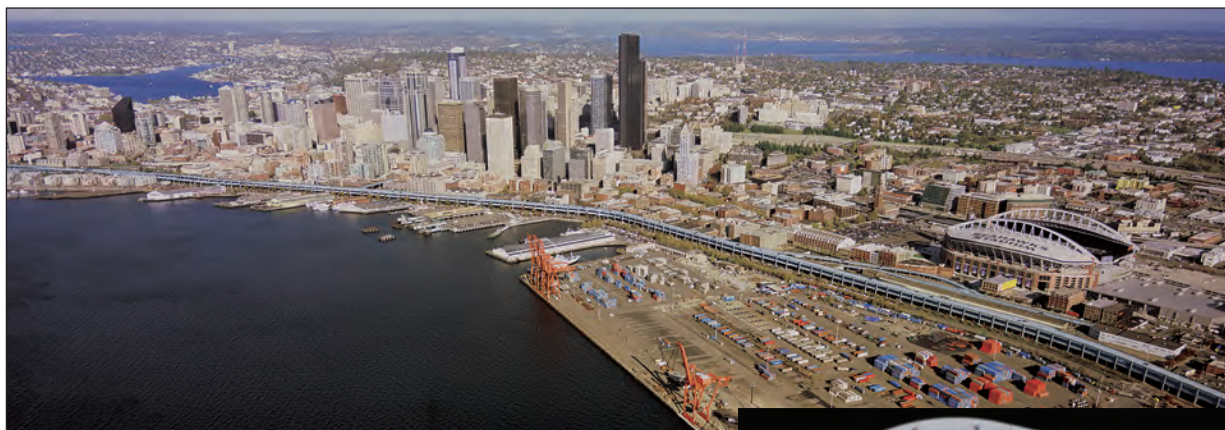
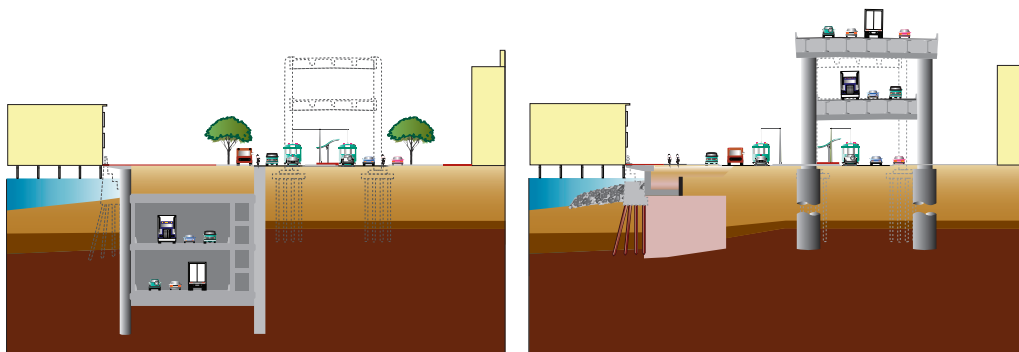


ALASKAN WAY VIADUCT REPLACEMENT PROJECT

Final Environmental Impact Statement

APPENDIX W Screening Documents



Submitted by:
PARSONS BRINCKERHOFF

Prepared by:
PARAMETRIX



JULY 2011

This Page Intentionally Left Blank

Appendix W

Screening Documents

2002 Screening

This Page Intentionally Left Blank

Screening of Initial Concepts Technical Memorandum



Submitted to:
Washington State Department of Transportation
Urban Corridors Office
401 Second Avenue, Suite 300
Seattle, WA 98104-2887

Submitted by:
Parsons Brinckerhoff Quade & Douglas, Inc.



January 2002

This Page Intentionally Left Blank

SR 99: Alaskan Way Viaduct Project

**Screening of Initial Concepts
Technical Memorandum**

Agreement No. Y-7888

Task E3.1

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

Parsons Brinckerhoff Quade & Douglas, Inc.

999 Third Avenue, Ste 2200
Seattle, WA 98104

In association with:

BERGER/ ABAM Engineers Inc.
David Evans and Associates, Inc.
Entech Northwest
EnviroIssues, Inc.
Harvey Parker & Associates, Inc.
Jacobs Sverdrup
Larson Anthropological Archaeological Services Limited
Mimi Sheridan, AICP
PanGEO INCORPORATED
Parametrix, Inc.
Preston, Gates, Ellis, LLP
ROMA Design Group
RoseWater Engineering, Inc.
Shannon & Wilson, Inc.
Steven L. Kramer, Ph.D., Consulting Engineer
Taylor Associates, Inc.
Tom Warne and Associates, LLC
William P. Ott

This Page Intentionally Left Blank

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
APPROACH	3
SCREENING CRITERIA.....	5
OVERVIEW OF CONCEPTS.....	6
A. ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWW CORRIDOR	8
A1a: RETROFIT CONCEPT	8
A1b: RETROFIT CONCEPT LIMITED TO PASSENGER VEHICLES AND TRANSIT	9
A2a: TWO-LEVEL AERIAL REPLACEMENT – WEST OF EXISTING	10
A2b: TWO-LEVEL AERIAL REPLACEMENT – EXISTING LOCATION	11
A3a: ONE-LEVEL AERIAL WITH SIX LANES – OVER EXISTING	12
A3b: ONE-LEVEL AERIAL WITH SIX LANES – WEST OF EXISTING	13
A4a: MULTI-LANE BOULEVARD SURFACE ROADWAY	14
A4b: MULTI-LANE BOULEVARD SURFACE ROADWAY WITH SECTIONS OF TUNNEL... ..	15
A5a: ONE-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY.....	16
A5b: TWO-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY	17
A6: COMBINE ONE-LEVEL ONE WAY AERIAL AND ONE WAY SURFACE ARTERIAL	18
A7: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE-LEVEL ONE WAY AERIAL	19
A8: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE WAY SURFACE ARTERIAL ...	20
A9: BORED TUNNELS UNDER ALASKAN WAY.....	21
B. ROADWAY IMPROVEMENTS OUTSIDE OF THE AWW CORRIDOR	23
B1a: TWIN BORED TUNNELS AT WESTERN AVE.	23
B1b: TWIN BORED TUNNEL ROUTES AT 1 ST AVE. AND 2 ND AVE.....	24
B1c: TWIN BORED TUNNELS AT 3 RD AVE.	24
B1d: TWIN BORED TUNNEL ROUTES AT 4 TH AVE. AND 5 TH AVE. – EAST PORTAL	25
B1e: TWIN BORED TUNNEL ROUTES AT 4 TH AVE. AND 5 TH AVE. – SOUTH PORTAL	26
B1f: TWIN BORED TUNNEL ROUTE AT I-5.....	27
B2: SIGNATURE BRIDGE ACROSS ELLIOTT BAY FROM WEST SEATTLE	28
B3: ELLIOTT BAY SUBMERGED TUNNEL ALONG WATERFRONT AREA.....	30
B4: I-5 IMPROVEMENTS TO ACCOMMODATE A PORTION OF SR-99 DEMAND	30
B5: ELLIOTT BAY FLOATING TUNNEL ALONG WATERFRONT AREA	31
B6: SIGNATURE BRIDGE FROM STADIUM AREA TO BELLTOWN VIA ELLIOTT BAY	32
B7: EXISTING 4 th AVENUE BNSF TUNNEL TRANSITIONING TO CUT-AND-COVER TUNNEL	33
B8a: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT BROAD STREET	34
B8b: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT SENECA STREET	35

C. MULTIMODAL SOLUTIONS	36
C1: TRANSPORTATION SYSTEM / DEMAND MANAGEMENT TO MAXIMIZE EXISTING SYSTEM	36
C2: HCT ALONG EXISTING AWV CORRIDOR WITH NEW CONCEPT	37
C3: HCT ALONG NEW AWV CORRIDOR WITH NEW CONCEPT	37
D. RELATED IMPROVEMENTS (COMBINE WITH OTHER CONCEPTS)	39
D1a: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE.....	39
D1b: IMPROVE ACCESS AT STADIUM AREA	39
D1c: ADD NEW ACCESS AT THE DOWNTOWN CORE	40
D1d: IMPROVE ACCESS AT BATTERY ST. / WESTERN AVE. / ELLIOTT AVE.....	40
D1e: ADD SOUTH SPOKANE STREET OFF-RAMP TO 6 TH AVENUE SOUTH FOR BUSES.....	41
D1f: ADD SOUTH SPOKANE STREET OFF-RAMP TO 4 TH AVENUE SOUTH.....	41
D1g: ADD EXTENSION TO THE SOUTH SPOKANE STREET 4 TH AVENUE ON-RAMP	42
D1h: PROVIDE SOUTHBOUND ACCESS TO SR 99 FROM WEST SEATTLE BRIDGE	42
D2a: ADD CONNECTION TO SOUTH LAKE UNION AREA.....	43
D2b: EXTEND ALASKAN WAY CORRIDOR TO I-5 THRU MERCER ST. CORRIDOR.....	43
D2c: EXTEND SR 520 TO ALASKAN WAY CORRIDOR.....	44
D2d: EXTEND SR 99 GRADE SEPARATION OVER 1 ST AVE. S. BRIDGE TO SR 509.....	44
D2e: IMPROVE BALLARD / INTERBAY CONNECTIONS	45
D2f: IMPROVE I-90 / SR 519 / SR 99 CONNECTIONS	45
D2g: IMPROVE I-5 / SR 99 CONNECTION AT SOUTH SPOKANE STREET	46
D2h: IMPROVE WATERFRONT ACCESS BETWEEN THE WEST SEATTLE BRIDGE AND BATTERY STREET	46
D2i: LOCATE TUNNEL PORTAL AT ROY STREET TO RECONNECT CROSSINGS AT THOMAS AND HARRISON.....	47
D2j: ADD OFF-RAMP TO AIRPORT WAY	47
D2k: RE-UTILIZE BATTERY STREET TUNNEL AS A VEHICULAR CONNECTION TO ALASKAN WAY	48
D3a: SR 99 GRADE SEPARATION CROSSING BETWEEN ATLANTIC AND SOUTH SPOKANE STREETS.....	48
D3b: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE.....	49
D3c: SOUTH HANFORD ST. RAMPS TO/FROM SR 99 FOR GENERAL TRAFFIC / FREIGHT	49
D3d: IMPROVE EAST-WEST FREIGHT ACCESS BETWEEN SOUTH SPOKANE ST. AND SOUTH HOLGATE ST.	50
D3e: IMPROVE BROAD STREET RAIL CROSSING	50
D3f: MOVE TRUCK CONTAINERS FROM WATERFRONT TO I-90.....	51

D3g: INCORPORATE EXISTING RAILROAD TRACKS WITHIN THE CUT-AND-COVER TUNNEL	51
D4a: ADD FERRY TRAFFIC QUEUING AREA ON EXISTING ALASKAN WAY S.	52
D4b: EXPAND PEDESTRIAN CONNECTIONS BETWEEN FERRY TERMINAL AND DOWNTOWN	52
D4c: IMPROVE FERRY CONNECTIONS TO AWV CORRIDOR AND DOWNTOWN	53
D5a: IMPROVE PEDESTRIAN ENVIRONMENT ALONG WATERFRONT	53
D5b: IMPROVE PEDESTRIAN CONNECTIONS BETWEEN WATERFRONT AND DOWNTOWN	54
D5c: RETAIL, RESIDENTIAL, AND PUBLIC SPACE WITH AERIAL STRUCTURE	54
D5d: BUILD WATERFRONT PEDESTRIAN PARK WITH BUSINESS	55
CONCEPTS RECOMMENDED TO BE DROPPED FROM FURTHER CONSIDERATION	56
ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWV CORRIDOR	56
ROADWAY IMPROVEMENTS OUTSIDE OF THE AWV CORRIDOR	56
MULTIMODAL SOLUTIONS	57
RELATED IMPROVEMENTS	57
CONCEPTS RECOMMENDED TO BE CARRIED FORWARD	58
ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWV CORRIDOR	58
ROADWAY IMPROVEMENTS OUTSIDE OF THE AWV CORRIDOR	58
MULTIMODAL SOLUTIONS	58
RELATED IMPROVEMENTS	58

Appendices

Appendix A: Screening Criteria Table	A
Appendix B: Initial Concept Status Summary Table	B
Appendix C: Conceptual Alternatives List	C

Screening of Initial Concepts

Technical Memorandum

EXECUTIVE SUMMARY

The purpose of the Phase 1 Alaskan Way Viaduct corridor study, led by Mirai Associates, was to identify a number of concepts that would address the corridor needs. In Phase 2 of the Alaskan Way Viaduct Project, a team led by Parsons Brinckerhoff is continuing to screen and refine the concepts as the project moves forward. This technical memorandum describes the concepts considered, their key features, and notes whether each was recommended to be carried forward or recommended to be dropped. It documents the status of concepts at the end of the Phase 1 screening process and those concepts developed during the Phase 2 efforts. The concepts were identified through a series of meetings involving WSDOT, the City of Seattle, the consultant teams, neighborhood groups, business interests, other organizations and agencies, and the public. The No Action alternative also is carried forward through this screening process.

