built by removing existing roadways, clearing and grading the area, laying the aggregate roadway foundation, and laying an asphalt roadway surface. Construction of at-grade roadway sections in the south is expected to take 9 to 12 months depending on the alternative and construction plan selected.

Option: Relocated Whatcom Railyard

The existing Whatcom Railyard between S. Hanford and S. Holgate Streets would be relocated to the east using the footprint of the existing SR 99, which would allow the Whatcom Railyard to be co-located with the BNSF SIG Railyard.

During Traffic Stage 3, the tail track would be relocated from its existing location in Terminal 46 to the east side of SR 99 and would run for approximately 3,000 additional feet to the north to about S. King Street.

During Traffic Stage 3 or 4, the Whatcom Railyard would be relocated to the vacated SR 99 footprint and connected to the relocated tail track near S. Massachusetts Street. In the south, near S. Hanford Street, a new rail connection would connect the existing tracks to the relocated Whatcom Railyard by crossing under the existing SR 99 aerial structure over Spokane Street.

This option would require two additional tracks to maintain the existing track length within the relocated Whatcom Railyard. It would also require additional utility work along SR 99, E. Marginal Way S., and in the Whatcom Railyard.

4.2.2 Central – S. Dearborn Street to Battery Street Tunnel

Construction activities in the central section would vary for the tunnel alignments and the Elevated Structure Alternative since very different structures are proposed. Exhibit 4-4 shows the length of time it would take to build the project components depending on the alternative and construction plan selected.
Exhibit 4-4. Central Section Construction Activities and Durations

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Build the temporary Colman Dock access bridge</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
<td>3 months</td>
</tr>
<tr>
<td>Replace the seawall from S. Washington Street to Yesler Way</td>
<td>9 months</td>
<td>9 months</td>
<td>9 months</td>
<td>9 months</td>
</tr>
<tr>
<td>Build the seawall/tunnel wall from S. Dearborn Street to Pine Street</td>
<td>18 months</td>
<td>18 months</td>
<td>18 months</td>
<td>18 months</td>
</tr>
<tr>
<td>Build the tunnel</td>
<td>30 months</td>
<td>51 months</td>
<td>51 months</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Build the elevated structure</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>69 months</td>
</tr>
<tr>
<td>Remove the existing viaduct</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
<td>6 months</td>
</tr>
<tr>
<td>Rebuild the seawall from Union Street to Broad Street</td>
<td>18 months</td>
<td>18 months</td>
<td>18 months</td>
<td>18 months</td>
</tr>
<tr>
<td>Total construction time</td>
<td>7.0 years</td>
<td>8.75 years</td>
<td>8.0 years</td>
<td>10.0 years</td>
</tr>
</tbody>
</table>

The proposed tunnel construction sequence is shown in Exhibit 4-5 for the stacked tunnel alignment and Exhibit 4-6 for the side-by-side tunnel alignment. Specific components of these construction elements are described below.

**Stacked Tunnel Alignment**

Once the initial utility relocations are completed (Traffic Stage 1), the stacked tunnel construction would start with the section from S. Jackson to Union Streets. (See Exhibit 4-5 for the stacked tunnel construction sequence.)

Diaphragm walls would be used to support the sides of the tunnel and would extend about 15 feet below the bottom of the tunnel.

Ramps at S. King Street would provide access to and from the south and would be constructed similar to the methods used for the SODO Ramps at S. Atlantic Street and S. Royal Brougham Way (see the description under SR 99 At-Grade with SODO Ramps in Section 4.2.1.).
Stacked Tunnel Construction Steps

**STEP 1 - INSTALL WEST TUNNEL WALL**
1. Remove parking and waterfront streetcar.
2. Relocate utilities—this will continue throughout construction.
3. Begin building the new west tunnel wall seawall from 8th Seaborn to Pine.
   A. Remove sidewalk adjacent to piers; provide temporary access for pedestrians as needed.
   B. Remove riprap adjacent to seawall and install temporary sheet pile waterfront of the existing seawall.
   C. Excavate soil, landward of seawall, brace as needed. The excavation will be about 15 feet deep and up to 40 feet wide.
   D. Dewater as needed.
   E. Remove obstructions as needed.
   F. Begin building west secant pile wall.

**STEP 2 - INSTALL EAST TUNNEL WALL**
1. Begin building the east wall—slurry wall.
2. Complete west wall construction.
3. Complete east (slurry) wall.
4. Continue excavating to top of relieving platform for full tunnel width.
5. Install top level bracing and tiebacks.
6. Construct temporary vehicle and pedestrian access to piers where needed.
7. Install dewatering wells and begin dewatering.

**STEP 3 - TUNNEL EXCAVATION**
1. Remove seawall relieving platform.
2. Continue excavation to the bottom of the proposed tunnel; install tiebacks as needed.
3. Cast bottom slab connecting walls and install tension wires.
4. Discontinue dewatering.
5. Replace existing seawall panels; remove sheet pile wall.

**STEP 4 - NORTHBOUND TUNNEL CONSTRUCTION**
1. Remove lower level bracings.
2. Install waterproofing membrane on bottom slab and east and west walls.
3. Cast northbound tunnel bottom slab, side walls, and ducts.
4. Cast the northbound tunnel roof slab.

**STEP 5 - SOUTHBOUND TUNNEL CONSTRUCTION**
1. Detension upper rows of tiebacks.
2. Install waterproofing membrane.
3. Cast southbound tunnel roadway, side walls, and ducts.
4. Cast the top tunnel slab.

**STEP 6 - COMPLETE TUNNEL CONSTRUCTION**
1. Install waterproofing over tunnel top slab.
2. Relocate utilities and backfill over tunnel.
3. Remove existing viaduct.
Side-By-Side Tunnel Construction Steps

**STEP 1 – INSTALL WEST TUNNEL WALL**
1. REMOVE PARKING AND WATERFRONT STREETCAR.
2. RELOCATE UTILITIES—THIS WILL CONTINUE THROUGHOUT CONSTRUCTION.
3. BEGIN BUILDING THE NEW WEST TUNNEL WALL; SEAWALL FROM S. SEARBORN TO PINE.
   a. REMOVE SIDEWALK ADJACENT TO PIERS; PROVIDE TEMPORARY ACCESS FOR PEDESTRIANS AS NEEDED.
   b. REMOVE RRPAK ADJACENT TO SEAWALL AND INSTALL TEMPORARY SHEET PILE WATERWAY OF THE EXISTING SEAWALL.
   c. EXCAVATE SOIL LANDWARD OF SEAWALL, BRACE AS NEEDED, THE EXCAVATION WILL BE ABOUT 15 FEET DEEP AND UP TO 45 FEET WIDE.
   d. DWATER AS NEEDED.
   e. REMOVE OBSTRUCTIONS AS NEEDED.
   f. BEGIN BUILDING WEST SECANT PILE WALL.

**STEP 2 – INSTALL EAST TUNNEL WALL**
1. BEGIN BUILDING THE EAST WALL—SLURRY WALL.
2. COMPLETE WEST WALL CONSTRUCTION.
3. COMPLETE EAST (SLURRY) WALL.
4. CONTINUE EXCAVATING TO TOP OF RELIEVING PLATFORM FOR FULL TUNNEL WIDTH.
5. INSTALL TOP LEVEL BRACING AND TIEBACKS.
6. CONSTRUCT TEMPORARY VEHICLE AND PEDESTRIAN ACCESS TO PIERS WHERE NEEDED.
7. INSTALL DewaterING Wells AND BEGIN Dewatering.

**STEP 3 – TUNNEL EXCAVATION**
1. REMOVE SEAWALL RELIEVING PLATFORM.
2. CONTINUE EXCAVATION TO THE BOTTOM OF THE PROPOSED TUNNEL; INSTALL TIEBACKS AS NEEDED.
3. MAINTAIN DewaterING.

**STEP 4 – CONTINUE SOUTHBOUND TUNNEL**
1. CAST SOUTHBOUND TUNNEL BOTTOM SLAB,
2. INSTALL WATERPROOFING MEMBRANE ON BOTTOM SLAB AND WALLS,
3. CONSTRUCT SOUTHBOUND TUNNEL ROADWAY SLAB,
4. REMOVE LOWER LEVEL BRACINGS AND TIEBACKS IN LOWER ROWS,
5. INSTALL WATERPROOFING,
6. CONSTRUCT INTERIOR WALLS,
7. INSTALL BRACING BETWEEN INTERIOR WALL.

**STEP 5 – SOUTHBOUND TUNNEL CONSTRUCTION**
1. MAINTAIN Dewatering.
2. REPOSITION BRACINGS AS NEEDED.
3. DETENTION TIEBACKS AND INSTALL ROOF WATERPROOFING.
4. CONSTRUCT ROOF STRUCTURE AND INSTALL ROOF WATERPROOFING.
5. REMOVE BRACING.
6. DISCONTINUE Dewatering.
7. COMPLETE SOUTHBOUND TUNNEL VENTILATION, ESSEX STAIRS, AND TUNNEL FINISHES.

**STEP 6 – COMPLETE SOUTHBOUND TUNNEL CONSTRUCTION**
1. REMOVE TRAFFIC DECKING AND TOP BRACING.
2. BACKFILL ABOVE TUNNEL, RELOCATE UTILITIES WHERE REQUIRED TO PERMANENT LOCATIONS.
3. REPLACE EXISTING SEAWALL PANELS; REMOVE SHEET PILE WALL.
4. SHIFT SOUTHBOUND TRAFFIC FROM VIADUCT TO NEW SOUTHBOUND TUNNEL.

Exhibit 4-6
Side-By Side Tunnel Construction Steps

**STEP 7 - NORTHBOUND TUNNEL CONSTRUCTION**
1. DEMOLISH EXISTING VIADUCT.
2. RELOCATE UTILITIES AS REQUIRED FOR NORTHBOUND TUNNEL EXCAVATION.
3. CONSTRUCT NEW EAST WALL.
4. CONTINUE NORTHBOUND TUNNEL CONSTRUCTION AS DESCRIBED IN STEPS 3 - 5. TIEBACKS WOULD NOT BE USED.

**STEP 8 - COMPLETE NORTHBOUND TUNNEL CONSTRUCTION**
1. BACKFILL ABOVE NORTHBOUND TUNNEL.
2. COMPLETE NORTHBOUND TUNNEL VENTILATION, TUNNEL FINISHES, AND SYSTEMS.
3. OPEN NORTHBOUND TUNNEL TO TRAFFIC.
4. COMPLETE ALASKAN WAY AND SURFACE IMPROVEMENTS.
A 280-foot section of the north end of the tunnel (between Pike and Pine Streets) would be supported by a mechanically stabilized earth (MSE) wall. Vent structures would be built near the south and north portals.

At the north portal of the tunnel near Virginia Street, the cut-and-cover tunnel would transition to an aerial structure up to Elliott Avenue, which would be supported by large-diameter drilled shafts. The construction methods for the aerial structure were described above in Section 4.2.1. SR 99 would transition to a retained cut section extending beneath Elliott and Western Avenues with the Under Elliott and Western Avenues Option.

**SR 99 Under Elliott and Western Avenues**

The option to build SR 99 under Elliott and Western would require a combination of retained cut and aerial structures. The existing viaduct between Pike Street and the Battery Street Tunnel would be replaced with an aerial structure carrying SR 99 traffic over the BNSF railroad tracks, then in a retained cut under Elliott and Western Avenues before tying into the Battery Street Tunnel. The aerial (bridge) structures would require drilled shafts for the bridge abutments and piers. For the stacked tunnel alignment, construction from Pine Street to the Battery Street Tunnel is expected to take about 51 months under the shorter plan and 57 months under the intermediate plan. This construction would likely require a combination of pile walls, secant pile walls, or slurry walls.

**Removing the Viaduct**

In the central section, the viaduct would be removed using the same methods described above for the south section. In the central section, it would take 6 to 12 months to remove the existing viaduct.

**BNSF Retaining Wall**

A retaining wall adjacent and parallel to the BNSF mainline tracks (east side of tracks) would extend from the BNSF tunnel portal to the north to support the hillside and provide access for construction activities. The retaining wall would be constructed using either permanent tiebacks into the slope soils or cantilevered retaining wall construction. There is likely to be some disruption to rail operations during construction, requiring coordination and negotiation with the railroad companies.

A temporary at-grade railroad track crossing would need to be built across the tracks, similar to other local street rail crossings in local streets.

This retaining wall and associated construction would likely require cranes, bulldozers, and loaders and would likely take about 18 months.
Alaskan Way Surface Street

The existing Alaskan Way surface street would be replaced. The new roadway would be built by clearing and grading the area, laying the aggregate roadway foundation, and placing an asphalt or concrete overlay. Sidewalks, a promenade, lighting and landscaping would all be included in the reconstruction of the Alaskan Way surface street.

It would take about 12 months to replace Alaskan Way for either of the tunnel alignments. The Tunnel Alternative would take longer than the Elevated Structure because of installation of the double streetcar tracks, the larger promenade area, and associated landscaping.

Alaskan Way surface street construction would require similar equipment as described in the south section for at-grade roadway construction (see Section 4.2.1).

For the duration of the project, on-street parking and parking under the existing viaduct would be eliminated. The waterfront streetcar tracks would be removed until the surface street is restored.

During tunnel construction, the Alaskan Way surface street would be effectively closed to through (north-south) traffic, but east-west access would be provided. During periods of construction that the Alaskan Way surface street is not closed to north-south traffic, it would be reduced to one lane of traffic in each direction and would be shifted east or west depending upon the construction activity. As an example, during early phases, the Alaskan Way surface street may be temporarily relocated under the existing viaduct, with one lane in each direction while the seawall is being rebuilt, or after the initial utility relocation and/or the seawall/tunnel construction is complete. At that point, a temporary Alaskan Way surface street would be constructed along the western side of the corridor.

It is anticipated that when in use, the temporary Alaskan Way surface street (one lane each way) would be temporarily shifted from side to side as needed to accommodate the construction activities between S. Holgate Street and Broad Street.

Prior to the completion of construction, double waterfront streetcar tracks would be installed (from Main Street north to Clay Street) and other surface improvements (bike lanes, sidewalks, etc.) would be completed. The promenade would be widened from the current 20 feet in width to approximately 70 feet.
Replacing the Seawall

The construction methods for rebuilding the seawall have changed since the Draft EIS was issued. Both alternatives propose to remove and replace or rebuild the existing seawall. For the Tunnel Alternative, the seawall would be replaced with the outer wall of the tunnel from S. Washington Street to Union Street (described in Section 3.2.2 in the 2004 Draft EIS Appendix B). Soil improvements and face paneling would replace the failing bulkhead located between S. Jackson Street and S. Washington Street. In most areas between Union and Broad Streets, the seawall would be rebuilt with a new face panel and L-wall support structure. Near Pier 66, between Blanchard and Battery Streets, only soil improvements would be needed. Rebuilding the seawall from Union Street to Broad Street would take about 18 months. The likely activities for tunnel wall construction are described below.

Step 1, Remove Sidewalk (above seawall) – In areas where the seawall would be rebuilt, crews would remove the existing sidewalk that extends out over the seawall. This activity is expected to take about 2 to 3 days for a 100-foot section of sidewalk. The sidewalk would be removed using concrete saws and cranes. Pedestrian access directly in front of the work zone would be rerouted. To help maintain pedestrian access along the waterfront, the project partners are considering the feasibility of constructing temporary over-water pedestrian walkways between some piers.

Step 2, Install Protective Wall – Once the sidewalk is removed, crews would remove riprap adjacent to the seawall and install a protective sheet pile wall in front of the existing seawall. During this activity, cranes and excavators would be parked on the landward side of the seawall, and they would be used to remove riprap adjacent to the seawall. Once the riprap is removed, a sheet pile wall would be installed in front of the existing seawall. The sheet pile wall would most likely be installed using vibration to limit effects to surrounding aquatic life. These activities would take about 2 to 3 weeks at each fixed location.

Step 3, Remove Soil – Next, crews would excavate down to the seawall’s relieving platform, which is about 15 feet below the Alaskan Way surface street. The excavated area would be about 15 feet deep and 40 feet wide. Backhoes and cranes would be used to dig and remove debris, and the material would most likely be removed from the site in trucks. Each 100-foot section would take 2 to 3 days to excavate.
Step 4, Improve Soil – Once the sheet pile wall is in place and the soil is removed, crews would begin strengthening the soil using a process called jet grouting, described above in Section 4.2.1 under Soil Improvements and shown on Exhibit 4-3. Jet grouting would create a solid block of strengthened soil behind the existing seawall. The extent of jet grouting required depends on soil conditions in the immediate area, but in general, jet grout would be injected below the relieving platform into an area up to 40 feet wide and 60 feet deep.

Step 5, Construct Seawall Components – Once grouting is completed, new seawall components would be built. These components include a new mud slab, tie slab, L-wall, and H-pile wall. These components would either be precast concrete or they would be built in place. Once these components are built, the excavated area would be filled with soil, the existing seawall face would be removed and replaced, and a new sidewalk would be built.

Excavation and Dewatering
The upper 15 to 35 feet of excavation would remove a variety of fill materials, including a large amount of wood debris from numerous pilings, timbers from the existing seawall relieving platform, and refuse and debris from various sources. It is anticipated that portions of these fill materials would include low levels of contaminants, petroleum hydrocarbons, and treated and untreated timbers. Excavated materials would be tested for contamination and transported by truck, rail, and/or barge to an appropriate disposal facility.

Construction of the stacked tunnel alignment would require excavation along the seawall through the central section to depths up to 65 to 80 feet, totaling approximately 1,366,000 cubic yards of excavated soils, which is slightly less than estimated for the Draft EIS Tunnel Alternative in the central section (see Section 3.4.2 of the 2004 Appendix B).

Tunnel construction requires dewatering prior to excavation to keep construction areas relatively dry and to provide a reasonably solid area to work in. Water pumped out of the construction area would be either reinjected back into the ground or discharged back into Elliott Bay. If water quality monitoring determined that the water required treatment, it would be treated before being discharged. The dewatering process and likely disposal methods would be the same as described in Section 3.4.2 of the 2004 Draft EIS Appendix B.
Seawall at Colman Curve

The section of seawall in the area between S. King Street and S. Washington Street (Pier 48 uplands area) would take approximately 9 months to replace. The Pier 48 upland area lies west of the new tunnel where the tunnel wall and the seawall diverge. The existing seawall in the Pier 48 uplands area consists of a steel sheet pile wall to be replaced and improved.

A soil strengthening method (jet grouting or deep soil mixing, for example) would be needed to reinforce the soils behind the sheet pile wall. Once the soil improvements are completed, the existing sheet pile wall would be removed. Potential risks associated with jet grouting are addressed in detail in Section 5.2.5 of the 2004 Draft EIS Appendix T, Geology and Soils Technical Memorandum.

Secant Pile Wall Construction

The western wall of the tunnel (for either tunnel) would likely be a secant pile wall, although as design advances, other types of diaphragm wall may be used. The secant pile wall would replace the existing seawall and would form the outer (west) wall of the tunnel. The construction duration for the entire length of the secant pile wall is estimated to be 18 months.

The wall would be constructed of interlocking drilled shafts. The shafts would be about 4 to 5 feet in diameter and would extend up to 90 feet deep along the entire length of the proposed tunnel (slightly less depth than was considered necessary at the time of the Draft EIS). These shafts would overlap to form a continuous wall from where the tunnel begins near S. Dearborn Street to where the tunnel would end near Pine Street. Large cranes would be needed, and a fairly large laydown area for construction materials would also likely be needed.

For the most part, the secant pile wall would be built close to the existing Alaskan Way Seawall. A temporary steel sheet pile wall and/or silt curtain would be installed just seaward of the existing seawall during construction to protect overall water quality.

This construction would take approximately 18 months, assuming multiple crews work at the same time.
Slurry Wall Construction

A slurry wall is the most likely type of tunnel wall to be used for the eastern wall of the tunnel. A slurry wall may also be used for the center wall in the side-by-side tunnel alignment. A slurry wall is a reinforced concrete wall, built in an excavated trench. During excavation, a sealing mixture (slurry) is made up of bentonite and water and used to support the excavated trench. Bentonite is a type of clay that expands to help seal off groundwater flow.

The slurry wall would be about 3 feet wide and about 90 feet deep along the entire length of the proposed tunnel. Construction of the eastern wall would most likely lag behind the secant pile wall construction by about 2 or 3 months so that the operations do not conflict, but both walls would end up being completed at roughly the same time. Large cranes would be required, along with some type of holding tank for the dewatering process, a centrifuge, and excavation equipment. Typical slurry wall construction methods were described in detail in Section 3.4.2 in the 2004 Draft EIS Appendix B. There have been two slight changes since the Draft EIS:

- The guidewalls (temporary concrete parallel walls separated by the width of the slurry wall) that guide the excavation horizontally and vertically to the required depths would probably require that only one trench be excavated.

- Slurry material is injected and maintains hydrostatic pressure, which helps keep the walls of the hole from caving in as the excavation progresses. The tunnel wall may require less depth than previously thought. The depth of the wall is now expected to range from 65 to 80 feet (previously expected to be 75 to 90 feet).

Please refer to Exhibits 4-5 and 4-6 for the basic construction sequence for the Tunnel Alternative. The construction duration for the slurry wall is estimated to be roughly the same as the secant pile wall, approximately 18 months.

Option: Side-by-Side Tunnel Alignment

Once the initial utility relocations are completed, the side-by-side tunnel construction would start with the southbound tunnel excavation from S. Dearborn Street to Pine Street. This would take approximately 24 months to complete (see Exhibit 4-6 for the side-by-side tunnel construction sequence). The northbound tunnel excavation (from S. Royal Brougham Way to Pike Street) would start once the SR 99 corridor is closed in either the intermediate plan or shorter plan and would also take approximately 24 months to complete.
Construction of the side-by-side tunnel alignment would require excavation up to 65 feet below the ground level, totaling approximately 1,552,000 cubic yards of excavated soils. This is similar to the estimate for the Draft EIS Tunnel Alternative.

At the north portal of the tunnel near Virginia Street, the cut-and-cover roadway would transition to an aerial structure, which would be supported by large-diameter drilled shafts. The construction methods for the aerial structure were described above in Section 4.2.1. The aerial structure would then go over Elliott and Western Avenues.

**SR 99 Over Elliott and Western Avenues**

The SR 99 Over Elliott and Western Option would replace the existing viaduct between Pike Street and the Battery Street Tunnel with an aerial structure carrying SR 99 traffic over the BNSF railroad tracks and over Elliott and Western Avenues before tying into the Battery Street Tunnel. The aerial (bridge) structures would require drilled shafts for the bridge abutments and piers. A portion of the north portal would be supported by an MSE wall. Vent structures would be built near the south and north portals.

Construction of this section would take 48 months with the intermediate plan. The construction of the aerial structures would require similar equipment as described in the south section for building the aerial streets as part of the SODO Ramps (see Section 4.2.1).

**4.2.3 North Waterfront – Pine Street to Broad Street**

**Replacing the Seawall – Union Street to Broad Street**

The Type A Seawall rebuild applies to the seawall portion between Union Street and Broad Street. The existing Type A Seawall would be replaced with a new reinforced concrete L-wall structure and cantilevered sidewalk (see Exhibit 4-7 for Type A Seawall – L-wall construction).

The Type B Seawall – L-wall with cantilevered sidewalk section that would overhang Elliott Bay is shown in Exhibit 4-8. This L-wall (structural support design) construction method would eliminate the need to use drilled shafts as described in the Draft EIS.

The soils behind the seawall would be strengthened through jet grouting. The existing exposed sheet pile wall would be removed by cutting it off at the mudline and replacing it with a new reinforced concrete face. A temporary sheet pile wall (or equivalent protective measure) is the most likely best management practice (BMP) to be used to protect water quality during seawall construction. New concrete face panels would replace the existing concrete face wall.
4.2.4 North – Battery Street Tunnel to Comstock Street

Construction activities and durations in the north section for the Tunnel Alternative are shown in Exhibit 4-9.

Exhibit 4-9. North Section Construction Activities and Durations

<table>
<thead>
<tr>
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<tr>
<td>Battery Street Tunnel improvements</td>
<td>27 months</td>
<td>27 months</td>
<td>36 months</td>
<td>24 months</td>
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<tr>
<td>Build west half of SR 99</td>
<td>18 months</td>
<td>18 months</td>
<td>24 months</td>
<td>18 months</td>
</tr>
<tr>
<td>Build east half of SR 99</td>
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<td>12 months</td>
<td>18 months</td>
<td>12 months</td>
</tr>
<tr>
<td>Construct bridges across SR 99</td>
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<td>12 months</td>
<td>18 months</td>
<td>12 months</td>
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<tr>
<td>Total construction time</td>
<td>42 months</td>
<td>36 months</td>
<td>51 months</td>
<td>36 months</td>
</tr>
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</table>

Battery Street Tunnel Improvements and Partially Lowered Aurora

The proposed Battery Street Tunnel improvements for the Tunnel Alternative include fire/life safety and seismic upgrades (as described in the Draft EIS), and lowering the tunnel floor to increase the vertical clearance to 16.5 feet. The existing north and south end curves would be left as is. Ventilation (air intakes) would be provided at both portals, although exact locations are still to be determined. The stacked tunnel alignment with the intermediate plan would use the Traffic Stage 4 closure duration (about 27 months) to build the exterior walls first (probably using some type of temporary steel pile wall), and then perform the excavation of the tunnel floor to obtain the 16.5 feet of vertical clearance. Northbound and southbound improvements would be built concurrently.

The Partially Lowered Aurora Option would lower the roadway profile of SR 99/Aurora Avenue N. into a side-by-side retained cut between the north portal of the Battery Street Tunnel and about Republican Street.

The construction would begin with the relocation of existing utilities that cross under SR 99 between Denny Way and Mercer Street and the improvement of the southbound right-turn lane to Roy Street. Only very limited design work
has been done for utility relocations in this area; more detail will be available as design advances and will be described in the Final EIS.

Initially, both directions of traffic would be diverted to the northbound lanes. A temporary center wall would be built to separate the northbound from the southbound lanes. Excavation could then begin for the installation of retaining walls that would vary in height from 4 to 25 feet on the west side of SR 99. When the retaining walls are completed, demolition of the southbound lanes on Aurora Avenue N. would begin, along with excavation. Once the work on the southbound lanes is complete, all traffic would be diverted to the west side.