The concepts considered fall into four categories:

- Roadway improvements within the existing Alaskan Way Viaduct corridor
- Roadway improvements outside of the Alaskan Way Viaduct corridor
- Multimodal solutions
- Related improvements (that could be combined with other concepts)

For each of the concepts, data was collected from a number of sources. Quantitative and qualitative analyses were performed. The data was developed at a level of detail sufficient to distinguish among concepts. Screening criteria were developed based upon the draft project Purpose and Need Statement and approved by WSDOT and the City of Seattle. The concepts were then evaluated and compared to the nine goals set in the screening criteria document. Those concepts that had “fatal flaws” based upon the screening criteria goals and those concepts that could not meet the goals as well as other concepts were documented and eliminated from further consideration.

A description of each concept, the main features, and the results of the first and second phase screening process have been recorded in this memorandum. The concepts were screened, modified, and refined, resulting in a number of

conceptual alternatives. The continuation of the screening process for the conceptual alternatives is described in a separate technical memorandum. The conceptual alternatives are to be subsequently screened down to those alternatives selected for inclusion in the Environmental Impact Statement (EIS).

APPROACH

The Alaskan Way Viaduct Project will result in a preferred alternative that best addresses the needs identified in the project Purpose and Need Statement.

The objective of the process used in Phase 1 was to reduce the number of study concepts for further investigation. This evaluation resulted in a list of issues and opportunities associated with each of the recommended concepts. The process to identify, develop, and screen the concepts involved several steps:

- The identification of ideas/concepts
- Development of screening criteria
- The initial screening of concepts
- Summary of primary concepts

The first step was to identify a number of concepts that would maintain or improve traffic capacity compared with the existing viaduct. The range of concepts included corridor-wide concepts as well as concepts specific to the existing elevated viaduct structure. The initial list of concepts was the basis for a workshop held in May 2001 that involved WSDOT and the Phase 1 consultant team. Several more concepts were added as a result of the workshop. The Technical Advisory Committee and the Leadership Group provided input on and refined the concepts, and identified a broad range of considerations. Public, agency, and tribal comments were received at scoping meetings. The results of each step were summarized in a report for WSDOT titled "*Development and Screening of Concepts, Working Paper #7 and 8*", dated August 2001 by Mirai Associates.

Additional comments have been developed during Phase 2 through January 8, 2002, by the Parsons Brinckerhoff (PB) Team and from meetings involving WSDOT, the City of Seattle, neighborhood groups, business interests, other organizations and agencies, and the public. Concepts developed from this point forward will be screened for possible inclusion into the project alternatives to be carried into the EIS documentation. Memoranda that document the screening of these concepts will be issued on a regular basis.

The Phase 2 Screening Criteria were developed and based upon the draft project Purpose and Need statement dated November 2, 2001. The Phase 2 Screening Criteria have identified nine goals to be used in evaluation of concepts considered for the Alaskan Way Viaduct project. The screening process uses the criteria to narrow the range of options for the EIS.

The concepts developed during Phase 1 have been screened using the screening criteria developed by the PB Team in conjunction with WSDOT and the City of

Seattle. Qualitative and quantitative analysis previously performed were used in this process. Those concepts that had “fatal flaws” based upon the screening criteria goals and those concepts that could not meet the goals as well as other concepts were documented and eliminated from further consideration. Additionally, those concepts that did not meet the purposes of the project were recommended to be dropped. The terminology relating to the alternatives identifies those ideas developed in Phase 1 and Phase 2 as concepts. The concepts carried forward in the screening process for further development and refinement are called conceptual alternatives. Those conceptual alternatives that are carried forward in the screening process into the Environmental Impact Statement documentation are termed alternatives.

Conceptual alternatives have been developed based upon those concepts recommended for further evaluation. These conceptual alternatives will be refined into options for the north, central, and south geographic areas of the project. The conceptual alternatives are itemized in Appendix C, Conceptual Alternatives List. Seawall conceptual alternatives have also been developed but are not considered in this technical memorandum. The various conceptual alternatives will be evaluated, screened down, and grouped into alternatives. These alternatives will be carried forward in the EIS.

SCREENING CRITERIA

Screening criteria were developed to assist the project team conduct the Phase 2 screening process. This resulted in the nine goals, approved by WSDOT, shown below. For each goal, the evaluation indicator, the evaluation criteria, source of the criteria indicator, and the evaluation metric were specified, (refer to Appendix A). The Phase 1 concepts were screened based on these goals. For each concept that was rejected from further consideration, the goal or goals that a concept either failed to meet or failed to meet as well as other concepts were specified.

The goals indicated in the screening process to justify rejection of a concept were considered to be adequate rationale by the consultant team, WSDOT, and the City of Seattle. There may be other goals not specified that a rejected concept cannot meet as well. The concepts that are recommended for further consideration specify the conceptual alternative that is associated with the concept.

Following are the Phase 2 Screening Criteria Goals:

- Goal 1: An alternative should provide a facility that meets current seismic design standards (mandatory)
- Goal 2: An alternative should maintain or improve the transportation functions of the Alaskan Way Viaduct corridor (mandatory)
- Goal 3: An alternative should improve traffic safety
- Goal 4: An alternative should maintain or improve transportation system linkages regionally and should allow for future linkages
- Goal 5: An alternative should minimize adverse impacts during construction
- Goal 6: An alternative should minimize environmental impacts during and after construction
- Goal 7: An alternative should minimize social and cultural impacts during and after construction
- Goal 8: An alternative should support land use and shoreline plans and policies pertaining to existing and future development of the downtown Seattle waterfront
- Goal 9: An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall

Goals 1 and 2 were mandatory. Concepts that do not meet either of these goals are dropped from further consideration.

OVERVIEW OF CONCEPTS

A number of transportation facilities and improvements to replace or retrofit the existing Alaskan Way Viaduct (AWV) have been identified. These Alaskan Way Viaduct concepts have been developed and grouped into four main categories. Refer to Appendix B for a summary table of the concepts and their status. There are 64 concepts that have been considered for screening. These concepts fall within the following four categories:

A. Roadway Improvements within the Existing AWV Corridor

- Retrofit the existing Alaskan Way Viaduct
- One- or Two-Level Aerial Replacement
- Multi-Lane Boulevard Surface Roadway
- One- or Two-Level Cut-and-Cover Tunnel
- Combine Aerial, Tunnel, and Surface Arterial Concepts
- Bored Tunnel Under Alaskan Way

B. Roadway Improvements Outside of the AWV Corridor

- Bored Twin Tunnels
- Signature Bridge Across Elliott Bay From West Seattle
- Elliott Bay Submerged Tunnel Along Waterfront Area
- I-5 Improvements
- Elliott Bay Floating Tunnel Along Waterfront Area
- Signature Bridge from Stadium Area to Belltown via Elliott Bay
- Cut-and-Cover Tunnel Combined with use of BNSF Tunnel
- Floating Bridge from Port of Seattle Area to Broad Street or Seneca Street via Elliott Bay

C. Multimodal Solutions

- Transportation System Management To Maximize Existing System
- High Capacity Transit (HCT) Along Existing AWV Corridor with New Concept
- HCT Along New AWV Corridor with New Concept

D. Related Improvements (would be combined with other concepts)

- Add Ramps and Improve Access
- Extend Alaskan Way Corridor
- Extend SR 99 Grade Separation
- Improve Connections
- Improve Freight Access
- Improve Ferry Connections and Environment
- Improve Pedestrian Connections and Environment

- Incorporate Retail, Residential, and Public Space into Aerial Structure

In addition to the 64 concepts considered in this screening process, the No Action alternative also is carried forward. The No Action alternative will be considered in addition to the build alternatives in the EIS documentation.

A. ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWW CORRIDOR

A1a: RETROFIT CONCEPT

General Functional Description

The existing Alaskan Way Viaduct structure is a 2.1 mile long segment of SR 99. The viaduct uses a double-decked, reinforced concrete structural system. It carries 2 to 4 lanes of NB and 2 to 3 lanes of SB traffic along Elliott Bay, through downtown Seattle. There are access connections at South Spokane Street, the stadium area, Columbia Street, Seneca Street, Elliott Avenue and Western Avenue. The design speeds within the Alaskan Way Viaduct Corridor between the Battery Street tunnel and South Spokane Street vary from 35 mph to 50 mph.

The structure was originally built in two phases. The first phase was completed in 1952 by the Seattle Engineering Department, and the second phase was completed in 1956 by the Washington State Department of Transportation. Neither phase meets current design standards for earthquake resistant design or traffic safety. There are some segments of the viaduct foundation system that are exposed to risks related to the waterfront seawall structure. In a major earthquake event, areas of soil liquefaction may allow lateral spreading of the soil that provides support to the pile foundations on the Viaduct. Retrofit or replacement of the seawall structure must be addressed as part of this concept as well.

Key Features

- Maintains traffic during construction
- Relatively short timeframe for implementation as compared to other build alternatives
- Environmental permits are likely
- Shortest design life
- Substantially less reliable than a replacement structure because of the deterioration that has occurred with age and the different design standards for new construction.
- May require partial seawall retrofit
- Would not address the substandard traffic safety issues.

Phase 1 Screening Results

The concept was recommended to be dropped during the Phase 1 screening process in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001. The justification was, “Recommended against by WSDOT expert panel.” The WSDOT expert panel found, “This recommendation [to replace] is based on our conclusion that even though a comprehensive seismic retrofit might achieve a level of safety comparable to a new structure, the eventual

deterioration of the current structure due to ageing would exact a greater sum of financial resources for maintenance and be less reliable than a new structure built to current seismic design standards.”

Phase 2 Screening Results

The concept is recommended to be carried forward as Conceptual Alternative R1, Retrofit.

A1b: RETROFIT CONCEPT LIMITED TO PASSENGER VEHICLES AND TRANSIT

General Functional Description

Under this concept, the existing structure would be maintained and would be limited to use by passenger vehicles and transit only. Note that buses are similar to trucks in terms of impact on the viaduct.

Key Features

- Maintains traffic during construction
- Relatively short timeframe for implementation as compared to other build alternatives
- Environmental permits are likely
- Shortest design life
- Substantially less reliable than a replacement structure because of the deterioration that has occurred with age and the different design standards for new construction.
- May require partial seawall retrofit
- Would not address the substandard traffic safety issues.
- Would hinder freight mobility

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept was recommended to be dropped for the following reasons:

- Goal #2, the capacity functions within the corridor cannot be maintained.
- Goal #2, the freight and truck mobility travel time through the AWW corridor is increased.