During Traffic Stage 2, two lanes of northbound traffic and one lane of southbound traffic would be shifted to the northbound side of SR 99 between Roy Street and the north Battery Street Tunnel portal. One lane of southbound traffic would be diverted to Roy Street. Broad Street would be closed to through traffic, and Mercer Street would be converted to two-way traffic. During this phase, the southbound SR 99 roadway would be widened to the west between John and Broad Streets, the southbound off-ramp to Denny Way would be rebuilt, the Broad Street overpass would be removed, and the Mercer Street overpass would be replaced.

On the east side of SR 99, a retaining wall would be constructed, varying in height from 4 to 25 feet depending on the depth of retained cut required. As this wall is built, clearing and excavation, and the new construction would take place on the northbound lanes of SR 99.

The existing SR 99 bridges crossing over Broad and Mercer Streets would be demolished and removed. The bridge over Mercer Street would be replaced with either cast-in-place or precast structures. Broad Street would be closed and backfilled to grade from approximately Fifth Avenue N. to Ninth Avenue N. Mercer Street would be widened and converted into a two-way street with three lanes in each direction and a center turn lane. The new bridges at Thomas and Harrison Streets would have two lanes in each direction.

In the final phase, Traffic Stage 6, when the mainline roadway is complete, the bridges at Thomas and Harrison Streets would be built; portions of Sixth and Taylor Avenues N. and Harrison, Thomas, and Roy Streets would be restored and constructed; the northbound on-ramp from Denny Way could be built. Cul-de-sacs at John, Valley, and Aloha Streets would also be built. Finally, the utilities would be installed in their final locations. The construction of all of the Partially Lowered Aurora Option improvements would take 36 to 42 months.

**Option: Battery Street Tunnel with Curves Widened and Lowered Aurora**

With this option, in addition to the fire/life safety and seismic upgrades, both the north and south curves of the Battery Street Tunnel would be widened.
and the exterior walls would be rebuilt. The tunnel floor would also be lowered to increase the vertical clearance in the tunnel to 16.5 feet.

If the option to widen the Battery Street Tunnel curves at both tunnel portals is selected, the construction would take an additional 12 months. This is not expected to increase the overall duration of the north end construction.

In order to widen the curves, the removal of about half the lid over the Battery Street Tunnel would be necessary, requiring both the Battery Street Tunnel and Battery Street to be closed to traffic for about 12 to 18 months. At the south portal of the tunnel, the lid would be removed from the portal near First Avenue to about Fifth Avenue. At the north portal, the lid would be removed up to about Fifth Avenue. Temporary roadway decking would be placed over the Battery Street Tunnel at First, Fifth, and Sixth Avenues and Denny Way so that traffic could continue to use these cross streets during construction. Battery Street would remain open if the curves are not widened.

As a result of the widening of the curves and the shorter duration of total closure for the side-by-side tunnel alignment, the Battery Street Tunnel construction would take place over two different traffic stages and would require 24 months in Traffic Stage 3 and another 12 months later in Traffic Stage 5.

With the Lowered Aurora Option, Aurora Avenue N. would be lowered in a retained cut section with four lanes at the Battery Street Tunnel north portal and ending in the north with a six-lane, at-grade roadway north of Highland Drive.

Construction would begin with relocation of existing utilities that cross under SR 99 and run under SR 99 between Denny Way and Prospect Street. Temporary bridges would also be built to reroute traffic off Mercer and Broad Streets. While traffic (two lanes in each direction) is maintained on SR 99, the new Roy Street off-ramp and some new retaining wall construction could proceed on the west side of SR 99. Once completed, southbound traffic could be diverted to surface streets using the Roy Street off-ramp or diverted to Broad Street using the existing Broad Street off-ramp. Northbound traffic would continue to use the Battery Street Tunnel and existing SR 99. During this traffic stage, southbound SR 99 could be lowered and constructed from Mercer Street south to the Battery Street Tunnel portal, and the western spans of new bridges at Thomas, Harrison, Republican, Mercer, and Roy Streets could be built. Once the lowered southbound SR 99 is completed, northbound traffic could be diverted to the southbound side while the northbound half of SR 99 is lowered and rebuilt. The eastern spans of the bridges and the ramps at Republican Street and Denny Way could be completed at the same time. Once Broad Street and Mercer Street are filled and regraded, new portions of Sixth
Avenue N. and Republican, Harrison, and Thomas Streets could be rebuilt and reconnected to the street grid.

The improvements north of the Battery Street Tunnel (Lowered Aurora) would be constructed in Traffic Stages 2, 3, and 4 over a period of 51 months.

4.3 Elevated Structure Alternative

Construction activities for the Elevated Structure Alternative would be similar to the Tunnel Alternative and are described below. Differences include ramp configurations and the connection between the south end improvements and the new viaduct rather than a connection to a tunnel portal. The only option proposed with the Elevated Structure Alternative is the Relocated Whatcom Railyard in the south.

4.3.1 South – S. Spokane Street to S. Dearborn Street

Construction activities and durations are shown in Exhibit 4-2.

Reconfigured Whatcom Railyard

Like the stacked tunnel alignment, the Elevated Structure Alternative is matched with the Reconfigured Whatcom Railyard to include the relocated BNSF SIG Railyard rail and tracks. The tail track would be relocated from its planned location on Terminal 46 to the east side of SR 99. The construction activities would take about 6 months, concurrent with the tail track relocation activities. Once constructed, the tail track would extend from the reconfigured BNSF SIG Railyard to just south of Railroad Way S. Typical excavation methods and earth-moving equipment would be used to remove and replace the rail materials. Excavated materials and new railroad ties, ballast, and rails would be transported to and from the site by trucks, rail, and/or barges.

SR 99 At-Grade with SODO Ramps

The construction of the SODO Ramps would be generally the same as described under the Tunnel Alternative (Section 4.2.1). Access to and from the stadium/SODO area would be the same as described above for the Tunnel Alternative. The only difference would be with the Relocated Whatcom Railyard Option, which would provide a new on-ramp from E. Marginal Way to southbound SR 99 south of S. Atlantic Street.

Soil Improvements

Soil (or ground) improvements would also be required for the Elevated Structure Alternative in the south where elevated structures and retained fills are proposed. The soil improvement methods necessary for the Reconfigured Whatcom Railyard and the SODO Ramps would be the same as described under the Tunnel Alternative in Section 4.2.1.
Aerial Structure Construction

The drilled shaft, driven piles and pile caps, columns and crossbeams, and superstructure construction methods are described in the Tunnel Alternative (Section 4.2.1).

Option: Relocated Whatcom Railyard

As described above, the Relocated Whatcom Railyard Option would provide a new on-ramp from E. Marginal Way to southbound SR 99 south of S. Atlantic Street. The construction of the Relocated Whatcom Railyard Option would require the removal of the Whatcom Railyard, portions of the existing BNSF SIG Railyard, and the existing tail track. This would include removing the existing railroad ballast, creosote rail ties, and steel rails, as well as minor grading. The excavated materials from track removal activities would be reused to the extent practicable; however, it is assumed that most of this material would be removed and disposed of at an appropriate facility.

Excavation and earth-moving equipment would be used to remove and replace the rail materials. Excavated materials and new railroad ties, ballast, and rails would be transported to and from the site by trucks, rail, and/or barges. The construction time for the tail track relocation in Traffic Stage 1 would be about 6 months, and the relocation of the Whatcom Railyard in Traffic Stage 3 would take about 6 months.

4.3.2 Central – S. Dearborn Street to Battery Street Tunnel

Replacing the Viaduct

In the central project area, the Elevated Structure Alternative would involve construction of a new viaduct from S. Dearborn Street to the Battery Street Tunnel. Construction activities and durations are shown in Exhibit 4-4. Exhibit 4-10 shows the construction steps for the Elevated Structure Alternative.

From S. Dearborn Street to Union Street, the existing double-level viaduct would be entirely replaced with a wider double-level viaduct in approximately the same location. The new components would include drilled shafts, columns, crossbeams, precast concrete girders, and roadway decking. It is anticipated that many of the new viaduct components would be constructed of precast or cast-in-place concrete and/or steel. The southbound SR 99 transition structure from S. Royal Brougham Way to S. King Street would be constructed in Traffic Stage 3. The northbound SR 99 transition structure would be built in Traffic Stage 5 after the existing viaduct is demolished.
Elevated Structure Construction Steps

**STEP 1**
1. Construct new drilled shafts and columns.

**STEP 2**
1. Restrict traffic to two lanes in each direction.
2. Construct lower level temporary widening for entire length of double-level viaduct.

**STEP 3**
1. Demolish the viaduct upper level. Approximate duration: 3 months.

**STEP 4**
1. Shift traffic to lower level.
2. Construct new upper level.
3. Use night closures to set precast girders.

**STEP 5**
1. Shift all traffic to new upper level.
2. 2 lanes in each direction.
3. Demolish remaining lower viaduct deck.

**STEP 6**
1. Construct new lower level.
2. Shift southbound traffic to lower level.

Exhibit 4-10
Foundations for the new structure would be constructed outside of the existing viaduct foundations, resulting in a wider structure. Large-diameter drilled shafts would likely be used to support the elevated structure. Soil improvements would be performed around each foundation south of S. Jackson Street.

The existing ramps at Columbia and Seneca Streets would be rebuilt using drilled shaft foundations and MSE wall approach fills.

The double-level viaduct would continue north and transition to a side-by-side roadway near Pike Street. The existing viaduct between Pike Street and the Battery Street Tunnel would be replaced with an aerial structure as described for the Tunnel Alternative. The SR 99 Over Elliott and Western Option would carry SR 99 traffic over the BNSF railroad tracks and over Elliott and Western Avenues before tying into the Battery Street Tunnel. The aerial (bridge) structures would require drilled shafts for the bridge abutments and piers. A portion of the north portal would be supported by an MSE wall. Although the Elevated Structure Alternative requires less excavation than the Tunnel Alternative, an estimated 1,313,000 cubic yards of soil would need to be excavated for the construction of the new structure. Vent structures would be built near the south and north portals of the Battery Street Tunnel.

Construction of this section would take 62 months for the Elevated Structure Alternative with the longer plan. The construction of the aerial structures would require similar equipment as described above in the south section for building the aerial streets as part of the SODO Ramps (see Section 4.2.1).

Replacing the Seawall

The Elevated Structure Alternative would remove and rebuild the seawall from S. Jackson Street up to Broad Street, which would take about 39 months. The following construction activities would take place in areas where the seawall would be replaced and rebuilt.

Pier 48 Bulkhead – S. Jackson to S. Washington Streets

There is a small section of failing bulkhead in the area between S. Jackson and S. Washington Streets (Pier 48 uplands area) that would be replaced. The description of the construction methods is the same as described under the Tunnel Alternative (Section 4.2.2 under Seawall at Colman Curve). The proposed seawall would connect to the new Pier 48 bulkhead approximately 35 feet seaward of the existing gravity seawall and would extend north to the Colman Dock area. The proposed seawall would likely be either a sheet pile or secant pile wall. In this area, the top of the proposed seawall would have a sidewalk that cantilevers seaward approximately 8 feet.
Pile-Supported Gravity Seawall – S. Washington to Madison Streets

A pile-supported gravity seawall extends from approximately S. Washington Street to Madison Street. There are four sections of pile-supported gravity seawall. See Exhibit 4-11 for the Pile-Supported Gravity Seawall section drawing, which shows the construction of this type of seawall.

In the Colman Curve area (between S. Washington Street and Yesler Way), the seawall would be built approximately 35 feet out into Elliott Bay beyond the existing seawall to allow for the wider Elevated Structure Alternative’s alignment.

Most of the construction to rebuild the seawall would take place slightly landward of the existing seawall. After jet grouting (or another soil strengthening method) is completed behind the existing seawall, top portions of the unreinforced concrete gravity wall would be removed and replaced with sloping riprap material to create additional water surface area. A sheet pile wall or other BMP would be used to protect Elliott Bay water quality during this construction. The construction activities for this would begin in Traffic Stage 1 and would go through Traffic Stage 2 for an overall period of 12 months.

Type B Seawall – Madison to Union Streets

The rebuild of the Type B Seawall applies to the seawall portion between Madison Street and Union Street. The existing concrete seawall would be replaced with a new reinforced concrete L-wall structure and cantilevered sidewalk. (See Exhibit 4-8 for Type B Seawall – L-wall construction and Exhibit 4-12 for the pile-supported cantilevered sidewalk section with L-wall construction.) The L-wall construction eliminates the need to use drilled shafts as described in the Draft EIS. Most of the construction to rebuild this section of the seawall would take place slightly landward of the existing seawall. This construction section would take approximately 12 months.

The soils behind the seawall would be strengthened through jet grouting. The existing exposed sheet pile wall would be removed by cutting it off at the mudline and replacing it with a new reinforced concrete face. A sheet pile wall is the most likely BMP to be used to protect water quality during Type B Seawall construction.

Alaskan Way Surface Street

The Alaskan Way surface street between S. Holgate Street and Pike Street would be relocated to a temporary street (one lane in each direction) under the existing viaduct during the seawall construction. Once seawall construction is complete, a temporary Alaskan Way surface street would be constructed above the seawall. At the end of the project construction, the permanent Alaskan Way surface street improvements would be constructed. These would include the replacement of the single streetcar tracks, sidewalks, the new roadway, and bicycle lanes on both the east and west sides.
Pile-Supported Gravity Seawall

Concrete Cantilever

Existing Gravity Seawall

Slope Protection

Excavation and Fill

Shoring

L-Wall

Jet Grouting
4 feet into competent soils

Liquifiable Soil

Soft Soil

Competent Soil

Exhibit 4-11
For the duration of the project, most of the on-street parking and parking under the existing viaduct would be eliminated.