A2a: TWO-LEVEL AERIAL REPLACEMENT – WEST OF EXISTING

General Functional Description

The existing Alaskan Way Viaduct would be replaced with a split-level structure. There would be three SB and three NB lanes of traffic along Elliott Bay, through downtown Seattle. The existing access connections at South Spokane Street, the stadium area, Columbia Street, Seneca Street, Elliott Avenue and Western Avenue would be maintained or improved. Existing design speeds between 35 mph and 50 mph would be maintained or improved. The traffic and seismic safety issues, inherent to the existing viaduct, would be brought up to current design standards. The new SB structure would be built to the west of the existing Alaskan Way Viaduct. All traffic would be diverted onto the structure temporarily in two directions while the existing viaduct is replaced with a new aerial NB structure in the same location.

Key Features

- Maintains traffic during construction.
- Design opportunities to reduce visual barrier
- Possible addition of access in central and south areas
- Would provide current design standards
- Environmental permits likely, though noise and storm water issues would need to be addressed
- North and south end construction is complicated
- Battery Street tunnel is a constraint at the north end
- Trolley relocation or closure is necessary
- Temporary closure of central business district ramps is required
- Limited community opportunities since little change from existing

Phase 1 Screening Results

The concept was recommended to be carried forward during the Phase 1 screening process in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, for the following reasons:

- Maintains existing mode functions within the corridor
- Potential to integrate HCT
- Can tie to Battery Street tunnel
- Opportunities for additional access and capacity expansion
- Improved aesthetics, but continued visual disruption
- Can be independent of seawall
- Moderate construction period; can be built in stages
- Maintains two lanes of traffic each way during construction

Phase 2 Screening Results

The concept is recommended to be carried forward as Conceptual Alternative C5, Staggered Aerial Structures with One Level NB and One Level SB.

A2b: TWO-LEVEL AERIAL REPLACEMENT – EXISTING LOCATION

General Functional Description

The existing Alaskan Way Viaduct would be replaced with a two-level structure similar to the existing. There would be 3 SB and 3 NB lanes of traffic along Elliott Bay, through downtown Seattle. The existing access connections at South Spokane Street, the stadium area, Columbia Street, Seneca Street, Elliott Avenue and Western Avenue could be maintained or improved. Existing design speeds between 35 mph and 50 mph would be maintained or improved. The traffic and seismic safety issues, inherent to the existing viaduct, would be brought up to current design standards. A short, temporary structure to the west of the existing Alaskan Way Viaduct would be built. All traffic would be diverted onto this structure temporarily in two directions. The corresponding segment of the existing viaduct would be replaced with the new structure in the same location. The traffic would be redirected onto the new structure; the short temporary structure would then be moved to the next adjacent segment and the process repeated until the Alaskan Way Viaduct is replaced with the new, two-level aerial structure.

Key Features

- Maintains traffic during construction.
- Possible addition of access in central and south areas
- Would provide current design standards
- Environmental permits likely, though noise and storm water issues would need to be addressed
- North and south end construction is complicated
- Traffic Management during construction is complicated
- Battery Street tunnel is a constraint at the north end
- Temporary trolley relocation or closure is necessary
- Temporary closure of central business district ramps is required
- Limited community opportunities since little change from existing

Phase 1 Screening Results

The concept was recommended to be carried forward during the Phase 1 screening process in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, for the following reasons:

- Maintains existing mode functions within the corridor
- Potential to integrate HCT

- Can tie to Battery Street tunnel
- Opportunities for additional access and capacity expansion
- Improved aesthetics, but continued visual disruption
- Can be independent of seawall
- Moderate construction period-can be built in stages
- Maintains two lanes of traffic each way during construction

Phase 2 Screening Results

The concept is recommended to be carried forward as Conceptual Alternative C3, Double Stacked Aerial Structure. There can be variations from the temporary structure concept to accommodate the traffic re-route.

A3a: ONE-LEVEL AERIAL WITH SIX LANES – OVER EXISTING

General Functional Description

The existing Alaskan Way Viaduct would be replaced with a new one-level aerial structure. The aerial structure would have three northbound and three southbound lanes. The existing viaduct would be demolished. This concept would expand capacity and improve access to the downtown core and waterfront areas. Noise impacts would continue, compared with existing conditions, but reductions would be possible. Visual impacts would remain.

Key Features

- Maintains traffic during construction
- Can provide design standards, but substantially wider structure would be required
- Environmental permits possible
- Property impacts are likely, including historic structures
- Battery Street tunnel is a constraint at north end
- Requires temporary trolley relocation or closure
- Ramp connections are very difficult

Phase 1 Screening Results

This concept was recommended to be dropped in August 2001, as detailed in “*Development and Screening of Concepts, Working Paper #7 and 8*”, dated August 2001. The reasons for rejecting this concept were as follows:

- Covers most of AWV right of way
- View issues
- Very difficult transitions at north end
- Intermediate access problematic
- Possible impacts to historic buildings

Phase 2 Screening Results

The Phase 2 screening also resulted in rejection of this concept because it did not meet several goals:

- Goal #2, the central downtown core access connections would be extremely difficult due to the height and width of the structure
- Goal #2, truck and freight mobility on surface streets would be hindered due to long ramps required for a high aerial structure
- Goal #5, construction risk is high and construction is difficult over an operating roadway
- Goal #7, historic structures likely impacted by large columns on either side of the existing viaduct
- Goal #7, the existing waterfront view corridor would be substantially impacted due to the width required for one level and the height required to build over the existing viaduct structure.
- The screening criteria goals of the project are better met by Conceptual Alternatives C3, Double Stacked Aerial Structure; C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB; and C5, Staggered Aerial Structures with One Level NB and One Level SB.

A3b: ONE-LEVEL AERIAL WITH SIX LANES – WEST OF EXISTING

General Functional Description

The existing Alaskan Way Viaduct would be replaced with a new one-level aerial structure. The aerial structure would be partially or fully west of the existing structure and have three northbound and three southbound lanes. The existing viaduct would be demolished. This concept would expand capacity and improve access to the downtown core and waterfront areas. Noise impacts would continue, compared with existing conditions. Visual impacts would be changed.

Key Features

- Maintains traffic during construction
- Can provide design standards, but a wider structure would be required
- Environmental permits possible
- Property impacts are likely, including historic structures
- Battery Street tunnel is a constraint at north end
- Requires temporary trolley relocation or closure
- Southbound ramp connections are very difficult

Phase 1 Screening Results

This concept was recommended to be dropped in August 2001, as detailed in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001. The reasons for rejecting this concept were as follows:

- Covers most of AWW right of way
- View issues
- Very difficult transitions at north end
- Intermediate access to and from SB lanes is problematic
- Possible impacts to historic buildings

Phase 2 Screening Results

The Phase 2 screening also resulted in rejection of this concept because it did not meet several goals:

- Goal #2, difficult to provide central downtown SB access connections due to the width of the structure
- Goal #7, the existing waterfront view corridor would be substantially impacted due to the width required for one level and the requirement for downtown access ramps.
- Goal #8, the expanded connections at the waterfront would be limited due to the width required for one level and the requirement for downtown access ramps.

A4a: MULTI-LANE BOULEVARD SURFACE ROADWAY

General Functional Description

The surface roadway concept would involve removal of the Alaskan Way Viaduct and expansion of the surface Alaskan Way with a multi-lane boulevard. This concept would shift the focus to transit and bike/pedestrian uses. Traffic function would be reduced. Road capacity would be reduced, with a portion of the capacity replaced by transit and trip reduction. This concept would result in relatively short construction disruptions. Multiple connections to downtown streets could be established. Environmental impacts would be minimal and community benefits would include the opening of views.

Key Features

- Maintains traffic during construction
- Shorter time frame for implementation, relative to other concepts
- Removes visual barrier
- Arterial connections replace existing ramps
- Environmental permits possible

- Limited ability to replace current general traffic and freight capacity with surface arterial
- Need north end connection to Battery Street tunnel
- Temporary trolley relocation or closure

Phase 1 Screening Results

The concept was recommended to be carried forward in Phase 1 and documented in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, Section *“Summary of Primary Concepts Carried Forward For Screening Analysis”*.

Phase 2 Screening Results

In Phase 2, this concept was recommended to be dropped because it did not meet the following goals:

- Goal #2, the capacity functions within the corridor cannot be maintained.
- Goal #2, decrease in access connections and reduction in level of service
- Goal #2, the freight and truck mobility travel time through the AWW corridor is increased.
- Goal #2, there is a reduction in vehicular access for the ferry system due to increase in street width.
- Goal #2, pedestrian and non-motorized user mobility decreases due to multi-lane boulevard and resulting traffic
- Goal #7, detracts from neighborhood character and inhibits future development

A4b: MULTI-LANE BOULEVARD SURFACE ROADWAY WITH SECTIONS OF TUNNEL

General Functional Description

This surface roadway concept would involve removal of the Alaskan Way Viaduct and expansion of the surface Alaskan Way with a multi-lane boulevard. Short sections of tunnel would be incorporated to allow through access. This concept would shift the focus to transit and bike/pedestrian uses. Traffic function would be reduced. Road capacity would be reduced, with a portion of the capacity replaced by transit and trip reduction. This concept would result in relatively short construction disruptions. Multiple connections to downtown streets could be established, although at the approaches to the tunnel portals, connections would be limited. Environmental impacts would be minimal and community benefits would include the opening of views.

Key Features

- Maintains traffic during construction
- Shorter time frame for implementation, relative to other concepts
- Removes visual barrier
- Arterial connections replace existing ramps
- Environmental permits possible
- Limited ability to replace current general traffic and freight capacity with surface arterial
- Need north end connection to Battery Street tunnel
- Temporary trolley relocation or closure
- Approaches to tunnel portals would limit downtown access to the waterfront in these areas

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

In Phase 2, this concept was recommended to be dropped because it did not meet the following goals:

- Goal #2, the capacity functions within the corridor cannot be maintained.
- Goal #2, decrease in access connections and reduction in level of service
- Goal #2, the freight and truck mobility travel time through the AWW corridor is increased.
- Goal #2, pedestrian and non-motorized user mobility decreases due to multi-lane boulevard and resulting traffic
- Goal #7, detracts from neighborhood character and inhibits future development

A5a: ONE-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY

General Functional Description

This concept proposes a cut-and-cover tunnel with one level under the existing Alaskan Way surface street. This concept would expand capacity on the viaduct and potentially increase access to the downtown core and waterfront areas. However, grade issues would make downtown connections difficult. Noise would be reduced, visual impacts improved over existing conditions, and potential open space would be created along the waterfront. Construction duration and intensity would be substantial. Hazardous soils and stormwater treatment issues may make environmental permitting difficult.

Key Features

- Maintains viaduct traffic during construction
- Removes visual barrier for much of waterfront
- Can provide design standards but requires a wider structure
- Possible fix for seawall
- Substantial construction disruption to Alaskan Way arterial
- Wide tunnel required to provide standards
- Impacts to BNSF yards
- Difficult to access Battery Street tunnel
- Temporary trolley relocation or closure
- Environmental permits difficult due to hazardous soil and surface water runoff
- Ramp connections are very difficult

Phase 1 Screening Results

This concept was recommended to be dropped in Phase 1 because “Downtown ramps very difficult; requires removal of viaduct to complete construction; difficult transitions at north end,” as described in “*Development and Screening of Concepts, Working Paper #7 and 8*”, dated August 2001.

Phase 2 Screening Results

In Phase 2, this concept was recommended to be dropped because it did not meet:

- Goal #2, maintaining or providing access connections, can be better met by Conceptual Alternatives C1-A, Cut-and-Cover Tunnel, and C1-B, Cut-and Cover Tunnel with Aerial Structure.
- Goal #5 of minimizing adverse impacts during construction can be better achieved by Conceptual Alternatives C1-A, Cut-and-Cover Tunnel, and C1-B, Cut-and Cover Tunnel with Aerial Structure.
- Goal #7 of minimizing social and cultural impacts during construction can be better achieved by Conceptual Alternatives C1-A, Cut-and-Cover Tunnel, and C1-B, Cut-and Cover Tunnel with Aerial Structure.