The construction methods for the replacement of the Alaskan Way surface street would be similar to those described under the Tunnel Alternative in Section 4.2.2. It would take about 6 months to replace Alaskan Way for the Elevated Structure Alternative. The waterfront streetcar tracks would be removed until Traffic Stage 7, when the surface street is restored.

4.3.3 North Waterfront – Pine Street to Broad Street

In the north waterfront, the Elevated Structure Alternative includes the rebuilding of the seawall and the reconstruction of the Alaskan Way surface street above the rebuilt seawall. Sections 4.2.3 and 4.3.2 describe seawall construction.

Replacing the Seawall

The Type A Seawall rebuild applies to the seawall portion between Union Street and Broad Street (see Exhibit 4-7 for Type A Seawall – L-wall construction). The Type A Seawall replacement is generally the same as the description for the Type B Seawall above in Section 4.3.2. New concrete face panels may replace the existing concrete face wall. Near Pier 66, between Blanchard and Battery Streets, only soil improvements would be needed as improvements have already been made as part of the Bell Harbor construction in the early 1990s.

4.3.4 North – Battery Street Tunnel to Comstock Street

The Battery Street Tunnel improvements and Partially Lowered Aurora Option for the Elevated Structure Alternative are the same as those for the Tunnel Alternative described above in Section 4.2.4. Construction activities in the north section would also be the same as those described for the Tunnel Alternative, although the length of time it would take to build these components varies depending on the construction plan selected, as shown in Exhibit 4-9.

4.4 Construction Mitigation

During construction, the Alaskan Way Viaduct and Seawall Replacement Project would affect the project corridor for approximately 7 to 10 years depending on the alternative selected and the construction plan that is used (shorter plan, intermediate plan, or longer plan).

Both the Draft EIS and this Supplemental Draft EIS discuss potential measures that could be used to mitigate negative construction effects, such as parking loss; changes in access and mobility in the project area; and noise, dust, and general disruption in circulation patterns. After reviewing public and agency comments on both documents, the project team will prepare more specific mitigation
measures to address identified construction effects. Opportunities for public and agency review of many of the mitigation elements will be provided. The project partners will finalize the list of mitigation measures and commit to their implementation in the Final EIS and the Record of Decision issued by the Federal Highway Administration (FHWA).

Some of these mitigation measures will be included in formal mitigation plans and others may become permit conditions. These plans will include the Construction Transportation Management Plan (which includes parking); noise; business and residential mitigation; historic and cultural resources; and fisheries, aquatic resources, and water quality.

Mitigation measures and plans will be developed by considering effects to adjacent and nearby properties in terms of severity and length of effects. The mitigation measures and plans will be tailored to the various construction stages and varying levels of effect over time as appropriate.

Construction activities, especially along the central waterfront, would likely interfere with access to businesses and properties adjacent to the project on either side of the right-of-way. A primary goal of construction planning is to maintain adequate access to all businesses so they can continue to operate. As construction phasing and staging is refined, it may be determined on a case-by-case basis that it is neither reasonable nor feasible to maintain access to some businesses. If adequate access cannot be maintained, impacts to affected businesses will be mitigated under policies to be identified in the project’s Business Mitigation Plan. If provisions of the Uniform Relocation Act are met, then relocation assistance would be provided.

The project is now only at a preliminary level of design, and it is still too early to define specific mitigation measures for each area of impact. Potential construction mitigation measures have been identified and are described in accompanying technical appendices. The construction transportation management strategies are described briefly in Section 2.2.1. For a list of the strategies included in the Construction Transportation Management Plan, see Section 6.4.1 of the 2006 Supplemental Draft EIS Appendix C, Transportation Discipline Report. Specific mitigation measures will be described in more detail in the Final EIS.
Chapter 5 CONSTRUCTION ACTIVITIES AND DURATIONS

The following text describes possible construction sequences for the Tunnel (Preferred) and Elevated Structure Alternatives. These construction durations have been developed as estimates based on what is known about the design at this time.

Although the longer plan is carried forward from the Draft EIS for evaluation with the Elevated Structure Alternative, the addition of the intermediate plan and shorter plan is an important development in the project since the Draft EIS was issued.

In the Draft EIS, the construction phasing was based on the construction assumption that two lanes in each direction of SR 99 and/or the Alaskan Way surface street would remain open throughout most of construction. In addition, SR 99 could be closed to traffic for up to 10 weeks during the summer months, along with numerous shorter closures.

After considering feedback and requests from the public and businesses, as well as changes to the proposed project, the lead agencies decided to evaluate additional construction plans that would shorten the overall construction period in this Supplemental Draft EIS. These plans look at closing SR 99 and Alaskan Way surface street for extended periods to minimize the total construction time.

Each alternative, alignment, option, and/or construction plan has a set of traffic stages that represent significant changes to the traffic flow and routing, such as detours or closures. Each traffic stage encompasses construction activities that must be completed prior to moving into the next traffic stage and subsequent construction activities. For greater detail on traffic movements and the construction effects on traffic in the project area, please refer to the 2006 Supplemental Draft EIS Appendix C, Transportation Discipline Report.

Both tunnel alignments (side-by-side and stacked) are evaluated with the two new construction plans—the intermediate plan and the shorter plan. The Elevated Structure Alternative and its option continue to be evaluated using the longer plan.

Exhibit 5-1 indicates the estimated construction duration, including 30 months for the initial utility relocation. These durations are also based on the construction assumptions described in Section 4.1 under Construction Elements Common to the Tunnel and Elevated Structure Alternatives. All construction durations are approximate at this time. The construction durations will be updated in the Final EIS.
### Exhibit 5-1. Construction Duration Overview (Traffic Stage 1 through Completion)

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Construction Duration (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shorter Plan</td>
</tr>
<tr>
<td>Tunnel Alternative</td>
<td></td>
</tr>
<tr>
<td>Stacked Tunnel Alignment</td>
<td>7.0</td>
</tr>
<tr>
<td>Side-by-Side Tunnel Alignment</td>
<td>7.0</td>
</tr>
<tr>
<td>Elevated Structure Alternative</td>
<td>n/a</td>
</tr>
</tbody>
</table>

n/a means that the construction plan was not evaluated with the alignment in this document.

### 5.1 Traffic Stage 1 (All Construction Plans)

Traffic Stage 1 is essentially the same for both the shorter plan and the intermediate plan for the Tunnel Alternative and the longer plan for the Elevated Structure Alternative. Each of the construction plans would take approximately 30 months (2.5 years) to perform the initial utility relocations and preliminary site work activities needed during Traffic Stage 1.

Construction activities in Traffic Stage 1 would not disrupt or change the existing traffic flow on SR 99. However, traffic on the Alaskan Way surface street would be reduced to one lane in each direction, the surface street would be shifted to the east under the existing viaduct, or Alaskan Way could be closed when required by the construction activities.

Traffic Stage 1 is set up primarily to allow for the initial relocation of utilities but also allows other early site improvements that create minimal conflict with the initial utility relocations. These early site improvements include in-water work at Colman Curve, relocation of the tail track, Whatcom Railyard modifications (for either design option in the south section), removal of the waterfront streetcar track, soil improvements for the SODO Ramps, construction of the seawall and west wall of the tunnel, and other associated activities.

Exhibit 5-2 provides a listing of the major activities to occur during Traffic Stage 1 that apply to both alternatives.
5.1.1 Initial Utility Relocations

The initial utility alignments and construction sequences are still conceptual and are subject to change.

Traffic Stage 1 generally addresses initial relocation of utilities and other preliminary site work, as shown in Exhibit 5-2. The initial utility moves are those relocations (temporary or permanent) that would be required for construction during Traffic Stages 2 and 3. This move is primarily a temporary relocation of existing utilities, although wherever possible, these utilities would be moved to permanent locations. Other temporary or permanent utility relocations would likely be ongoing through subsequent traffic stages.

**South and Central sections** – South of Pike Street, the utilities would be temporarily relocated under the existing viaduct and/or east of the viaduct to allow for seawall construction in both alternatives. It should be noted that utility pole placement on overhead poles may still need to be considered for temporary relocation of the transmission lines (landside or waterside).

**North Waterfront** – Between Pike Street and Broad Street along Alaskan Way, the utilities would likely be temporarily relocated under the existing east sidewalk, streetcar track bed, and/or the northbound lanes of the existing
street to allow space along the existing seawall for the new seawall construction and associated soil improvements.

North – Traffic Stage 1 also includes temporary and permanent utility relocations required for the construction activities of the temporary structures and the improvements along the west half of Aurora Avenue N.

5.1.2 Preliminary Construction Activities

Remove Existing Parking
Prior to the temporary utility relocations along the waterfront (S. Holgate Street to Broad Street), the existing parking under the viaduct as well as the on-street parking would be removed to allow for the temporary utility relocations. Removal of parking under the viaduct might occur prior to the temporary utility relocations in Traffic Stage 1. Although the project assumes a 30-month duration for the initial utility relocations, some of the relocations may occur earlier than the assumed start date if a receiving area is available and any necessary permits are obtained.

Temporary Ferry Holding Site and Colman Dock Access
Colman Dock Ferry Terminal traffic would be rerouted during construction. A temporary access bridge would be built between Pier 48 and the existing Colman Dock Ferry Terminal. This temporary over-water bridge would be used during construction and removed after construction. Additionally, ferry holding would be relocated to a holding area east of SR 99. This construction would take place over a 3-month period for both the temporary over-water bridge section and related activities.

Waterfront Streetcar
The waterfront streetcar tracks must be removed prior to utility relocations in Traffic Stage 1. Mitigation for removing the streetcar will be considered as part of the Construction Transportation Management Plan.

Reconfigured or Relocated Whatcom Railyard and Tail Track
The tail track for Whatcom Railyard would be reconfigured or relocated early in Traffic Stage 1 to accommodate the initial utility relocation. Construction activities such as the soil improvements for the west half of the SODO Ramps and the secant pile wall/seawall in the central section could be performed while using only temporary lane closures on the surface streets during Traffic Stage 1.
5.2 Tunnel Alternative (Preferred Alternative)

5.2.1 Shorter Plan Construction Sequencing

For the Tunnel Alternative, both the stacked tunnel and the side-by-side tunnel alignments have the same traffic stages for the shorter plan, so both alignments are addressed together in this section. The bulk of the improvements for both alignments would be constructed during a complete closure of the north-south traffic through the corridor. SR 99 would be closed, and except for east-west access to waterfront businesses, the Alaskan Way surface street would be closed.

Traffic Stage 1 – Site Preparation (30 months)

In addition to the construction activities shown in Exhibit 5-2, the following construction activities would start or take place in Traffic Stage 1:

- Install a temporary in-water wall at Colman Curve—a steel sheet pile wall or equivalent measure to separate Elliott Bay waters from the tunnel construction/secant pile wall.
- Start construction of the tunnel wall/seawall (probably a secant pile wall).
- Construct any major city street improvements outside the AWV Corridor that are needed for traffic diversions or closures. Currently these improvements have not been identified.
- Construct the BNSF retaining wall between Pike Street and the Battery Street Tunnel (both stacked and side-by-side tunnel alignments).
- Construct the temporary bridges at Thomas and John Streets over Aurora Avenue N. (side-by-side tunnel alignment only).

These activities can be performed prior to closure of the corridor, which then minimizes the corridor closure duration in Traffic Stage 2.

Traffic Stage 2 – Construction with SR 99 Closure (42 months)

Traffic Stage 2 with the shorter plan would detour both the northbound and southbound SR 99 traffic out of the existing corridor and onto the existing city streets.

Northbound SR 99 – The northbound traffic would be diverted off the corridor south of S. Spokane Street, and southbound traffic would be diverted off the corridor north of the Battery Street Tunnel. Both northbound and southbound SR 99 would filter through the city street grid using the existing north-south streets or I-5.

Southbound SR 99 – South of S. Spokane Street, southbound SR 99 traffic could enter back onto the existing SR 99 (at First Avenue S.). North of the Battery
Street Tunnel, the northbound SR 99 traffic could enter back onto the existing SR 99/Aurora Avenue N at Denny Way.

*Aurora Avenue N.* – Between Denny Way and Comstock Street, three lanes of traffic would be maintained, two in one direction and one in the other direction, during construction of the Partially Lowered Aurora Option (with the stacked tunnel [preferred] alignment) or the Lowered Aurora Option with the side-by-side tunnel.

*Alaskan Way* – The Alaskan Way surface street would be closed except for east-west access to waterfront businesses.

Construction durations are outlined in Exhibit 5-3.

**Exhibit 5-3. Traffic Stage 2 – Shorter Plan – Tunnel Alternative Construction Activities and Durations**

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Durations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Duration – Traffic Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Concurrent Major Activities in Traffic Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td>Build elevated SODO Ramps</td>
<td>24 months</td>
</tr>
<tr>
<td>Complete secant pile seawall (S. Jackson to Pike Streets)</td>
<td>9 months</td>
</tr>
<tr>
<td>Build stacked tunnel (S. Jackson to University Streets)</td>
<td>42 months</td>
</tr>
<tr>
<td>Build side-by-side tunnel</td>
<td>42 months</td>
</tr>
<tr>
<td>Build bridge over BNSF tracks (Pike to Lenora Streets)</td>
<td>21 months</td>
</tr>
<tr>
<td>Excavate retained cut for Under Elliott and Western Avenues</td>
<td>27 months</td>
</tr>
<tr>
<td>Build Elliott and Western Avenue overpasses</td>
<td>15 months</td>
</tr>
<tr>
<td>Build aerial structure (Pike Street to Battery Street Tunnel)</td>
<td>36 months</td>
</tr>
<tr>
<td>Make Battery Street Tunnel improvements</td>
<td>24 months</td>
</tr>
<tr>
<td>Start improvements north of Battery Street Tunnel</td>
<td>42 months</td>
</tr>
<tr>
<td>Partially Lowered Aurora Option</td>
<td>36 months</td>
</tr>
<tr>
<td>Lowered Aurora Option</td>
<td>42 months</td>
</tr>
<tr>
<td>Rebuild seawall (Union Street to Broad Street)</td>
<td>18 months</td>
</tr>
</tbody>
</table>

**Traffic Stage 3 – Final Traffic Stage for Shorter Plan (12 Months)**

Alaskan Way and SR 99 traffic would be moved into their final configurations from S. Spokane Street to Denny Way, and surface restoration and urban design features would be completed. During this time, SR 99 would be open to traffic and Alaskan Way would be periodically reduced to one lane in each direction with the possibility of occasional closures.
Construction activities during northbound SR 99 closure are listed in Exhibit 5-4.

Exhibit 5-4. Traffic Stage 3 – Shorter Plan – Tunnel Alternative Construction Activities and Durations

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Durations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 3</td>
<td>Stacked</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 3</td>
<td>Side-by-Side</td>
</tr>
<tr>
<td>Continue improvements north of Battery Street Tunnel –</td>
<td>12 months</td>
</tr>
<tr>
<td>(Lowered Aurora Option only with the side-by-side tunnel)</td>
<td>12 months</td>
</tr>
<tr>
<td>Restore surface street</td>
<td>12 months</td>
</tr>
<tr>
<td>Close out project</td>
<td>12 months</td>
</tr>
</tbody>
</table>

5.2.2 Intermediate Plan Construction Sequencing – Stacked Tunnel Alignment

Traffic Stage 1 – Site Preparation (30 months)

See the description under Section 5.1.1, Traffic Stage 1. In addition to the construction activities shown in Exhibit 5-2, the following construction activities would start or take place in Traffic Stage 1.

- Install a temporary in-water wall at Colman Curve—a steel sheet pile wall or equivalent measure to separate Elliott Bay waters from the tunnel construction/secant pile wall.
- Start construction of tunnel wall/seawall (a secant pile wall).
- Construct any major city street improvements outside the corridor that are needed for traffic diversions or closures. Currently these improvements have not been identified.

Traffic Stage 2 – Construction of Seawall and Stacked Tunnel (9 months)

During Traffic Stage 2, traffic would be configured generally the same as in Traffic Stage 1 except that the Western Avenue off-ramp would be closed for the temporary Bell Street Overpass construction. The Bell Street Overpass would be built as a temporary bridge in the footprint of the existing northbound off-ramp from Western Avenue, crossing over Elliott and Western Avenues to carry SR 99 traffic. Except for the closure of the Western Avenue off-ramp, SR 99 traffic would remain on the viaduct in its existing configuration. Alaskan Way surface street would be closed to through north-south traffic, but east-west local access to the waterfront businesses would be provided.

Construction activities and durations are outlined in Exhibit 5-5.
### Exhibit 5-5. Traffic Stage 2 – Intermediate Plan – Stacked Tunnel Alignment

#### Construction Activities and Durations

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 2</td>
<td>9 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 2</td>
<td></td>
</tr>
<tr>
<td>Start west half of elevated SODO Ramps</td>
<td>9 months</td>
</tr>
<tr>
<td>Start stacked tunnel (S. Jackson to University Streets)</td>
<td>9 months</td>
</tr>
<tr>
<td>Complete secant pile seawall construction (S. Jackson to Pike Streets)</td>
<td>9 months</td>
</tr>
<tr>
<td>Build BNSF retaining wall (Pike Street to Battery Street Tunnel)</td>
<td>9 months</td>
</tr>
<tr>
<td>Build Bell Street Overpass</td>
<td>9 months</td>
</tr>
</tbody>
</table>

#### Traffic Stage 3 – Removal of Southbound Viaduct – Pike Street to Battery Street Tunnel (15 months)

During the 15 months of Traffic Stage 3, construction of the southbound aerial structure and the southbound underpass (under Elliott and Western Avenues) would begin. The west half of the SODO Ramps construction would be completed.

Traffic would be in the following general configuration:

**Northbound SR 99:**

- Two lanes would remain open between S. Spokane Street and Denny Way.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.

**Southbound SR 99:**

- Two lanes would remain open between S. Spokane Street and the Columbia Street on-ramp.
- All southbound lanes would be closed from Columbia Street to Denny Way for construction activities between Pike Street and the Battery Street Tunnel. This would also allow other elements to be built during this traffic stage.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.
Alaskan Way Surface Street:

- Alaskan Way surface street would be closed to through north-south traffic, but local access across the corridor to the waterfront businesses would be provided.

The construction activities and durations are summarized in Exhibit 5-6.

**Exhibit 5-6. Traffic Stage 3 – Intermediate Plan – Stacked Tunnel Alignment Construction Activities and Durations**

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Duration – Traffic Stage 3</strong></td>
<td>15 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 3</td>
<td></td>
</tr>
<tr>
<td>Complete west half of elevated SODO Ramps</td>
<td>9 months</td>
</tr>
<tr>
<td>Continue stacked tunnel</td>
<td>15 months</td>
</tr>
<tr>
<td>Remove existing southbound viaduct – Pine Street to Battery Street Tunnel</td>
<td>6 months</td>
</tr>
<tr>
<td>Start southbound tunnel under Elliott and Western Avenues</td>
<td>15 months</td>
</tr>
<tr>
<td>Start improvements north of Battery Street Tunnel (Partially Lowered Aurora)</td>
<td>15 months</td>
</tr>
</tbody>
</table>

**Traffic Stage 4 – Close SR 99, Remove Viaduct, Start Stacked Tunnel Transitions and Battery Street Tunnel Improvements, and Complete Southbound SR 99 from S. Spokane Street to Denny Way (27 months)**

Traffic Stage 4 includes the majority of the construction activities that can be constructed concurrently due to the 27 months of SR 99 closure. This construction stage allows the section of the existing viaduct between S. Holgate Street and the Battery Street Tunnel to be removed and the east half of the SODO Ramps to be completed. Both the northbound and southbound bridges over the tail track would be built, and the stacked tunnel transitional structures would be built.

Traffic would be configured as follows:

- SR 99 would be closed between S. Spokane Street and Denny Way for 27 months.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.
- Alaskan Way surface street would be closed to through north-south traffic, but local east-west access across the corridor to the waterfront businesses would be maintained.
Construction activities and durations during complete closure of SR 99 are listed in Exhibit 5-7.

**Exhibit 5-7. Traffic Stage 4 – Intermediate Plan – Stacked Tunnel Alignment Construction Activities and Durations**

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Total Duration – Traffic Stage 4</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrent Major Activities in Traffic Stage 4</td>
<td>27 months</td>
<td>27 months</td>
</tr>
<tr>
<td>Remove remaining existing viaduct (S. Holgate Street to Battery Street Tunnel)</td>
<td></td>
<td>6 months</td>
</tr>
<tr>
<td>Complete east half of SODO Ramps</td>
<td></td>
<td>24 months</td>
</tr>
<tr>
<td>Complete northbound and southbound tail track bridges</td>
<td></td>
<td>9 months</td>
</tr>
<tr>
<td>Complete southbound tunnel (S. Royal Brougham Way to Pike Street)</td>
<td></td>
<td>27 months</td>
</tr>
<tr>
<td>Complete southbound bridge over BNSF tracks</td>
<td></td>
<td>18 months</td>
</tr>
<tr>
<td>Start northbound bridge over BNSF tracks</td>
<td></td>
<td>12+ months</td>
</tr>
<tr>
<td>Complete tunnel Under Elliott and Western Avenues</td>
<td></td>
<td>18 months</td>
</tr>
<tr>
<td>Start Battery Street Tunnel improvements – Lower roadway</td>
<td></td>
<td>27 months</td>
</tr>
<tr>
<td>Complete improvements north of Battery Street Tunnel (Partially Lowered Aurora)</td>
<td></td>
<td>21 months</td>
</tr>
<tr>
<td>Start rebuilding seawall north of Union Street</td>
<td></td>
<td>3 months</td>
</tr>
</tbody>
</table>

**Traffic Stage 5 – Open New Southbound SR 99 Roadway (S. Spokane Street to Denny Way); New Northbound SR 99 Closed for Completion of Tunnel Finishes (12 months)**

Traffic Stage 5 includes the continued reconstruction of the seawall north of Union Street. The northbound stacked tunnel would be completed, along with the northbound half of the Battery Street Tunnel reconstruction. The final utility relocation would also take place during Traffic Stage 5.

Traffic would be configured as follows:

Northbound SR 99:
- SR 99 would be open from Spokane Street to S. King Street.
- SR 99 would be closed from S. King Street to Denny Way.
- SR 99 north of Denny Way would be completed and open to traffic.

Southbound SR 99:
- SR 99 would be open between S. Spokane Street and Denny Way.
- SR 99 north of Denny Way would be completed and open to traffic.
Alaskan Way surface street:

- Alaskan Way surface street would be closed to through north-south traffic, but local east-west access across the corridor to the waterfront businesses would be maintained.

Construction activities and durations during the northbound closure of SR 99 are listed in Exhibit 5-8.

Exhibit 5-8. Traffic Stage 5 – Intermediate Plan – Stacked Tunnel Alignment
Construction Activities and Durations

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 5</td>
<td>12 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 5</td>
<td></td>
</tr>
<tr>
<td>Continue rebuilding seawall north of Pike Street</td>
<td>12 months</td>
</tr>
<tr>
<td>Complete northbound tunnel (vent buildings, tunnel finishes, mechanical and electrical)</td>
<td>12 months</td>
</tr>
<tr>
<td>Complete northbound Battery Street Tunnel improvements (vent buildings, tunnel finishes, mechanical and electrical)</td>
<td>12 months</td>
</tr>
<tr>
<td>Complete final utility relocation</td>
<td>12 months</td>
</tr>
</tbody>
</table>

Traffic Stage 6 – Traffic Directed to Final Configuration with Surface Restoration and/or Completion of Urban Design Features (12 months)

Alaskan Way and SR 99 traffic would be moved into their final configurations from S. Spokane Street to Denny Way, and surface restoration and urban design features would be completed. During this time, SR 99 would be open to traffic and Alaskan Way would be periodically reduced to one lane in each direction with the possibility of occasional closures.

Traffic Stage 6 construction activities and durations are listed in Exhibit 5-9.

Construction Activities and Durations

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 6</td>
<td>12 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 6</td>
<td></td>
</tr>
<tr>
<td>Complete seawall rebuild north of Pike Street</td>
<td>3 months</td>
</tr>
<tr>
<td>Restore surface street</td>
<td>12 months</td>
</tr>
<tr>
<td>Close out project</td>
<td>12 months</td>
</tr>
</tbody>
</table>
5.2.3 Intermediate Plan Construction Sequencing – Side-by-Side Tunnel Alignment

Traffic Stage 1 – Site Preparation (30 Months)

In addition to the construction activities shown in Exhibit 5-2, the following construction activities would start or take place in Traffic Stage 1:

- Install a temporary in-water wall at Colman Curve—a steel sheet pile wall or equivalent measure would be used to separate Elliott Bay waters from the tunnel construction/secant pile wall.
- Start construction of the tunnel wall/seawall (a secant pile wall).
- Construct any major city street improvements outside the AWV Corridor that are needed for traffic diversions or closures. Currently these improvements have not been identified.

Traffic Stage 2 – Construction of Southbound Tunnel and SR 99 Detour Routes (12 months)

During Traffic Stage 2, traffic would be configured basically the same as in Traffic Stage 1, except that the SR 99 Western Avenue off-ramp would be closed for the temporary Bell Street Overpass construction.

Except for the closure of the SR 99 Western Avenue off-ramp, SR 99 would remain on the viaduct in its existing configuration. Alaskan Way surface street would be closed to through north-south traffic, but local access across the corridor to the waterfront businesses would be provided.

Construction activities and durations are listed in Exhibit 5-10.

**Exhibit 5-10. Traffic Stage 2 – Intermediate Plan – Side-By-Side Tunnel Alignment Construction Activities and Durations**

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Total Duration – Traffic Stage 2</th>
<th>Concurrent Major Activities in Traffic Stage 2</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start west half of elevated SODO Ramps</td>
<td>12 months</td>
<td>12 months</td>
<td></td>
</tr>
<tr>
<td>Start southbound tunnel (S. Royal Brougham Way to Pike Street)</td>
<td>12 months</td>
<td>12 months</td>
<td></td>
</tr>
<tr>
<td>Complete secant pile seawall construction (S. Jackson Street to Pike Street)</td>
<td>12 months</td>
<td>12 months</td>
<td></td>
</tr>
<tr>
<td>Build BNSF retaining wall (Pike Street to Battery Street Tunnel)</td>
<td>9 months</td>
<td>9 months</td>
<td></td>
</tr>
<tr>
<td>Build Bell Street Overpass</td>
<td>9 months</td>
<td>9 months</td>
<td></td>
</tr>
<tr>
<td>Build temporary bridges over Aurora north of Battery Street Tunnel</td>
<td>9 months</td>
<td>9 months</td>
<td></td>
</tr>
<tr>
<td>Start west half of Lowered Aurora improvements</td>
<td>3 months</td>
<td>3 months</td>
<td></td>
</tr>
<tr>
<td>Construct First Avenue S. Detour</td>
<td>6 months</td>
<td>6 months</td>
<td></td>
</tr>
</tbody>
</table>
Traffic Stage 3 – Demolition of Southbound Viaduct – Pike Street to Battery Street Tunnel (12 Months)

In Traffic Stage 3, construction of the southbound aerial structure from Pike Street to the Battery Street Tunnel, the north and southbound Battery Street Tunnel improvements (fire/life safety, lowering the roadway to increase the clearance), and the vent buildings would all be started. In addition, the west half of the SODO Ramps and the southbound tunnel structural elements would be completed.