A5b: TWO-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY

General Functional Description

This concept proposes a cut-and-cover tunnel with two levels under the existing Alaskan Way surface street. This concept would expand capacity on the viaduct and may increase access to the downtown core and waterfront, although grade issues would make downtown connections challenging. Noise would be

reduced and visual impacts would be improved over existing conditions. Potential open space may be created along the waterfront. Construction duration and intensity would be considerable. Hazardous soils and stormwater treatment issues may make environmental permitting difficult.

Key Features

- Maintains viaduct traffic during construction
- Removes visual barrier for much of waterfront
- Possible fix for seawall
- Substantial construction disruption to Alaskan Way arterial
- Wide tunnel required to provide standards
- Impacts to BNSF yards
- Difficult to access Battery Street tunnel
- Temporary trolley relocation or closure
- Environmental permits difficult due to hazardous soil and surface water runoff
- Ramp connections are very difficult

Phase 1 Screening Results

For Phase 1, the concept was recommended to be carried forward as described in *"Development and Screening of Concepts, Working Paper #7 and 8"*, dated August 2001.

Phase 2 Screening Results

The concept is recommended to be carried forward in Phase 2 as Conceptual Alternative C1-A, Cut-and-Cover Tunnel.

A6: COMBINE ONE-LEVEL ONE WAY AERIAL AND ONE WAY SURFACE ARTERIAL

General Functional Description

This is a combination concept that proposed a single-level aerial structure in one direction and a surface arterial in one direction. The existing viaduct would be demolished. This concept would expand capacity and improve access to the downtown core and waterfront areas. Noise impacts would continue, compared with existing conditions, but reductions would be possible. Visual impacts would remain. The surface arterial may make waterfront and ferry access difficult for vehicles and pedestrians. Construction disruptions would be shorter than for a replacement structure.

Key Features

- Quicker time frame for implementation than replacement structure

- High volume facility along surface Alaskan Way corridor conflicts with pedestrians
- Difficult transition for lower level to Battery Street tunnel
- Complicates ferry and port access

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept was recommended to be rejected in Phase 2 because it did not meet several goals:

- Goal #2, the capacity functions within the corridor cannot be maintained.
- Goal #2, freight and truck mobility is reduced due to reduced capacity of the surface aerial
- Goal #2, the ferry vehicular and pedestrian access travel time in the AWW corridor would be increased due to the surface arterial.
- Goal #2, the pedestrian and non-motorized user mobility travel time in the AWW corridor would be increased due to the surface arterial.

A7: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE-LEVEL ONE WAY AERIAL

General Functional Description

This is a combination concept that proposes a single-level tunnel in one direction under Alaskan Way and a single-level aerial structure in one direction. The existing Alaskan Way Viaduct would be demolished. This concept would expand capacity and potentially increase access to the downtown core and waterfront areas. However, grade issues may make connections between the tunnel and downtown difficult. Visual impacts would be slightly improved over existing conditions. Noise impacts would continue, but reductions would be possible. Construction duration and intensity would be substantial, although traffic would be maintained during construction. Hazardous soils and stormwater treatment issues present challenges for the tunnel portion.

Key Features

- Maintains traffic during construction
- Ramp connections possible
- Reduces visual impact of structure
- Replace existing ramps with arterial connections
- Possible fix for seawall
- Environmental permits difficult for tunnel portion

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept is recommended to be carried forward as Conceptual Alternative C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB.

A8: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE WAY SURFACE ARTERIAL

General Functional Description

This is a combination concept that proposed a single-level tunnel in one direction under Alaskan Way and a surface arterial in one direction. The existing Alaskan Way Viaduct would be demolished. This concept would expand capacity and potentially increase access to the downtown core and waterfront areas. However, grade issues may make connections between the tunnel and downtown difficult. Visual impacts would be improved over existing conditions. Noise impacts would continue, but reductions would be possible. Hazardous soils and stormwater treatment issues present challenges for the tunnel portion. The surface arterial may make waterfront and ferry access difficult for vehicles and pedestrians. Construction disruptions would be shorter compared with other concepts.

Key Features

- Shortens duration of tunnel construction compared with other concepts
- Removes visual impacts along waterfront
- Maintains traffic during construction
- Ramp connections possible
- Possible fix for seawall
- Environmental permits difficult for tunnel portion
- High volume facility along surface Alaskan Way corridor conflicts with pedestrians
- Difficult transition to Battery Street tunnel
- Complicates ferry and port access

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

In Phase 2, this concept was recommended to be dropped. It did not meet several goals, as follows:

- Goal #2, the capacity functions within the corridor cannot be maintained.
- Goal #2, freight and truck mobility is reduced due to reduced capacity of surface arterial.
- Goal #2, the ferry vehicular and pedestrian access travel time in the AWW corridor would be increased due to the surface arterial.
- Goal #2, the pedestrian and non-motorized user mobility travel time in the AWW corridor would be increased due to the surface arterial.

A9: BORED TUNNELS UNDER ALASKAN WAY

General Functional Description

Bored tunnels would be constructed under the existing Alaskan Way Viaduct, which would be demolished. The concept includes two lanes in each direction. The focus would be on through traffic. Downtown connections would not be done. Additional lanes would be difficult to construct and would include additional bores. Construction disruptions would be moderate. Capacity of the existing corridor would be maintained during construction. The tunnel would reduce noise and visual impacts over existing conditions. Community benefits would include the opening of views and potential provision of open space. Environmental concerns include possible hazardous soil removal and potential dewatering at the southern terminus of the tunnel.

Key Features

- Separates through and local traffic, with through traffic focus
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Impact to properties at south end (BNSF yards; Pioneer Square)
- Need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99 and Interbay/Ballard
- Limited property impacts, except at portals
- Reduced traffic noise
- Relatively long construction period compared with other concepts
- Requires ventilation, life-safety and emergency egress
- Complex design for capacity, safety, and ventilation
- Access issues difficult at south and north ends

Phase 1 Screening Results

The concept was recommended to be carried forward in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001.

Phase 2 Screening Results

The concept was recommended to be dropped in Phase 2 for the following reasons:

- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- A similar concept was carried forward outside of the existing AWV corridor as Conceptual Alternative C2-A, Twin Bored Tunnels.

B. ROADWAY IMPROVEMENTS OUTSIDE OF THE AWW CORRIDOR

B1a: TWIN BORED TUNNELS AT WESTERN AVE.

General Functional Description

This concept proposes to bore twin tunnels under Western Avenue. Similar to concept A9, this concept includes two lanes in each direction. The focus would be on through traffic and no intermediate ramp connections are likely. Construction disruptions would be moderate. Capacity of the existing viaduct would be maintained during construction. The tunnel would reduce noise and visual impacts over existing conditions. Community benefits would include the opening of views and potential provision of open space.

Key Features

- Separates through and local traffic, with through traffic focus
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Impact to properties at south end (BNSF yards; Pioneer Square)
- Need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99 and Interbay/Ballard
- Limited property impacts, except at portals
- Reduced traffic noise
- Relatively long construction period compared with other concepts
- Requires ventilation, life-safety and emergency egress
- Complex design for capacity, safety, and ventilation

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

In Phase 2, a similar concept was carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st and Western Avenues. The 1st Avenue/Western Avenue route is preferred over the Western Avenue route because the structural impact of each bore on the other is reduced and it will stay within the existing right-of-way for a large part of the route.

B1b: TWIN BORED TUNNEL ROUTES AT 1ST AVE. AND 2ND AVE.

General Functional Description

In this concept, twin tunnels would be bored under 1st and 2nd Avenues. Two lanes would be provided in each tunnel and 2nd Avenue provides extra width potential for increased tunnel capacity. The functional description is similar to concept B1a.

Key Features

- Separates through and local traffic, with through traffic focus
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Impact to properties at south end (BNSF yards; Pioneer Square)
- Need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99 and Interbay/Ballard
- Limited property impacts, except at portals
- Reduced traffic noise
- Relatively long construction period compared with other concepts
- Requires ventilation, life-safety and emergency egress
- Complex design for capacity, safety, and ventilation

Phase 1 Screening Results

The concept was recommended to be carried forward in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, Section *“Summary of Primary Concepts Carried Forward For Screening Analysis.”*

Phase 2 Screening Results

In Phase 2, a similar concept was carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st Avenue and Western Avenue. The 1st Avenue/Western Avenue route is preferred over the 1st Avenue/2nd Avenue route because it avoids the metro sewer line under 2nd Avenue.

B1c: TWIN BORED TUNNELS AT 3RD AVE.

General Functional Description

This concept proposes to bore a tunnel under 3rd Avenue, below the bus tunnel. The tunnel would connect with SR 99 north and south of downtown. The functional description is similar to concept B1a.

Key Features

- Separates through and local traffic, with through traffic focus
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Impact to properties at south end (BNSF yards; Pioneer Square)
- Need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99 and Interbay/ Ballard
- Limited property impacts, except at portals
- Reduced traffic noise
- Relatively long construction period compared with other concepts
- Requires ventilation, life-safety and emergency egress
- Complex design for capacity, safety, and ventilation
- Creates potential settlement problems with the 3rd Avenue bus tunnel above

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept was recommended to be dropped in Phase 2 because it did not meet several goals:

- Goal #2, the central downtown key access connections cannot directly be provided.
- A similar concept was carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st and Western Avenues. The 1st Avenue/Western Avenue route is preferred over the 3rd Avenue route because it avoids the bus tunnel under 3rd Avenue.

B1d: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. – EAST PORTAL

General Functional Description

This concept would bore twin tunnels under 4th and 5th Avenues. They would connect with SR 99 north and south of downtown. The southern terminus would be east of the E-3 Busway at about S. Massachusetts and the north terminus would be at SR 99, just south of Mercer Street. The functional description is similar to concept B1a.

Key Features

- Separates through and local traffic, with through traffic focus
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99 and Interbay/ Ballard
- Limited property impacts, except at portals
- Reduced traffic noise
- Relatively long construction period compared with other concepts
- Requires ventilation, life-safety and emergency egress
- Complex design for capacity, safety, and ventilation
- Increases freight and truck travel time to SR 99 and Interbay Ballard

Phase 1 Screening Results

The concept was both recommended for further study and recommended to be dropped in Phase 1. It was recommended to be carried forward in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, Section *“Summary of Primary Concepts Carried Forward For Screening Analysis”*. However, the 5th Avenue alignment was recommended to be dropped due to *“Narrow street; does not meet SR 99 role and function – difficult transitions; deep bore required; possible transit corridor in future.”*

Phase 2 Screening Results

In Phase 2, the concept was recommended to be dropped for several reasons:

- Goal #2, the central downtown core and stadium key access connections cannot directly be provided.
- Goal #2, the freight and truck mobility travel time through the AWW corridor is increased.

B1e: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. – SOUTH PORTAL

General Functional Description

This concept would bore twin tunnels under 4th and 5th Avenues. They would connect with SR 99 north and south of downtown. The southern terminus would be east of the Seattle International Gateway (SIG) Yard at about S. Stacy Street and the north terminus would be at SR 99 at about Denny Way. The functional description is similar to concept B1a.

Key Features

- Separates through and local traffic, with through traffic focus
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Impact to properties at south end (BNSF yards; Pioneer Square)
- Need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99 and Interbay/ Ballard
- Limited property impacts, except at portals
- Reduced traffic noise
- Relatively long construction period compared with other concepts
- Requires ventilation, life-safety and emergency egress
- Complex design for capacity, safety, and ventilation

Phase 1 Screening Results

The concept was both recommended for further study and recommended to be dropped in Phase 1. It was recommended to be carried forward in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, Section *“Summary of Primary Concepts Carried Forward For Screening Analysis”*. However, the 5th Avenue alignment was recommended to be dropped due to *“Narrow street; does not meet SR 99 role and function – difficult transitions; deep bore required; possible transit corridor in future.”*

Phase 2 Screening Results

In Phase 2, the concept was recommended to be dropped for several reasons:

- Goal #2, the central downtown core and stadium key access connections cannot directly be provided.
- A similar concept was carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st and Western Avenues. The 1st Avenue/Western Avenue route is preferred over the 4th/5th Avenue route because it avoids the Burlington Northern train tunnel under 4th Avenue and the tunnel lengths are shorter.

B1f: TWIN BORED TUNNEL ROUTE AT I-5

General Functional Description

Under this concept, bored tunnels would be constructed under I-5 through Seattle. The multiple lanes at project completion would increase I-5 capacity. The focus would be on through traffic. Intermediate connections would be

difficult due to tunnel depth and existing I-5 ramps and other structures. This concept would serve as an alternate to I-5 more than as an alternate to SR 99.

Key Features

- Separates through and local traffic, with through traffic focus
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Limited property impacts, except at portals
- Reduced traffic noise
- Relatively long construction period compared with other concepts
- Requires ventilation, life-safety and emergency egress
- Complex design for capacity, safety, and ventilation
- Increases freight and truck travel time to SR 99 and Interbay/Ballard
- Increases I-5 capacity
- Does not maintain AWV corridor capacity

Phase 1 Screening Results

The concept was dropped in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001. The justification was:

- “I-5 Alignment does not meet SR 99 role and function; possible future I-5 improvement option.”

Phase 2 Screening Results

The concept also was recommended to be dropped in Phase 2 because it did not meet the following goals:

- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- Goal #2, the freight and truck mobility capacity within the AWV corridor is not maintained or improved, but decreased due to the lack of connections.
- Goal #4, the AWV corridor linkage between the areas northwest and southwest of downtown Seattle are not maintained.

B2: SIGNATURE BRIDGE ACROSS ELLIOTT BAY FROM WEST SEATTLE

General Functional Description

This concept would construct a signature bridge across Elliott Bay from West Seattle to the Battery Street tunnel area. It would provide three to four lanes in each direction, designed to meet demand. Intermediate connections would not

be available. Opportunities for HCT include possible rail/bus route from West Seattle and waterfront rail or BRT at surface or elevated levels along the waterfront. A bridge would only serve part of the demand to and from West Seattle. Demand for access to and from the south would not be met. Construction disruptions would be substantial and would result in shipping disruptions. This concept would reduce noise and improve visual impacts along the waterfront. However, a new visual barrier would be created in Elliott Bay. Environmental considerations include ESA and shoreline issues in addition to substantial permitting issues.

Key Features

- Removes visual impact along waterfront
- Creates new visual impact in Puget Sound
- No intermediate ramp connections
- Very difficult construction due to water depth in excess of 200 feet
- Would not serve all of existing travel needs if connected to West Seattle

Phase 1 Screening Results

This concept was recommended to be dropped in Phase 1, as discussed in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001. The justification for dropping the concept was:

- Handles only small portion of SR 99 corridor demand
- Construction problematic due to deep water
- Difficult to obtain permits
- Waterfront view concerns

Phase 2 Screening Results

The concept also was recommended to be dropped in Phase 2 because it did not meet a number of goals:

- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- Goal #2, the freight and truck mobility capacity within the AWW corridor is not maintained or improved, but decreased.
- Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay
- Goal #7, the view corridor of Elliott Bay would be impacted by the bridge.

B3: ELLIOTT BAY SUBMERGED TUNNEL ALONG WATERFRONT AREA

General Functional Description

Under this concept, a submerged tunnel along the Elliott Bay waterfront area is proposed. Three lanes would be provided in each direction. The focus would be on through traffic and intermediate connections would not be provided. Joint tunnel operation with HCT does not serve the market, although waterfront rail or BRT could be incorporated at surface or elevated levels. Noise impacts would be eliminated and visual impacts would be improved. Environmental considerations include ESA and shoreline issues, along with substantial permitting issues.

Key Features

- Removes visual impact along waterfront
- Maintains viaduct traffic during construction
- Separates through and local traffic
- Environmental permits possible
- Very difficult construction to maintain shipping access; deep water
- No intermediate ramp connections
- Would need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept was recommended to be dropped in Phase 2 for the following reasons:

- Goal #2, the central downtown core and stadium key access connections cannot reasonably be provided.
- Goal #5, constructability difficult due to Elliott Bay bathymetry.
- Conceptual Alternatives N2, Twin Bored Tunnels into Cut-and-Cover Tunnel, plus C2-A, Twin Bored Tunnels, better meet Goal #5.

B4: I-5 IMPROVEMENTS TO ACCOMMODATE A PORTION OF SR-99 DEMAND

General Functional Description

This concept proposes to improve capacity of I-5 to accommodate a portion of the SR 99 demand. Increased capacity on I-5 would be accomplished through

widening. This concept would serve as an improvement to I-5 more than as an alternate to SR 99. Capacity in the AWV corridor would be reduced.

Key Features

- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Very difficult to add capacity in I-5 corridor without substantial property impacts
- Extensive traffic management already in place
- Likely high cost
- Does not serve all of SR 99 travel demands

Phase 1 Screening Results

The concept was dropped in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001. The justification for rejecting the concept was:

- “General widening of I-5 is impractical due to physical limitations through downtown Seattle. Does not fully meet SR 99 role and function. Future tunnel possibility.”

Phase 2 Screening Results

The concept was recommended to be dropped in Phase 2 because it did not meet four goals:

- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- Goal #2, the freight and truck mobility capacity within the AWV corridor is not maintained or improved, but decreased.
- Goal #4, the AWV corridor linkage between the areas northwest and southwest of downtown Seattle are not maintained.
- Goal #5, widening of I-5 would be extremely difficult to construct.

B5: ELLIOTT BAY FLOATING TUNNEL ALONG WATERFRONT AREA

General Functional Description

This concept proposes a submerged floating tube under Elliott Bay, along the waterfront. Three lanes would be provided in each direction. The focus would be on through traffic and intermediate connections would not be provided. Joint tunnel operation with HCT does not serve the market, although waterfront rail or BRT could be incorporated at surface or elevated levels. Noise impacts would be eliminated and visual impacts would be improved. Environmental

considerations include ESA and shoreline issues, along with substantial permitting issues.

Key Features

- Maintains viaduct traffic during construction
- Removes visual impact along waterfront
- Separates through and local traffic
- Environmental permits possible
- Very difficult construction to maintain shipping access; deep water
- No intermediate ramp connections
- Would need to bypass Battery Street tunnel; possible tunnel connections north to Mercer Street area on SR 99
- Would need to be very deep to avoid shipping conflicts

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The floating tunnel concept was recommended to be dropped in Phase 2. It did not meet several project goals:

- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- Goal #5, freight mobility during construction would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay
- Goal #5, there are substantial construction risks associated with a floating tunnel.
- Conceptual Alternatives N2, Twin Bored Tunnels into Cut-and-Cover Tunnel, plus C2-A, Twin Bored Tunnels, better meets Goals #2 and #5.

B6: SIGNATURE BRIDGE FROM STADIUM AREA TO BELLTOWN VIA ELLIOTT BAY

General Functional Description

This concept would construct a high-rise suspension bridge across Elliott Bay from the stadium area to Belltown. It would provide three to four lanes in each direction. Opportunities would exist to expand capacity in the future. Intermediate connections would not be available. Construction disruptions would be substantial and could result in disruptions to ferry and cruise ship access to the waterfront. Capacity of the existing viaduct would be maintained

during construction. This concept would reduce noise and improve visual impacts along the waterfront. However, a new visual barrier would be created in Elliott Bay. Environmental considerations include ESA and shoreline issues in addition to substantial permitting issues.

Key Features

- Removes visual impact along waterfront
- Creates new visual impact in Puget Sound
- No intermediate ramp connections
- Very difficult construction to maintain shipping access; deep water

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

The concept was recommended to be dropped in Phase 2 because it did not meet a number of goals:

- Goal #2, the central downtown core key access connections cannot be maintained.
- Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay.
- Goal #7, the view corridor of Elliott Bay would be impacted by the bridge.

B7: EXISTING 4th AVENUE BNSF TUNNEL TRANSITIONING TO CUT-AND-COVER TUNNEL

General Functional Description

This concept recommends a cut-and-cover tunnel that connects with the existing BNSF rail tunnel under 4th Avenue. The north portal of the BNSF tunnel at Blanchard Street would be connected to a point north of Broad Street by way of a cut-and-cover tunnel.

Key Features

- Limited capacity in BNSF tunnel due to tunnel size
- Tunnel ventilation would need to be provided
- No downtown ramp connections are likely
- Maintains viaduct traffic during construction
- Removes visual barrier for waterfront
- Environmental permits possible
- Potential impact to BNSF use of tunnel

- Need to bypass Battery Street tunnel
- Reduced traffic noise

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

The concept was recommended to be dropped in Phase 2 because it did not meet the following:

- Goal #2, adequate capacity cannot be provided in the BNSF tunnel.
- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- Goal #2, the freight and truck mobility capacity within the AWW corridor is not maintained or improved, but decreased.
- Goal #2, vehicular and pedestrian access to the ferry system is not maintained or improved.

B8a: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT BROAD STREET

General Functional Description

This concept proposes a floating bridge from the Port of Seattle property on the south end of the viaduct to connect to the existing SR 99 at Broad Street by way of a cut-and-cover tunnel.

Key Features

- Maintains viaduct traffic during construction
- Removes visual impact along waterfront
- Creates new visual impact in Puget Sound
- No midtown connections
- Port of Seattle operations would need to be relocated
- Ferry and cruise ship facilities would need to be relocated
- Navigation in Elliott Bay would be hindered, particularly along the Seattle waterfront

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

The concept also was recommended to be dropped in Phase 2 because it did not meet a number of goals:

- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay.
- Goal #2, vehicular and pedestrian access to the ferry from downtown is decreased.

B8b: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT SENECA STREET

General Functional Description

This concept proposes a floating bridge from the Port of Seattle property on the south end of the viaduct to connect to the existing viaduct at Seneca Street.

Key Features

- Maintains viaduct traffic during construction
- Removes visual impact along waterfront
- Creates new visual impact in Puget Sound
- No midtown connections
- Port of Seattle operations would need to be relocated
- Ferry and cruise ship facilities would need to be relocated
- Navigation in Elliott Bay would be hindered, particularly along the Seattle waterfront

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

The concept also was recommended to be dropped in Phase 2 because it did not meet a number of goals:

- Goal #2, the central downtown core and stadium key access connections cannot be provided.
- Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay.
- Goal #2, vehicular and pedestrian access to the ferry from downtown is decreased.

C. MULTIMODAL SOLUTIONS

C1: TRANSPORTATION SYSTEM / DEMAND MANAGEMENT TO MAXIMIZE EXISTING SYSTEM

General Functional Description

The goal of this concept is to use transportation system and demand management (TSM/TDM) to maximize the existing system either through changes to improve traffic flow or reduce demand on facilities. The components of this concept include maximizing transit and non-motorized modes and the use of existing transportation facilities. Modest improvements to several existing facilities would be combined with an emphasis on alternative modes. Possibilities include transit priority, replacement or retrofit of existing viaduct as required to meet safety needs only, pricing strategies for general traffic and freight to minimize vehicle demand, and improved pedestrian and bicycle connections.

Key Features

- Maintains traffic during construction
- Removes visual barrier
- Replace existing ramps with arterial connections
- Emphasizes pedestrian and bicycle opportunities
- Environmental permits possible
- Short time-frame for implementation
- Uncertain prospects for replacing current person movement and freight capacity with surface arterial and alternate modes
- Generally lower cost in comparison to capital improvements

Phase 1 Screening Results

This concept was recommended to be carried forward in “*Development and Screening of Concepts, Working Paper #7 and 8*”, dated August 2001, Section “*Summary of Primary Concepts Carried Forward For Screening Analysis, Boulevard with Multi-Modal Options.*”

Phase 2 Screening Results

TSM/TDM alone could not address the purpose and need of the project, specifically the mandatory goal #2 of maintaining or improving the transportation functions of the AWW corridor. TSM/TDM was therefore dropped as a stand-alone project. However, systems management and demand management strategies will be applied within each of the Conceptual Alternatives that are carried forward.