During the 12 months of Traffic Stage 3 construction, traffic would be in the following general configuration:

Northbound SR 99:
- Between S. Spokane Street and Railroad Way S., SR 99 would be closed. SR 99 traffic would be reduced to two lanes and diverted from SR 99 to the First Avenue S. Detour.
- Between Railroad Way S. and Denny Way, SR 99 would be open on the existing viaduct.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.

Southbound SR 99:
- SR 99 would be closed from S. Spokane Street to Denny Way.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.

Alaskan Way surface street:
- Alaskan Way surface street would be closed to through north-south traffic, but local access would be provided across the corridor to the waterfront businesses.

Construction activities and durations for Traffic Stage 3 are listed in Exhibit 5-11.


<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 3</td>
<td></td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 3</td>
<td>12 months</td>
</tr>
<tr>
<td>Complete west half of elevated SODO Ramps</td>
<td>6 months</td>
</tr>
<tr>
<td>Relocate Whatcom Railyard</td>
<td>9 months</td>
</tr>
<tr>
<td>Complete southbound tunnel</td>
<td>12 months</td>
</tr>
<tr>
<td>Remove existing southbound viaduct – Pike Street to Battery Street Tunnel</td>
<td>6 months</td>
</tr>
<tr>
<td>Remove existing stacked viaduct – Railroad Avenue to S. Holgate Street</td>
<td>6 months</td>
</tr>
<tr>
<td>Start southbound aerial structure (Pike Street to Battery Street Tunnel)</td>
<td>9 months</td>
</tr>
</tbody>
</table>

SR 99: Alaskan Way Viaduct & Seawall Replacement Project
Alternatives Description and Construction Methods Technical Memorandum
Supplemental Draft EIS

July 2006 99
Construction Activities and Durations (continued)

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 3</td>
<td>12 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 3</td>
<td></td>
</tr>
<tr>
<td>Start northbound Battery Street Tunnel improvements (Sixth Avenue N. to John Street –</td>
<td>12 months</td>
</tr>
<tr>
<td>northbound only)</td>
<td></td>
</tr>
<tr>
<td>Start southbound Battery Street Tunnel improvements – Lower roadway</td>
<td>12 months</td>
</tr>
<tr>
<td>Continue improvements north of Battery Street Tunnel (west half of Lowered Aurora)</td>
<td>12 months</td>
</tr>
<tr>
<td>Start rebuilding seawall north of Pike Street</td>
<td>18 months</td>
</tr>
</tbody>
</table>

Traffic Stage 4 – Complete Closure of SR 99 (18 months)

During Traffic Stage 4, improvements in the Battery Street Tunnel and the new southbound roadway, southbound tunnel, and southbound aerial structure would all be completed. In addition, during the complete closure, the viaduct would be removed and the northbound tunnel (S. King Street to Pike Street) would be started. Construction of southbound SR 99 from S. Spokane Street to Denny Way would be completed.

During the 18 months of Traffic Stage 4 construction, traffic would be in the following configuration:

- SR 99: From S. Spokane Street to Denny Way, the SR 99 corridor would be closed with traffic diverted to city streets.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.
- Alaskan Way surface street would be closed to through north-south traffic, but local access would be provided across the corridor to the waterfront businesses.

Construction activities and durations for Traffic Stage 4 are listed in Exhibit 5-12.

Traffic Stage 5 – Open New Southbound Roadway to Southbound SR 99 Traffic; New Northbound SR 99 Remains Closed until Completion of Tunnel Finishes (12 months)

During the 12 months of Traffic Stage 5 construction, traffic would be in the following general configuration:

Northbound SR 99:

- SR 99 would be open between S. Spokane Street and S. Atlantic Street.
- SR 99 would be closed between S. Atlantic Street and Denny Way.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.
Southbound SR 99:

- Southbound SR 99 would be open from S. Spokane Street to Denny Way.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.

Exhibit 5-12. Traffic Stage 4 – Intermediate Plan – Side-By-Side Tunnel Alignment
Construction Activities and Durations

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Duration – Traffic Stage 4</strong></td>
<td>18 months</td>
</tr>
<tr>
<td><strong>Concurrent Major Activities in Traffic Stage 4</strong></td>
<td></td>
</tr>
<tr>
<td>Complete southbound at-grade roadway (S. Hanford to King Streets)</td>
<td>6 months</td>
</tr>
<tr>
<td>Complete east half of SODO Ramps</td>
<td>12 months</td>
</tr>
<tr>
<td>Complete southbound tunnel mechanical/electrical and finishes</td>
<td>12 months</td>
</tr>
<tr>
<td>Start northbound tunnel</td>
<td>18 months</td>
</tr>
<tr>
<td>Start northbound aerial structure – Pike Street to Battery Street Tunnel</td>
<td>15 months</td>
</tr>
<tr>
<td>Complete Battery Street Tunnel improvements – north and south tunnel portals</td>
<td>15 months</td>
</tr>
<tr>
<td>Start Battery Street Tunnel vent buildings</td>
<td>6 months</td>
</tr>
<tr>
<td>Continue improvements north of Battery Street Tunnel</td>
<td>18 months</td>
</tr>
<tr>
<td>Complete seawall rebuild north of Pike Street</td>
<td>9 months</td>
</tr>
</tbody>
</table>

Alaskan Way surface street:

- Alaskan Way surface street would be closed to through north-south traffic, but local access would be provided across the corridor to the waterfront businesses.

Construction activities and durations during Traffic Stage 5 are listed in Exhibit 5-13.

Construction Activities and Durations

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Duration – Traffic Stage 5</strong></td>
<td>12 months</td>
</tr>
<tr>
<td><strong>Concurrent Major Activities in Traffic Stage 5</strong></td>
<td></td>
</tr>
<tr>
<td>Complete northbound single-level tunnel (vent buildings, tunnel finishes,</td>
<td>12 months</td>
</tr>
<tr>
<td>mechanical/electrical)</td>
<td></td>
</tr>
<tr>
<td>Complete northbound Battery Street Tunnel improvements (vent buildings,</td>
<td>12 months</td>
</tr>
<tr>
<td>tunnel finishes, mechanical/electrical)</td>
<td></td>
</tr>
<tr>
<td>Complete improvements north of Battery Street Tunnel (Lowered Aurora Option)</td>
<td>9 months</td>
</tr>
<tr>
<td>Complete final utility relocations</td>
<td>12 months</td>
</tr>
</tbody>
</table>
Traffic Stage 6 – Traffic Diverted to Final Configuration, Surface Restoration and/or Urban Design Features Completed (12 months)

Alaskan Way and SR 99 traffic would be moved into their final configurations from S. Spokane Street to Denny Way, and surface restoration and urban design features would be completed. During this time, SR 99 would be open to traffic and Alaskan Way would be periodically reduced to one lane in each direction with the possibility of occasional closures.

Construction activities and durations during Traffic Stage 6 are listed in Exhibit 5-14.


<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 6</td>
<td>12 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 6</td>
<td></td>
</tr>
<tr>
<td>Restore surface street</td>
<td>12 months</td>
</tr>
<tr>
<td>Close out project</td>
<td>12 months</td>
</tr>
</tbody>
</table>

5.3 Elevated Structure Alternative

Construction sequencing, staging, and detour routes for the Elevated Structure Alternative are described below.

5.3.1 Longer Plan Construction Sequencing

Traffic Stage 1 – Site Preparation (30 Months)

In addition to the construction activities shown in Exhibit 5-2, the following construction activities would start or take place in Traffic Stage 1.

- Construct a temporary over-water bridge at Colman Curve.
- Install a temporary in-water wall—a steel sheet pile wall or equivalent measure would be used to separate Elliott Bay waters from the seawall construction.

Traffic Stage 2 – Construction of Detour Routes, Drilled Shafts and Columns for Viaduct, and Secant Pile Seawall (9 months)

During Traffic Stage 2, traffic would be configured basically the same as in Traffic Stage 1, except that the SR 99 Western Avenue off-ramp would be closed for the temporary Bell Street Overpass construction. The Elliott Avenue on-ramp would remain open.

SR 99 traffic would remain on the existing viaduct. The Alaskan Way surface street would be reduced to one lane in each direction, though additional closures may be required.
Construction activities and durations for Traffic Stage 2 are outlined in Exhibit 5-15.


<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 2</td>
<td>9 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 2</td>
<td></td>
</tr>
<tr>
<td>Construct new shafts and columns alongside existing viaduct</td>
<td>9 months</td>
</tr>
<tr>
<td>Construct Broad Street Detour</td>
<td>9 months</td>
</tr>
<tr>
<td>Construct temporary Bell Street Overpass</td>
<td>9 months</td>
</tr>
<tr>
<td>Construct First Avenue S. Detour</td>
<td>6 months</td>
</tr>
<tr>
<td>Continue seawall construction (S. Jackson Street to Pike Street)</td>
<td>9 months</td>
</tr>
<tr>
<td>Construct BNSF retaining wall (Pike Street to Battery Street Tunnel)</td>
<td>9 months</td>
</tr>
<tr>
<td>Construct city street improvements for detour routes</td>
<td>6 months</td>
</tr>
</tbody>
</table>

**Traffic Stage 3 – Start Construction of the Aerial Structure (Pike Street to Battery Street Tunnel) and the Battery Street Tunnel Improvements (27 months)**

Traffic Stage 3 would divert southbound SR 99 to both the Broad Street Detour in the north and the First Avenue S. Detour in the south. This would allow construction of the southbound aerial structure between Pike Street and the Battery Street Tunnel. It also would allow the southbound Battery Street Tunnel improvements to start to ensure that the improvements can be completed sufficiently so that the tunnel can be reopened at the end of the next traffic stage (Traffic Stage 4). The Elliott and Western ramps would be closed during this stage; however, southbound traffic on Elliott Avenue could enter onto the southbound Broad Street Detour route by traveling westbound on Vine or Wall Streets and then turning left onto Alaskan Way. This would also be true during Traffic Stage 5.

During the 27 months of Traffic Stage 3 construction, traffic would be in the following general configuration:

Northbound SR 99:

- Two lanes would remain open between S. Spokane Street and Denny Way.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.
Southbound SR 99:

- Southbound SR 99 would be closed and traffic would be reduced to two lanes and routed to the First Avenue S. Detour between S. Spokane Street and Railroad Avenue S.
- SR 99 would be open but reduced to two lanes on the existing viaduct between Railroad Avenue S. and Pike Street.
- Between Pike Street and Denny Way, SR 99 would be closed and traffic would be reduced to two lanes and routed to the Broad Street Detour.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.

Alaskan Way surface street:

- Alaskan Way surface street would be reduced to one lane in each direction, though additional closures may be required.

The construction activities and durations for Traffic Stage 3 are listed in Exhibit 5-16.


<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete west half of elevated SODO Ramps</td>
<td>18 months</td>
</tr>
<tr>
<td>Start southbound SR 99 transition viaduct (S. Royal Brougham Way to S. Jackson Street)</td>
<td>24 months</td>
</tr>
<tr>
<td>Complete seawall (central waterfront)</td>
<td>3 months</td>
</tr>
<tr>
<td>Complete seawall (north waterfront)</td>
<td>18 months</td>
</tr>
<tr>
<td>Remove existing southbound viaduct (Pike Street to Battery Street Tunnel)</td>
<td>6 months</td>
</tr>
<tr>
<td>Build southbound aerial structure (Pike Street to Battery Street Tunnel)</td>
<td>24 months</td>
</tr>
<tr>
<td>Build west half of improvements north of Battery Street Tunnel (Partially Lowered Aurora)</td>
<td>18 months</td>
</tr>
<tr>
<td>Start east half of improvements north of Battery Street Tunnel (Partially Lowered Aurora)</td>
<td>9 months</td>
</tr>
<tr>
<td>Upgrade the Battery Street Tunnel (lower the roadway to increase the vertical clearance)</td>
<td>24 months</td>
</tr>
<tr>
<td>Relocate Whatcom Railyard (with the Relocated Whatcom Railyard Option)**</td>
<td>9 months**</td>
</tr>
</tbody>
</table>

** Note: Reconfiguring the Whatcom Railyard would occur in Traffic Stage 1, whereas the relocation of the Whatcom Railyard would occur in Traffic Stage 3.
Traffic Stage 4 – Close Corridor to SR 99 Traffic for Battery Street Tunnel Improvements and Construction of Lower Level of New Viaduct (3 months)

SR 99 would be closed in both directions to allow removal of the upper roadway deck and columns of the existing viaduct. During the 3-month full closure period, other construction activities may continue.