C2: HCT ALONG EXISTING AWV CORRIDOR WITH NEW CONCEPT

General Functional Description

This concept proposes to combine a High Capacity Transit (HCT) route, such as Light Rail Transit (LRT), Monorail, or Bus Rapid Transit (BRT), together with a roadway replacement. Variations may include a HCT route adjacent to, above, or below, the new viaduct structure, within new tunnel structure, or above or part of the surface street option.

Key Features

- Ties to ongoing ETC/ITC studies and King County Metro BRT planning efforts
- Could be used as partial construction mitigation
- Timing of decisions need to be coordinated
- Waterfront route may not be preferred transit corridor
- Cost and time addition

Phase 1 Screening Results

This concept was recommended to be carried forward in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, Section *“Summary of Primary Concepts Carried Forward For Screening Analysis, Boulevard with Multi-Modal Options.”*

Phase 2 Screening Results

Some level of HCT can be accommodated in all Conceptual Alternatives.

C3: HCT ALONG NEW AWV CORRIDOR WITH NEW CONCEPT

General Functional Description

This concept would combine a HCT route (LRT, Monorail, BRT) together with a tunnel or bridge concept. Variations could include bus only lanes in tunnels, or aerial structures for BRT, and bus or rail priority lanes on the surface.

Key Features

- Ties to ongoing Monorail and ITC study, and King County Metro BRT planning efforts
- Could substantially expand transit capacity through downtown (tunnel route)
- Timing of decisions need to be coordinated
- Could substantially affect design of tunnel
- Cost and time addition

Phase 1 Screening Results

This concept was recommended to be carried forward in *“Development and Screening of Concepts, Working Paper #7 and 8”*, dated August 2001, Section *“Summary of Primary Concepts Carried Forward For Screening Analysis, Bored Tunnels.”*

Phase 2 Screening Results

Some level of HCT can be accommodated in all Conceptual Alternatives.

D. RELATED IMPROVEMENTS (COMBINE WITH OTHER CONCEPTS)

D1a: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE

General Functional Description

This concept would add missing ramps at the South Spokane Street/ Alaskan Way interchange. Additional data on freight demand are necessary to justify investments.

Key Features

- Freight access improvements
- Removes trucks from city streets; more effectively uses AWV corridor for freight
- Improves access from West Seattle

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

In Phase 2, this concept, with connections to and from the north, is recommended to be carried forward in all south alignment Conceptual Alternatives. This concept is the same as D3b.

D1b: IMPROVE ACCESS AT STADIUM AREA

General Functional Description

This concept would improve the access in the vicinity of the baseball stadium and the new football stadium. Connections between surface streets and the AWV would be provided.

Key Features

- Improve existing design deficiencies at existing ramps
- Helps relieve traffic on city streets
- Helps balance flows between SR 99 and I-5
- Reduces role of viaduct as a bypass of downtown
- May cause traffic congestion concerns on viaduct due to added volume
- Coordination with SR 519 improvements required

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is recommended to be carried forward in all Conceptual Alternatives.

D1c: ADD NEW ACCESS AT THE DOWNTOWN CORE

General Functional Description

This concept would add new access at the downtown core. Connections between surface streets and the AWV would be improved.

Key Features

- Improve existing design deficiencies at existing ramps
- Helps relieve traffic on city streets
- Helps balance flows between SR 99 and I-5
- Reduces role of viaduct as a bypass of downtown
- May cause traffic congestion concerns on viaduct and immediate adjacent arterials due to added volume

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

In Phase 2, this concept is recommended to be carried forward in Conceptual Alternatives C1-A, Cut-and-Cover Tunnel; C1-B, Cut-and Cover Tunnel with Aerial Structure; C2-B, Twin Bored Tunnels with Aerial Structure; C3, Double Stacked Aerial Structure; C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB; and C5, Staggered Aerial Structures with One Level NB and One Level SB.

D1d: IMPROVE ACCESS AT BATTERY ST. / WESTERN AVE. / ELLIOTT AVE.

General Functional Description

This concept would improve the access at Battery Street/Western Avenue/Elliott Avenue.

Key Features

- Improves existing design deficiencies at existing ramps
- Helps relieve traffic on city streets
- Helps balance flows between SR 99 and I-5
- Reduces role of viaduct as a bypass of downtown
- May cause traffic congestion concerns on viaduct and immediate adjacent streets due to added volume

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is recommended to be carried forward in Conceptual Alternatives C1-A, Cut-and-Cover Tunnel; C1-B, Cut-and-Cover Tunnel with Aerial Structure; C2-A, Twin Bored Tunnels; C2-B, Twin Bored Tunnels with Aerial Structure; C3, Double Stacked Aerial Structure; C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB; and C5, Staggered Aerial Structures with One Level NB and One Level SB.

D1e: ADD SOUTH SPOKANE STREET OFF-RAMP TO 6TH AVENUE SOUTH FOR BUSES

General Functional Description

This concept would add an off-ramp to 6th Avenue South from South Spokane Street for bus use.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is recommended to be dropped because it is not related to the purpose of the project.

D1f: ADD SOUTH SPOKANE STREET OFF-RAMP TO 4TH AVENUE SOUTH

General Functional Description

This concept would add an off-ramp from South Spokane Street to 4th Avenue South.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is recommended to be dropped because it is not related to the purpose of the project.

D1g: ADD EXTENSION TO THE SOUTH SPOKANE STREET 4TH AVENUE ON-RAMP

General Functional Description

This concept would add an extension to the South Spokane Street 4th Avenue on-ramp.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is recommended to be dropped because it is not related to the purpose of the project.

D1h: PROVIDE SOUTHBOUND ACCESS TO SR 99 FROM WEST SEATTLE BRIDGE

General Functional Description

This concept would add southbound access to SR 99 from the West Seattle Bridge.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is recommended to be dropped because it is not related to the purpose of the project.

D2a: ADD CONNECTION TO SOUTH LAKE UNION AREA

General Functional Description

This concept would add connections to the south Lake Union area. Access to and from south Lake Union and SR 99 would be improved.

Key Features

Further study required.

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept is recommended to be carried forward in Conceptual Alternatives N1, Mined Tunnel into Cut-and-Cover Tunnel; N2, Twin Bored Tunnels into Cut-and-Cover Tunnel; N3, Cut-and-Cover Tunnel; and N4, Twin Mined Tunnels into Cut-and Cover Tunnel.

D2b: EXTEND ALASKAN WAY CORRIDOR TO I-5 THRU MERCER ST. CORRIDOR

General Functional Description

The Alaskan Way corridor would be extended to I-5 through the Mercer Street corridor at the south end of Lake Union.

Key Features

Further study required.

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.

D2c: EXTEND SR 520 TO ALASKAN WAY CORRIDOR

General Functional Description

This concept proposes to extend SR 520 west to the Alaskan Way corridor.

Key Features

Further study required.

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.

D2d: EXTEND SR 99 GRADE SEPARATION OVER 1ST AVE. S. BRIDGE TO SR 509

General Functional Description

This concept would extend the SR 99 grade separation over the 1st Avenue South Bridge to SR 509.

Key Features

Further study required.

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.

D2e: IMPROVE BALLARD / INTERBAY CONNECTIONS**General Functional Description**

For this regional connection concept, connections between SR 99 and Ballard/ Interbay would be improved.

Key Features

Further study required.

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept is recommended to be carried forward in Conceptual Alternatives N1, Mined Tunnel into Cut-and-Cover Tunnel; N2, Twin Bored Tunnels into Cut-and-Cover Tunnel; N3, Cut-and-Cover Tunnel; and N4, Twin Mined Tunnels into Cut-and Cover Tunnel.

D2f: IMPROVE I-90 / SR 519 / SR 99 CONNECTIONS**General Functional Description**

This concept proposed to improve the connections between I-90, SR 519, and SR 99.

Key Features

Further study required.

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept of improving the connection between I-90 and SR 519 is not precluded, however it is not related to the purpose of the project. In Phase 2, the concept of connecting SR 519 to SR 99 is recommended to be carried forward in all Conceptual Alternatives.

D2g: IMPROVE I-5 / SR 99 CONNECTION AT SOUTH SPOKANE STREET

General Functional Description

The connection between I-5 and SR 99 would be improved at South Spokane Street.

Key Features

Further study required.

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

The concept of improving the connection between I-5 and South Spokane Street is not precluded, however it is not related to the purpose of the project. In Phase 2, the concept of improving the connection between South Spokane Street and SR 99 is recommended to be carried forward.

D2h: IMPROVE WATERFRONT ACCESS BETWEEN THE WEST SEATTLE BRIDGE AND BATTERY STREET

General Functional Description

Access to the waterfront would be improved at all points between the West Seattle Bridge and Battery Street.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept. All of the concepts recommended to be carried forward as Conceptual Alternatives contribute in varying degrees to Goal #8, the continuing development of the downtown urban waterfront through expanded connections between downtown Seattle, the waterfront, and central Puget Sound for local citizens and visitors.

D2i: LOCATE TUNNEL PORTAL AT ROY STREET TO RECONNECT CROSSINGS AT THOMAS AND HARRISON

General Functional Description

This concept proposes to locate a concept's tunnel portal at Roy Street, allowing for the reconnecting of Thomas Street and Harrison Street.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept can be accommodated in Conceptual Alternatives N1, Mined Tunnel into Cut-and-Cover Tunnel; N2, Twin Bored Tunnels into Cut-and-Cover Tunnel; N3, Cut-and-Cover Tunnel; and N4, Twin Mined Tunnels into Cut-and-Cover Tunnel.

D2j: ADD OFF-RAMP TO AIRPORT WAY

General Functional Description

This concept would add an off-ramp to Airport Way.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.

D2k: RE-UTILIZE BATTERY STREET TUNNEL AS A VEHICULAR CONNECTION TO ALASKAN WAY

General Functional Description

This concept would use the Battery Street Tunnel as a vehicular connection to Alaskan way, reducing traffic on Broad Street at Alaskan Way.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is not related to the purpose of the project, but can be accommodated in all build Conceptual Alternatives.

D3a: SR 99 GRADE SEPARATION CROSSING BETWEEN ATLANTIC AND SOUTH SPOKANE STREETS

General Functional Description

This concept for improving freight mobility proposes a grade-separated crossing of SR 99 for trucks between South Atlantic and South Spokane Streets. Additional data on freight demand are needed to justify investments.

Key Features

- Freight access improvements
- Removes trucks from city streets; more effectively uses AWW corridor for freight

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is recommended to be carried forward in Conceptual Alternatives S1, Aerial Structure with East Alignment; S2, Aerial Structure with West Alignment; S4, Twin Bored Tunnels; and S6, Cut-and-Cover Tunnel.

D3b: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE

General Functional Description

This concept would add missing ramps at the South Spokane Street/ Alaskan Way interchange. Additional data on freight demand are necessary to justify investments.

Key Features

- Freight access improvements
- Removes trucks from city streets; more effectively uses AWV corridor for freight

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

In Phase 2, this concept, with connections to and from the north, is recommended to be carried forward in all south alignment Conceptual Alternatives. This concept is the same as D1a.

D3c: SOUTH HANFORD ST. RAMPS TO/FROM SR 99 FOR GENERAL TRAFFIC / FREIGHT

General Functional Description

This concept proposes to add South Hanford Street ramps for general traffic or freight access to/from northbound SR 99. Additional data on freight demand are necessary to justify investments.