- S. Spokane Street to Denny Way – The existing viaduct would be closed to traffic for 3 months.
- North of Denny Way, SR 99 would be restricted to three lanes total with two lanes in one direction and one lane in the opposite direction.

Alaskan Way surface street:

- Alaskan Way would be reduced to one lane in each direction, though additional closures may be required.

The construction activities and durations for Traffic Stage 4 are listed in Exhibit 5-17.

**Exhibit 5-17. Traffic Stage 4 – Longer Plan – Elevated Structure Alternative Construction Activities and Durations**

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 4</td>
<td></td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 4</td>
<td></td>
</tr>
<tr>
<td>Demolish existing viaduct upper level (S. Holgate Street to Battery Street Tunnel)</td>
<td>3 months</td>
</tr>
<tr>
<td>Complete southbound aerial structure (Pike Street to Battery Street Tunnel)</td>
<td>3 months</td>
</tr>
</tbody>
</table>

Traffic Stage 5 – Reopen Corridor to Two Lanes of SR 99 Traffic in Each Direction (24 Months)

In Traffic Stage 5, two lanes of traffic in each direction would be accommodated on the lower level of the existing viaduct in each direction from S. Royal Brougham Way to Pike Street while the upper level of the new structure is built.

Between Denny Way and Pike Street, southbound SR 99 traffic would continue to be routed off of SR 99 onto the Broad Street Detour. Southbound traffic on Elliott Avenue could access southbound SR 99 by turning onto Alaskan Way to merge with the Broad Street Detour Route.

Northbound SR 99 traffic that would normally exit on to Western Avenue would have to detour and exit to the left onto Elliott Avenue.

SR 99 traffic (two lanes each direction) would use the completed improvements as follows:
Northbound and southbound SR 99:

- S. Spokane Street to bridges over tail track – At-grade SR 99
- Southbound bridge over tail track (on overpass)
- Bridges over tail track to S. Royal Brougham Way – At-grade
- S. Royal Brougham Way to Pike Street – on temporary widened lower level of new viaduct (two lanes in each direction)
- Pike Street to Battery Street Tunnel – On southbound aerial structure from Pike Street to Battery Street Tunnel (two lanes in each direction)
- Battery Street Tunnel – Northbound and southbound tunnels open
- SR 99 north of Denny Way open in both directions

Alaskan Way surface street:

- Alaskan Way would be reduced to one lane in each direction, though additional closures may be required.

Construction activities and durations for Traffic Stage 5 are listed in Exhibit 5-18.

**Exhibit 5-18. Traffic Stage 5 – Longer Plan – Elevated Structure Alternative Construction Activities and Durations**

<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 5</td>
<td></td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 5</td>
<td>24 months</td>
</tr>
<tr>
<td>Complete northbound transition to at-grade roadway (S. Royal Brougham Way to S. King Street)</td>
<td>24 months</td>
</tr>
<tr>
<td>Complete east half of SODO Ramps</td>
<td>24 months</td>
</tr>
<tr>
<td>Complete new upper level viaduct (S. Dearborn Street to Pine Street)</td>
<td>18 months</td>
</tr>
<tr>
<td>Complete northbound aerial structure (Pike Street to Battery Street Tunnel)</td>
<td>24 months</td>
</tr>
<tr>
<td>Complete east half of Partially Lowered Aurora improvements (north of Battery Street Tunnel)</td>
<td>15 months</td>
</tr>
<tr>
<td>Complete final utility relocations</td>
<td>12 months</td>
</tr>
</tbody>
</table>

**Traffic Stage 6 – Reopen Corridor to Two Lanes of SR 99 Traffic in Each Direction (21 Months)**

During Traffic Stage 6, northbound and southbound SR 99 traffic would be reduced to two lanes in each direction and diverted to the new upper level of the viaduct during the construction of the lower level of the new viaduct. The Elliott Avenue on-ramp would be closed, and the Western Avenue off-ramp would be open.

SR 99 traffic (two lanes each direction) would use the completed improvements as follows:
Northbound and southbound SR 99:

- S. Spokane Street to tail track bridges – At-grade northbound and southbound SR 99
- Northbound and southbound tail track bridges
- Tail track bridges to S. Royal Brougham Way – At-grade
- S. Royal Brougham Way to Pike Street – on new upper level of new viaduct (two lanes in each direction)
- Pike Street to Battery Street Tunnel – On northbound and southbound aerial structure from Pike Street to Battery Street Tunnel (two lanes each direction)
- Battery Street Tunnel – Northbound and southbound tunnels open

Alaskan Way surface street:

- Alaskan Way would be reduced to one lane in each direction, though additional closures may be required.

Construction activities and durations for Traffic Stage 6 are listed in Exhibit 5-19.


<table>
<thead>
<tr>
<th>Construction Activity</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Duration – Traffic Stage 6</td>
<td>21 months</td>
</tr>
<tr>
<td>Concurrent Major Activities in Traffic Stage 6</td>
<td></td>
</tr>
<tr>
<td>Remove lower level of existing viaduct</td>
<td>6 months</td>
</tr>
<tr>
<td>Complete new lower level viaduct (S. Dearborn Street to Pine Street)</td>
<td>18 months</td>
</tr>
<tr>
<td>Complete northbound at-grade roadway (S. Spokane Street to S. Royal Brougham Way)</td>
<td>6 months</td>
</tr>
<tr>
<td>Remove Broad Street Detour</td>
<td>6 months</td>
</tr>
</tbody>
</table>

Traffic Stage 7 – Direct All Traffic into Final Configurations and Complete Traffic Stage 6 Work Using Lane Closures and Total Closures during Off-Peak Hours (6 months)

Alaskan Way and SR 99 traffic would be moved into their final configurations from S. Spokane Street to Denny Way, and surface restoration and urban design features would be completed. During this time, SR 99 would be open to traffic and Alaskan Way would be periodically reduced to one lane in each direction with the possibility of occasional closures.
Construction activities and durations for Traffic Stage 7 are listed in Exhibit 5-20.

**Exhibit 5-20. Traffic Stage 7 – Longer Plan – Elevated Structure Alternative Construction Activities and Durations**

<table>
<thead>
<tr>
<th>Construction Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Duration – Traffic Stage 7</strong></td>
<td>6 months</td>
</tr>
<tr>
<td><strong>Concurrent Major Activities in Traffic Stage 7</strong></td>
<td>6 months</td>
</tr>
<tr>
<td>Restore surface street</td>
<td>6 months</td>
</tr>
<tr>
<td>Close out project</td>
<td>6 months</td>
</tr>
</tbody>
</table>
Chapter 6 CUMULATIVE IMPACTS

The Alaskan Way Viaduct and Seawall Replacement Project must consider the long-term cumulative effects, or those impacts that are additive effects of the project, when combined with other reasonably foreseeable developments or actions in the future. The cumulative impacts must be identified and examined in an effort to avoid or minimize their possible effects and incorporate mitigation and project planning where needed.

Both the Tunnel (Preferred) and the Elevated Structure Alternatives are comparable in terms of likely cumulative effects. The description below is generalized to assume the proposed action of the replacement of the Alaskan Way Viaduct and seawall as a whole.

During the AWV Project’s construction phase, several other projects are expected to be under construction in the downtown Seattle area, including Sound Transit’s Central Link Light Rail Project, the Colman Dock Ferry Terminal Expansion Project, the U.S. Army Corps of Engineers Elliott Bay Seawall Project, and the Mercer Corridor Project.

It is likely that construction of sections of Link light rail, Colman Dock, the Elliott Bay Seawall, and the Mercer Corridor will overlap with some viaduct and seawall construction activities. If construction schedules overlap, they could have a cumulative effect on the downtown area. Together, these projects could:

• Intensify traffic congestion through downtown. This would cause problems for all drivers, including transit and emergency service providers. Excessive congestion in downtown could negatively affect businesses if people chose to avoid downtown.

• Cumulatively increase construction noise and temporary air quality impacts.

• Cause problems for utility providers. Most of the proposed projects require utilities to be relocated. Funding, having enough skilled workers, and ensuring minimal utilities disruptions could be a challenge or cause delays in construction.

• Cumulatively affect aquatic habitat and tribal fishing areas in Elliott Bay.

Even if construction detours and material haul routes are well-coordinated, the projects could have adverse cumulative effects on traffic congestion and associated air pollutant emissions. If other construction projects take place within the immediate vicinity (less than approximately 1,000 feet) of the viaduct and seawall construction areas, the cumulative effects of noise and
dust and other potential construction impacts could increase in the vicinity of those activities.

As project design and construction planning moves forward, there will be continuing work with Sound Transit (the agency responsible for Link), Washington State Ferries, the U.S. Army Corps of Engineers, and other participating agencies to minimize possible cumulative effects. Even with extensive coordination among agencies and effective mitigation plans, cumulative impacts relate to a larger area of impacts (both beneficial or negative) than if this project were the only major project under construction.

Long-term cumulative effects from the AWV Project are limited. Both the AWV Project and the Colman Dock Ferry Terminal Expansion Project would affect aquatic habitat between Pier 48 and the existing Colman Dock. Specifically, the AWV Project requires filling up to 0.29 acre of shallow underwater habitat between Pier 48 and Colman Dock. Additionally, the WSDOT Washington State Ferries (WSF) division is planning to expand Colman Dock, which would most likely increase over-water coverage near this same area. To avoid and minimize potential cumulative effects to aquatic life and habitat, WSDOT and WSF are closely coordinating project planning and proposed mitigation efforts. Specifically, WSDOT plans to purchase the existing Pier 48 over-water pier and upland area. WSDOT plans to remove the existing over-water pier and possibly a portion of the Pier 48 uplands to offset future cumulative effects from the AWV Project and expanding Colman Dock.

Additional long-term cumulative effects from the project may depend somewhat on which alternative gets built. The character of Seattle’s central waterfront could change considerably if the Tunnel Alternative is built. The Tunnel Alternative would open up views of Elliott Bay that have been obstructed by the existing viaduct for many years, reduce noise levels, improve air quality, and allow for new public open space. These changes could make the central waterfront more conducive to revitalization of nearby areas. The combined effect could benefit the surrounding community and change the way people live, work, and play along the central waterfront. In contrast, the Elevated Structure Alternative would substantially increase the size of the elevated highway along the waterfront, compared to existing conditions. This would increase the effect it has on views between downtown and the waterfront, and the surrounding residents, businesses, and visitors would continue to experience high noise levels.
For either alternative, replacing the existing viaduct and seawall would have a cumulative long-term benefit on the surrounding area. The risks and effects of not replacing these two facilities are simply too great. In addition, improvements north of the Battery Street Tunnel and improved connections with S. Atlantic Street and S. Royal Brougham Way near the stadiums could support and encourage revitalization in surrounding areas.

6.1 Major Construction Projects in Downtown Seattle

Other projects that are likely to overlap with the AWV Project’s construction timeframe are described below, along with several projects that were discussed in the Draft EIS that have since been dropped from consideration.

The major construction projects planned for downtown Seattle that could overlap with the construction of the AWV Project are the Colman Dock Ferry Terminal Expansion, the U.S. Army Corps of Engineers Elliott Bay Seawall Project, the Mercer Corridor Project, and Link light rail.

6.1.1 Colman Dock Ferry Terminal Expansion

WSDOT’s WSF division is planning to expand Colman Dock to accommodate future growth in passenger volumes and to upgrade the facility to current design standards and security requirements. Improvements to the ferry terminal are independent of the AWV Project, but work on both projects is being closely coordinated within WSDOT. This coordination is recognized as critical since these projects interact directly due to their geographic proximity and their importance in the regional transportation network. This coordination should help minimize the potential for negative cumulative effects in the corridor. Possible effects are likely to include traffic congestion and effects to aquatic life.

Currently, Colman Dock accommodates approximately 600 vehicles. The proposed dock will most likely increase in size to accommodate future growth, as discussed in WSF’s Long-Range Strategic Plan. A range of dock sizes based on a capacity for 1,000 to 1,300 vehicles appears to reasonably represent future expansion. Construction of the new ferry terminal is expected to begin as early as 2009 and will be phased over a period of 5 to 7 years.

To provide space for construction of both the AWV and Colman Dock projects, WSDOT plans to purchase Pier 48. During construction of the AWV Project, the upland area of Pier 48 would be used for barge access, material and equipment storage, and other construction-related activities. In addition, a temporary bridge connecting Colman Dock and Pier 48 would be built and used to provide vehicle access to and from Colman Dock during construction. WSDOT also plans to remove the over-water pier and a portion of the Pier 48
uplands. Benefits to aquatic habitat from removing the over-water portion of Pier 48 and a portion of the Pier 48 uplands are expected to offset future cumulative effects from the AWV Project and expanding Colman Dock.

Both projects require in-water construction work in Elliott Bay and may involve long-term changes (such as fill in Elliott Bay) to the aquatic environment. Both projects are also located within the usual and accustomed fishing grounds and stations of the Muckleshoot and Suquamish Tribes. For these reasons, WSDOT is closely coordinating efforts on the two projects by participating in regular project coordination meetings, providing information on both projects at public meetings, and consulting together with tribes on treaty fishing rights and historical and cultural resources protected under Section 106 of the National Historic Preservation Act.