Key Features

- Freight access improvements
- Removes trucks from city streets; more effectively uses AWV corridor for freight

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept was recommended to be dropped for the following reasons:

- Goal #2, improvements in access connections are redundant due to South Spokane Street connection improvements

- Goal #3, does not meet roadway design standards for ramps due to close proximity to South Spokane Street

D3d: IMPROVE EAST-WEST FREIGHT ACCESS BETWEEN SOUTH SPOKANE ST. AND SOUTH HOLGATE ST.

General Functional Description

Improved east-west freight access in the area between South Spokane and South Holgate Streets would occur under this concept. Additional data on freight demand are necessary to justify investments.

Key Features

- Freight access improvements
- Removes trucks from city streets; more effectively uses AWW corridor for freight

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

- This concept is recommended to be carried forward in Conceptual Alternatives S1, Aerial Structure with East alignment; S2, Aerial Structure with West Alignment; S4, Twin Bored Tunnels, and S6, Cut-and-Cover Tunnel.

D3e: IMPROVE BROAD STREET RAIL CROSSING

General Functional Description

This concept proposes improving the rail crossing at Broad Street.

Key Features

- Freight mobility improvements
- Vehicular mobility improvements

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is not precluded, however it is not related to the purpose of the project.

D3f: MOVE TRUCK CONTAINERS FROM WATERFRONT TO I-90

General Functional Description

This concept proposes to move the truck containers from the waterfront to I-90.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept was recommended to be carried forward. The concept of providing a connection to I-90 via SR 519 from the Alaskan Way Corridor would be accomplished in all conceptual alternatives carried forward.

D3g: INCORPORATE EXISTING RAILROAD TRACKS WITHIN THE CUT-AND-COVER TUNNEL

General Functional Description

This concept proposes to incorporate the existing railroad tracks within the new cut-and-cover tunnel. North of the railroad portal at Pike Street, the rail line would be lowered to be combined with the cut-and-cover tunnel.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is not related to the purpose of the project and is recommended to be dropped.

D4a: ADD FERRY TRAFFIC QUEUING AREA ON EXISTING ALASKAN WAY S.**General Functional Description**

A queuing area for ferry traffic would be added within the existing Alaskan Way S. right-of-way.

Key Features

- Expansion of current projects (e.g. SR 519)
- Complicates implementation of certain viaduct replacement concepts

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

In Phase 2, the intent of this concept is recommended to be carried forward as part of Conceptual Alternatives S1, Aerial Structure with East Alignment; S2, Aerial Structure with West Alignment; S3, Surface Roadway with West Alignment; S4, Twin Bored Tunnels; S5, Surface Roadway with East Alignment; and S6, Cut-and-Cover Tunnel, by providing queuing out of the existing Alaskan Way ROW.

D4b: EXPAND PEDESTRIAN CONNECTIONS BETWEEN FERRY TERMINAL AND DOWNTOWN**General Functional Description**

Pedestrian connections between the ferry terminals and the downtown core would be expanded.

Key Features

- Expansion of current projects (e.g. SR 519)
- Complicates implementation of certain viaduct replacement concepts

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is recommended to be carried forward with the urban design component of each Conceptual Alternative.

D4c: IMPROVE FERRY CONNECTIONS TO AWW CORRIDOR AND DOWNTOWN

General Functional Description

This concept would improve ferry connections to the AWW corridor and downtown core.

Key Features

- Expansion of current projects (e.g. SR 519)
- Complicates implementation of certain viaduct replacement concepts

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is recommended to be carried forward in all Conceptual Alternatives via the SR 519 connection.

D5a: IMPROVE PEDESTRIAN ENVIRONMENT ALONG WATERFRONT

General Functional Description

This concept proposes to improve the pedestrian environment along the waterfront.

Key Features

- Consistent with city's downtown neighborhood plans and vision
- Conflicts with certain concepts for replacement of viaduct

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is recommended to be carried forward with the urban design component of each Conceptual Alternative.

D5b: IMPROVE PEDESTRIAN CONNECTIONS BETWEEN WATERFRONT AND DOWNTOWN

General Functional Description

Under this concept, pedestrian connections between the waterfront and downtown core would be improved.

Key Features

- Consistent with city's downtown neighborhood plans and vision
- Conflicts with certain concepts for replacement of viaduct

Phase 1 Screening Results

No action was taken to either drop or carry forward the concept.

Phase 2 Screening Results

This concept is recommended to be carried forward with the urban design component of each Conceptual Alternative.

D5c: RETAIL, RESIDENTIAL, AND PUBLIC SPACE WITH AERIAL STRUCTURE

General Functional Description

Under this concept, retail, residential and/or public space would be combined with an aerial structure.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is carried forward pending alternative development and is not precluded by any of the aerial structure Conceptual Alternatives.

D5d: BUILD WATERFRONT PEDESTRIAN PARK WITH BUSINESS

General Functional Description

Under this concept, a waterfront pedestrian park would be built and integrated with downtown businesses.

Key Features

Further study required.

Phase 1 Screening Results

This concept was not considered in Phase 1.

Phase 2 Screening Results

This concept is carried forward pending alternative development and is not precluded by any Conceptual Alternative.

CONCEPTS RECOMMENDED TO BE DROPPED FROM FURTHER CONSIDERATION

ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWV CORRIDOR

- A1b: RETROFIT CONCEPT LIMITED TO PASSENGER VEHICLES AND TRANSIT
- A3a: ONE-LEVEL AERIAL WITH SIX LANES - OVER EXISTING
- A3b: ONE-LEVEL AERIAL WITH SIX LANES - WEST OF EXISTING
- A4a: MULTI-LANE BOULEVARD SURFACE ROADWAY
- A4b: MULTI-LANE BOULEVARD SURFACE ROADWAY WITH SECTIONS OF TUNNEL
- A5a: ONE-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY
- A6: COMBINE ONE-LEVEL ONE WAY AERIAL AND ONE WAY SURFACE ARTERIAL
- A8: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE WAY SURFACE ARTERIAL
- A9: BORED TUNNEL UNDER ALASKAN WAY

ROADWAY IMPROVEMENTS OUTSIDE OF THE AWV CORRIDOR

- B1c: TWIN BORED TUNNELS AT 3RD AVE.
- B1d: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. - EAST PORTAL
- B1e: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. - SOUTH PORTAL
- B1f: TWIN BORED TUNNEL ROUTE AT I-5
- B2: SIGNATURE BRIDGE ACROSS ELLIOTT BAY FROM WEST SEATTLE
- B3: ELLIOTT BAY SUBMERGED TUNNEL ALONG WATERFRONT AREA
- B4: I-5 IMPROVEMENTS TO ACCOMMODATE A PORTION OF SR-99 DEMAND
- B5: ELLIOTT BAY FLOATING TUNNEL ALONG WATERFRONT AREA
- B6: SIGNATURE BRIDGE FROM STADIUM AREA TO BELLTOWN VIA ELLIOTT BAY
- B7: EXISTING 4TH AVENUE BNSF TUNNEL TRANSITIONING TO CUT-AND-COVER TUNNEL
- B8a: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT BROAD STREET
- B8b: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT SENECA STREET

MULTIMODAL SOLUTIONS

No multimodal solutions are recommended to be dropped.

RELATED IMPROVEMENTS

- D1e: ADD SOUTH SPOKANE STREET OFF-RAMP TO 6TH AVENUE FOR BUSES
- D1f: ADD SOUTH SPOKANE STREET OFF-RAMP TO 4TH AVENUE SOUTH
- D1g: ADD EXTENSION TO THE SOUTH SPOKANE STREET 4TH AVENUE ON-RAMP
- D1h: PROVIDE SOUTHBOUND ACCESS TO SR 99 FROM WEST SEATTLE BRIDGE
- D2b: EXTEND ALASKAN WAY CORRIDOR TO I-5 THRU MERCER ST. CORRIDOR
- D2c: EXTEND SR 520 TO ALASKAN WAY CORRIDOR
- D2d: EXTEND SR 99 GRADE SEPARATION OVER 1ST AVE. S. BR. TO SR 509
- D2h: IMPROVE WATERFRONT ACCESS BETWEEN THE WEST SEATTLE BRIDGE AND BATTERY STREET
- D2j: ADD OFF-RAMP TO AIRPORT WAY
- D2k: RE-UTILIZE BATTERY STREET TUNNEL AS A VEHICULAR CONNECTION TO ALASKAN WAY
- D3c: HANFORD ST. RAMPS TO/FROM SR 99 FOR GENERAL TRAFFIC / FREIGHT
- D3e: IMPROVE BROAD STREET RAIL CROSSING
- D3g: INCORPORATE EXISTING RAILROAD TRACKS WITHIN THE CUT-AND-COVER TUNNEL

CONCEPTS RECOMMENDED TO BE CARRIED FORWARD

ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWW CORRIDOR

- A1a: RETROFIT CONCEPT
- A2a: TWO-LEVEL AERIAL REPLACEMENT - WEST OF EXISTING
- A2b: TWO-LEVEL AERIAL REPLACEMENT - EXISTING LOCATION
- A5b: TWO-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY
- A7: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE-LEVEL ONE WAY AERIAL

ROADWAY IMPROVEMENTS OUTSIDE OF THE AWW CORRIDOR

- B1a: TWIN BORED TUNNELS AT WESTERN AVE. (1ST AVE. AND WESTERN AVE. IN CONCEPTUAL ALTERNATIVE C2-A, TWIN BORED TUNNELS)
- B1b: TWIN BORED TUNNEL ROUTES AT 1ST AVE. AND 2ND AVE. (1ST AVE. AND WESTERN AVE. IN CONCEPTUAL ALTERNATIVE C2-A, TWIN BORED TUNNELS)

MULTIMODAL SOLUTIONS

- C1: TRANSPORTATION SYSTEM MANAGEMENT
- C2: ACCOMMODATE HCT ALONG EXISTING AWW CORRIDOR WITH NEW CONCEPT
- C3: ACCOMMODATE HCT ALONG NEW AWW CORRIDOR WITH NEW CONCEPT

RELATED IMPROVEMENTS

- D1a: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE
- D1b: IMPROVE ACCESS AT STADIUM AREA
- D1c: ADD NEW ACCESS AT THE DOWNTOWN CORE
- D1d: IMPROVE ACCESS AT BATTERY ST. / WESTERN AVE. / ELLIOTT AVE.
- D2a: ADD CONNECTION TO SOUTH LAKE UNION AREA
- D2e: IMPROVE BALLARD / INTERBAY CONNECTIONS
- D2f: IMPROVE SR 519 / SR 99 CONNECTIONS
- D2g: IMPROVE I-5 / SR 99 CONNECTION AT SOUTH SPOKANE STREET
- D2i: LOCATE TUNNEL PORTAL AT ROY STREET

- D3a: SR 99 GRADE SEPARATION CROSSING BTWN ATLANTIC AND SOUTH SPOKANE
- D3b: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE
- D3d: IMPROVE EAST-WEST FREIGHT ACCESS BETWEEN SOUTH SPOKANE ST. AND SOUTH HOLGATE ST.
- D3f: MOVE TRUCK CONTAINERS FROM WATERFRONT TO I-90
- D4a: ADD FERRY TRAFFIC QUEUING AREA ON EXISTING ALASKAN WAY
- D4b: EXPAND PEDESTRIAN CONN. BTWN FERRY TERMINAL AND DOWNTOWN
- D4c: IMPROVE FERRY CONN. TO AWV CORRIDOR AND DOWNTOWN
- D5a: IMPROVE PEDESTRIAN ENVIRONMENT ALONG WATERFRONT
- D5b: IMPROVE PEDESTRIAN CONN. BTWN WATERFRONT AND DOWNTOWN
- D5c: RETAIL, RESIDENTIAL, AND PUBLIC SPACE WITH AERIAL STRUCTURE
- D5d: BUILD WATERFRONT PEDESTRIAN PARK WITH BUSINESS