6.1.2 Link Light Rail Project

The Central Link light rail line is planned to run from Westlake Station in the Downtown Seattle Transit Tunnel to S. 154th Street near the Seattle-Tacoma International (Sea-Tac) Airport. Construction began in 2003 and will continue through 2009. Currently, the Downtown Seattle Transit Tunnel is closed so it can be equipped for joint bus and light rail operations. Work in the transit tunnel should be completed by the end of 2007. While the transit tunnel work is underway, buses that typically run in the transit tunnel are operating on downtown surface streets. The transit tunnel will reopen for buses in the fall of 2007, and light rail service will begin in late 2009.

Additional light rail construction is expected to begin in 2006 for the Airport Link segment, which will connect the light rail terminus at S. 154th Street to the Sea-Tac Airport. Airport Link is expected to open approximately 6 months after the Central Link segment is completed. Sound Transit also plans to build North Link, connecting Central Link to Capitol Hill, the University District, Roosevelt, and Northgate. North Link construction could begin as early as 2008, with operations starting in 2014 to 2016.

6.1.3 U.S. Army Corps of Engineers Elliott Bay Seawall Project

The U.S. Army Corps of Engineers (Corps) is studying the feasibility of rehabilitating all or part of the existing Alaskan Way Seawall. The purpose of the Corps’ seawall rehabilitation effort is to protect the public facilities and economic activities along the Elliott Bay shoreline from storm damages associated with potential failure of the existing seawall. The Corps’ feasibility study will determine the Corps’ federal interest in sharing the cost of addressing the degraded condition of the seawall.
The Corps’ feasibility study process is designed to enable decision-makers to make comparisons among financial requests made to Congress from the entire country. To facilitate this comparison, the Corps’ regulations require them to prepare a single document that integrates both the feasibility study and an EIS. The Corps’ EIS will incorporate the material from the AWV Project that is pertinent to their study and will add to it as necessary. This approach will fulfill the Corps’ requirements while minimizing any redundancies between the projects.

The Corps and the AWV project partners are working together to closely coordinate both projects to make sure that financial and technical resources are maximized for all parties involved. The Corps’ Draft Feasibility Study and EIS is expected to be published in early 2007. The impacts of replacing the seawall are described in this document, and it is unlikely that if a portion of the seawall is replaced by the Corps that there would be substantial additional impacts.

### 6.1.4 Mercer Corridor Project

The City of Seattle is planning improvements in the South Lake Union area. These improvements include reconstructing and reconfiguring Mercer Street and Valley Street between Dexter Avenue N. and I-5. Construction is expected to occur between approximately 2008 and 2010. As such, construction of the Mercer Corridor project could overlap with construction of the AWV Project’s improvements north of the Battery Street Tunnel, which are scheduled to start in 2009. Possible cumulative effects include additional traffic disruption during construction. Long-term benefits of the two projects include improved traffic, pedestrian, and bicycle conditions between I-5, SR 99, Seattle Center, and the South Lake Union and Queen Anne neighborhoods.

### 6.2 Other Planned Projects with Potential Cumulative Effects

There are many future projects planned to be built in or near Seattle. Other major transportation improvements, such as those for SR 520 and SR 509, are being considered in the Seattle area, but funding is uncertain. Other transportation projects with potential cumulative effects are discussed below.

#### 6.2.1 S. Spokane Street Viaduct Widening

The City of Seattle plans to improve the existing S. Spokane Street viaduct and ground-level roadway. Improvements would be constructed between Sixth Avenue S. and E. Marginal Way and would include:

- Widening the existing roadway.
- Relocating the westbound on- and off-ramps to First Avenue S.
• Building a new eastbound Fourth Avenue S. off-ramp and a new westbound loop ramp to Fourth Avenue S.

• Improving the lower-level roadway with curbs and sidewalks.

Construction could occur in one, two, or three phases, depending on the availability and timing of funding. Construction would begin in 2007 at the earliest and be completed in either 2009 or 2010, depending on how the project is funded.

6.2.2 SR 519 Intermodal Access and Surface Street Improvements

This WSDOT project involves reconstructing connections between Seattle and I-90 and elevating S. Atlantic Street above the railroad tracks to avoid rail and vehicle conflicts. This project also provides for improved street connections to SR 99 and is being closely coordinated with the City of Seattle. The first phase of this project has been built and includes a new on-ramp to I-90 that was built at Fourth Avenue S. and S. Atlantic Street. Partial funding has been provided for construction of the second phase of the project, which is currently being revised. Phase 2 alternatives are under consideration and there is no construction schedule at this time. As such, it is difficult to predict potential cumulative effects. The SR 519 project is being closely coordinated by WSDOT and the City of Seattle with the AWV Project to avoid and minimize any potential cumulative effects.

6.2.3 Seattle Aquarium and Waterfront Park

The Seattle Parks and Recreation Department and the Seattle Aquarium Society have proposed to expand the Seattle Aquarium at Pier 59 and develop a new waterfront park on Pier 62/63. The first phase of the Aquarium Expansion project is currently being constructed and will be completed before the AWV Project begins. Timing of future phases is unknown. At this time, no cumulative effects are expected, though the AWV Project partners will continue to coordinate with the Seattle Parks and Recreation Department and Seattle Aquarium Society.

6.2.4 Belltown/Queen Anne Proposed Development

Nineteen private projects in the Belltown/Queen Anne area are in various planning and permitting stages. Most developments propose to construct buildings offering a mix of residential, retail, and office uses. At this time, proposed developments include approximately 1,000 residential units and 4 million square feet of office, retail, and commercial space. By 2010, the area is estimated to contain 5.5 million square feet of new retail/office space and 1,800 new residential dwelling and mixed-use units. A portion of this proposed development would likely still be under construction at the start of
proposed construction for the AWV Project. Because the City is a project partner, they will keep the project team informed of any potential construction projects that might cause cumulative effects.

6.2.5 South Lake Union Streetcar Project

The City of Seattle is building a new streetcar line in the South Lake Union area. The streetcar would improve local transit service and connections between downtown and the South Lake Union neighborhood. The streetcar line will be approximately 1.3 miles in each direction (2.6 track miles total).

The streetcar will begin in the vicinity of Westlake Avenue and Olive Way and Fifth Avenue in downtown Seattle and it will extend north through and terminate in the vicinity of Fairview Avenue N. and Ward Street near the Fred Hutchinson Cancer Research Center. A maintenance facility will be built at Harrison Street and Fairview Avenue N., and a spur track will be built on Harrison Street to connect the streetcar line to the maintenance facility. The streetcar line will connect the Denny Triangle and South Lake Union neighborhoods with the regional transit hub at Westlake Center.

Construction will begin in 2006 and is expected to take approximately 12 to 18 months. Because the City is a project partner, they will keep the project team informed of any potential construction projects so that negative cumulative effects can be avoided or minimized.

6.2.6 South Lake Union Redevelopment

Many of the light industrial properties located in the South Lake Union neighborhood have been purchased over the past years for redevelopment. Current plans are to develop a high-density, mixed-use neighborhood with a focus on a biotechnology center for private industries centered around the existing Fred Hutchinson Cancer Research Center and the University of Washington Medical Center. Other projects are proposed that would be associated with the University of Washington.

The area’s development plans include constructing several mixed retail and residential development projects. Over the next 20 years, these development projects are expected to provide office space for approximately 16,000 to 20,000 employees and 8,000 to 10,000 residential units. Many of these projects are likely to be built during construction of the AWV Project.

Because the City is a project partner, they will keep the project team informed of any potential construction projects so that negative cumulative effects can be avoided or minimized. One possible cumulative effect of the AWV Project’s proposed improvements north of the Battery Street Tunnel and proposed developments in the South Lake Union area is that the overall character of this area will change over time to be more dense urban development than exists.
today. This land use change is consistent with current City of Seattle long-term development plans for the South Lake Union area.

### 6.2.7 I-5 Improvements

WSDOT is developing a plan to improve portions of the 40-year old pavement on I-5 from the Boeing Access Road north to Northgate. Improvements may include removing and replacing existing pavement, reinforcing joints, improving lane continuity at bottleneck locations, and shifting left on- and off-ramps to the right side. The plan and schedule are expected to be completed by the summer of 2007. WSDOT will coordinate construction schedules for the AWV and I-5 projects to avoid and minimize any potential cumulative effects.

### 6.2.8 I-405 Improvements

WSDOT is working with local communities and transit agencies to improve regional capacity on I-405. Funds from the 2003 Transportation Funding Package (also known as the Nickel Package) will fund three I-405 projects: the Kirkland, Bellevue, and Renton Nickel Improvement Projects. Also providing funding for these improvements is the 9.5-cent gas tax passed in a 2005 funding initiative. The gas tax was passed in the 2004 legislative session as part of the Transportation Partnership Act (TPA), a 16-year plan to fund transportation projects across the state.

The Bellevue Nickel Project should be built by 2009, and the Renton and Kirkland projects should be completed in 2011. Together, these three I-405 projects would provide benefits to the AWV Project by improving regional north-south roadway capacity while capacity on SR 99 is either restricted or closed during construction.

The Kirkland Nickel Project will add one new northbound lane from NE 70th Street to NE 124th Street and one new southbound lane between SR 522 and SR 520. Additionally, the I-405/NE 116th Street interchange will be reconstructed, realigned, and reconfigured. Construction activities have started and are scheduled for 2005 through 2011.

The Bellevue Nickel Project will add one northbound lane between I-90 and SE 8th Street, one southbound lane between SE 8th Street and I-90, and the existing high-occupancy vehicle (HOV) lane at I-90 will be extended north from the on-ramp from SE 8th Street. In addition, a new structure will be built underneath the railroad, just east of the existing Wilburton Tunnel. The northbound bridge over the railroad and the southbound bridge over SE 8th Street will be widened. Construction activities are scheduled for 2007 to 2009.
The Renton Nickel Improvement Project includes adding a new northbound lane and southbound lane from I-5 to SR 169. A new southbound lane will also be added on SR 167 between I-405 and the 41st Street off-ramp. Finally, the existing southbound HOV lane on SR 167 will be extended to begin at I-405. Construction activities are scheduled from 2007 to 2011.

In addition to these projects, the I-405 Corridor received nearly $1 billion in funds from the 2005 gas tax increase. This money will be used to build 11 projects in the I-405 Corridor. Several of these projects would provide benefits to the AWV Project by improving regional north-south roadway capacity while capacity on SR 99 is either restricted or closed during construction beginning in mid- to late 2010.

The following projects are also planned in the I-405 Corridor (WSDOT 2006):

- **NE 10th Street, Bellevue** – Adds a new bridge over I-405 to improve surface street access into downtown Bellevue. Construction is expected to begin in 2007 and be completed by 2009.

- **New Lane, Bothell Area** – Improves northbound traffic flow by adding a new lane between 195th and SR 527. Construction is expected to begin in 2007 and be completed by 2009.

- **New Lane, SR 167 to SE 180th, Renton** – Adds a lane to SR 167 from the I-405 interchange to eliminate a bottleneck for people traveling south off of I-405. Construction is expected to begin in 2007 and be completed by 2010.

- **New Lanes between I-5 and West Valley Highway (SR 181), Tukwila** – Adds one lane in each direction to reduce congestion for people traveling from I-5 to I-405. Construction is expected to begin in 2008 and be completed by 2010.

- **New Interchange at Talbot Road (SR 515), Renton** – Relieves pressure from SR 167 and improves access to downtown Renton. Construction is expected to begin in 2008 and be completed by 2010.

- **New Lane between SR 167 and SR 169, Renton** – Adds a new northbound general purpose lane for 1 mile to improve traffic flow just past the SR 167 interchange. Construction is expected to begin in 2009 and be completed by 2011.

- **New Lane between Bellevue and SR 520** – Relieves congestion caused by traffic from Bellevue merging to SR 520, where there can be congestion up to 8 hours a day. Construction is expected to begin in 2009 and be completed by 2012.
• New Lanes in Each Direction between NE 44th and 112th, Renton – Addresses a major I-405 choke point where the existing roadway is one lane narrower than I-405 north of I-90. Construction is expected to begin in 2015 and be completed by 2018.

• New Lane between NE 124th and SR 522 – Adds a northbound lane from NE 124th to NE 160th Street. Construction is expected to begin in 2017 and be completed by 2020.

• New Interchange at NE 132nd Street – Alleviates traffic from the busy NE 124th interchange and provides new access to I-405. Construction is expected to begin in 2019 and be completed by 2021.

• 112th Avenue to I-90 Area Improvements – Adds an auxiliary lane and ramp metering. The construction schedule for this project has not yet been determined.

6.3 Projects No Longer Considered

Three projects that were discussed in the Draft EIS but will no longer be built in the AWV project’s timeframe are described below.

6.3.1 Seattle Monorail Project

The Monorail Green Line that was discussed in the Draft EIS will no longer be constructed because continued funding for the Seattle Monorail Project was rejected in the November 2005 election.

6.3.2 Terminal 46

Since the Draft EIS was issued, a potential project to redevelop Terminal 46 is no longer planned. Terminal 46 is one of the Port of Seattle’s three major container terminals dedicated to international freight movements. The Port recently extended its lease with Hanjin Shipping for use of the terminal as a container terminal until 2015, with an option until 2025. This eliminates the potential for redevelopment of the site in the foreseeable future.

6.3.3 Elliott to Alaskan Way Underpass

This roadway (described in the Draft EIS) is no longer planned.
Chapter 7 REFERENCES

Please refer to the references in Chapter 6 in the 2004 Draft EIS Appendix B, Alternatives Description and Construction Methods Technical Memorandum. In addition, the following references were used to prepare this technical memorandum:


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