Appendix A: Screening Criteria Table

Appendix B: Initial Concept Status Summary Table

Appendix C: Conceptual Alternatives List

ALASKAN WAY VIADUCT PROJECT

CONCEPTUAL ALTERNATIVES LIST

EXISTING CONCEPTUAL ALTERNATIVE

EX1: NO-BUILD

RETROFIT ALTERNATIVE

R1: RETROFIT

NORTH ALIGNMENT CONCEPTUAL ALTERNATIVES

- N1: MINED TUNNEL INTO CUT-AND-COVER TUNNEL
- N2: TWIN BORED TUNNELS INTO CUT-AND-COVER TUNNEL
- N3: CUT-AND-COVER TUNNEL
- N4: TWIN MINED TUNNELS INTO CUT-AND-COVER TUNNEL

CENTRAL ALIGNMENT CONCEPTUAL ALTERNATIVES

- C1-A: CUT-AND-COVER TUNNEL (PAIRED WITH N1)
- C1-B: CUT-AND COVER TUNNEL WITH AERIAL STRUCTURE (PAIRED WITH N1)
- C2-A: TWIN BORED TUNNELS (PAIRED WITH N2)
- C2-B: TWIN BORED TUNNELS WITH AERIAL STRUCTURE (PAIRED WITH N2)
- C3: DOUBLE STACKED AERIAL STRUCTURE (PAIRED WITH N3)
- C4: SPLIT WITH ONE LEVEL CUT-AND-COVER TUNNEL (PAIRED WITH N4)
NB AND ONE LEVEL AERIAL STRUCTURE SB
- C5: STAGGERED AERIAL STRUCTURES WITH ONE LEVEL (PAIRED WITH N3)
NB AND ONE LEVEL SB

SOUTH ALIGNMENT ALTERNATIVES

- S1: AERIAL STRUCTURE WITH EAST ALIGNMENT
- S2: AERIAL STRUCTURE WITH WEST ALIGNMENT
- S3: SURFACE ROADWAY WITH WEST ALIGNMENT
- S4: TWIN BORED TUNNELS
- S5: SURFACE ROADWAY WITH EAST ALIGNMENT
- S6: CUT-AND-COVER TUNNEL

This Page Intentionally Left Blank

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
GOAL 1 - MANDATORY: An alternative should provide a facility that meets current seismic design standards.			
A. Meets Current Seismic Standards	The alternative meets the current WSDOT and AASHTO seismic design standards.	WSDOT Bridge Design Manual and AASHTO	Note the characteristic(s) of an alternative that appear seismically vulnerable.

Phase II Screening

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 2 – MANDATORY: An alternative should maintain or improve the transportation functions of the Alaskan Way Viaduct corridor.

A. Capacity	The alternative provides an equal or increased capacity to carry people and goods in the corridor.	Transportation Analysis	Note the capacity function(s) that cannot be provided by an alternative.
B. Access Connections	The alternative provides equal or improved access to key locations.	Key Access Locations: Central Downtown Core, the Stadiums, the Ballard – Interbay Area, and the Duwamish Manufacturing and Industrial Centers	Note the access connection(s) that cannot be provided by an alternative.
C. Freight and Truck Mobility	The alternative provides equal or improved truck and freight mobility in the corridor.	Transportation Analysis	Note the freight and truck mobility function(s) that cannot be provided by an alternative.
D. Ferry System Access	The alternative provides equal or improved vehicular and pedestrian access to the ferry system.	Transportation Analysis	Note the vehicular and pedestrian access function(s) that cannot be provided by an alternative.
E. Pedestrian and Non-motorized User Mobility	The alternative provides equal or improved pedestrian and non-motorized user mobility in the corridor.	Transportation Analysis	Note the pedestrian and non-motorized user mobility function(s) that cannot be provided by an alternative.

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 3 - An alternative should improve traffic safety.			
A. Roadway Design Standards for Lane Widths	The alternative should improve traffic safety by meeting WSDOT approved roadway design standards for lane widths.	WSDOT Approved Roadway Design Standards	List the location(s) where an alternative does not meet roadway design standards and briefly describe the safety implications of not meeting the standards.
B. Roadway Design Standards for Shoulder Widths	The alternative should improve traffic safety by meeting WSDOT approved roadway design standards for shoulder widths.	WSDOT Approved Roadway Design Standards	List the location(s) where an alternative does not meet roadway design standards and briefly describe the safety implications of not meeting the standards.
C. Roadway Design Standards for Ramps	The alternative should improve traffic safety by meeting WSDOT approved roadway design standards for ramps.	WSDOT Approved Roadway Design Standards	List the location(s) where an alternative does not meet roadway design standards and briefly describe the safety implications of not meeting the standards.

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 4 - An alternative should maintain or improve transportation system linkages regionally and should allow for future linkages.			
A. Regional Transportation Projects	The alternative should integrate functionally with other transportation projects currently underway or planned.	Projects: SR 519, Spokane Street Viaduct Widening, South Lander Street Overpass, and SR 509.	List the transportation system project(s) that are precluded or restricted.
B. Regional Linkages	The alternative should maintain or improve the existing regional linkages and allow for future linkages.	Linkages to: I-5, Trans-Lake / SR 520, and South Lake Union.	List the transportation system linkages that are precluded or restricted.
C. High Capacity Transit	The alternative should improve high capacity transit through the corridor.	High Capacity Transit Modes: Monorail, Light Rail, Bus Rapid Transit, and HOV Lanes.	List the transportation system high capacity transit mode(s) that are precluded or restricted.

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 5 - An alternative should minimize adverse impacts during construction.			
A. Construction Time	The alternative should minimize the construction timeframe.	Project Team Estimate	List and briefly describe the area(s) where the length of construction time appears to have a sever impact.
B. Construction Methods	The alternative should rely on proven construction methods to avoid or minimize construction risks.	Project Team Estimate	List and briefly describe the area(s) where adverse construction risks appear particularly severe.
C. Local Businesses and Communities	The alternative should minimize construction related impacts on local businesses and communities during construction.	Project Team Estimate	List and briefly describe the area(s) where adverse impacts on local businesses and communities appear particularly severe.
D. Vehicles and Pedestrians	The alternative should minimize construction related impacts on the mobility of vehicles and pedestrians within the corridor during construction.	Transportation Analysis	List and briefly describe the area(s) where adverse impacts on vehicle and pedestrian mobility appear particularly severe.
E. Traffic Management	The alternative should promote effective traffic management within the corridor during construction.	Transportation Analysis	List and briefly describe the area(s) where adverse traffic management impacts appear particularly severe.
F. Utilities	The alternative should minimize construction related impacts on utilities within the corridor during construction.	Utilities: water, sanitary sewer, storm drainage, power, natural gas, communications, and steam.	List and briefly describe the area(s) where utility impacts appear particularly severe.

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 6 - An alternative should minimize environmental impacts during and after construction.

A. Noise	The alternative should avoid, minimize, or mitigate adverse environmental noise impacts during and after construction.	Project Team Estimate of Sensitive Receptors	List and briefly describe area(s) where noise impacts are particularly severe.
B. Water Quality	The alternative should avoid, minimize, or mitigate adverse environmental impacts on water quality during and after construction.	Project Team Estimate of In-water Work and other water quality impacts	List and briefly describe area(s) where water quality impacts are particularly severe.
C. Fish and Wildlife	The alternative should avoid, minimize, or mitigate adverse environmental impacts on fish and wildlife during and after construction.	Project Team Estimate	List and briefly describe area(s) where fish and wildlife impacts are particularly severe.

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 7 - An alternative should minimize social and cultural impacts during and after construction.

A. Historic and Cultural Resources	The alternative should avoid, minimize, or mitigate impacts on historic and cultural resources during and after construction.	Historic resources include known historic sites and buildings. Cultural resources include known cultural activities and sites.	List and briefly describe the area(s) where impacts to cultural and historic resources appear to be severe.
B. Neighborhoods	The alternative should avoid or minimize impacts on neighborhoods during and after construction.	Project Team Estimate	List and briefly describe the area(s) where impacts to neighborhood(s) appear to be severe.
C. Parks	The alternative should avoid, minimize, or mitigate impacts on parks during and after construction.	Project Team Estimate	List and briefly describe the area(s) where impacts to park(s) appear to be severe.
D. Trails	The alternative should avoid, minimize, or mitigate impacts on trails during and after construction.	Project Team Estimate	List and briefly describe the area(s) where impacts to trail(s) appear to be severe.
E. Recreation Areas	The alternative should avoid, minimize, or mitigate impacts on recreation areas during and after construction.	Project Team Estimate	List and briefly describe the area(s) where impacts to recreation area(s) appear to be severe.
F. Displacement	The alternative should minimize the displacement of the community during and after construction.	The community includes: residences, commercial establishments, churches, schools, community centers, parking, and view corridors.	List and briefly describe the area(s) where displacement of the community appears to be severe.

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 8 - An alternative should support land use and shoreline plans and policies pertaining to existing and future development of the downtown Seattle waterfront.			
A. Downtown Urban Waterfront Connections	The alternative should contribute to the continuing development of the downtown urban waterfront through expanded connections between downtown Seattle, the waterfront and central Puget Sound for local citizens and visitors.	Connections: Visual, Physical, and Aesthetic	List and briefly describe area(s) where continued development of the waterfront for expanded connections would be inhibited.
B. Public Open Spaces	The alternative should maintain or improve accessible public open spaces.	Project Team Estimate	List and briefly describe area(s) where continued development of the waterfront for public open spaces would be inhibited.

Phase II Screening

ALASKAN WAY VIADUCT PROJECT
SCREENING CRITERIA TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	CRITERIA SOURCE	EVALUATION METRIC
----------------------	---------------------	-----------------	-------------------

GOAL 9 - An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall.

A. Marine and Inter-tidal Habitat	The alternative should support improved habitat in the marine and inter-tidal environment.	Project Team Estimate	Briefly describe how an alternative could inhibit habitat improvements.
-----------------------------------	--	-----------------------	---

Phase II Screening

This Page Intentionally Left Blank

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A. ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWV CORRIDOR				
A1a	Retrofit Concept	DROPPED 8/01	CARRIED FORWARD	<p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001.</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ “Recommended against by WSDOT expert panel,” <i>Report of the Structural Sufficiency Review Committee</i>, dated June 28, 2001. <p>Phase 2 - Carried forward as Conceptual Alternative R1, Retrofit.</p>
A1b	Retrofit Concept Limited to Passenger Vehicles and Transit	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the capacity functions within the corridor cannot be maintained. ➤ Goal #2, the freight and truck mobility travel time through the AWV corridor is increased.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	

A2	Two-Level Aerial Replacement Concept			
A2a	West of Existing: New Southbound Aerial Structure to West-Demo Existing-Replace Existing Viaduct with Northbound Aerial Structure	CARRIED FORWARD 8/01	CARRIED FORWARD	Phase 1 - Carried forward in “ <i>Development and Screening of Concepts, Working Paper #7 and 8</i> ”, dated August 2001. Phase 2 - Carried forward as Conceptual Alternative C5, Staggered Aerial Structures with One Level NB and One Level SB
A2b	Existing Location: Temporary Structure to West-Demo Existing-Replace with Similar Aerial Structure	CARRIED FORWARD 8/01	CARRIED FORWARD	Phase 1 - Carried forward in “ <i>Development and Screening of Concepts, Working Paper #7 and 8</i> ”, dated August 2001. Phase 2 - Carried forward as Conceptual Alternative C3, Double Stacked Aerial Structure. There can be variations from the temporary structure concept to accommodate traffic re-route.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A3	One-Level Aerial Structure with 6-lane Roadway Concept			
A3a	New One-Level Aerial Structure Over Existing Viaduct-Demo Existing Viaduct	DROPPED 8/01	DROPPED	<p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001. Justification:</p> <ul style="list-style-type: none"> ➤ “Covers most of AWV right-of-way; view issues; very difficult transitions at north end; intermediate access problematic; possible impacts to historic buildings.” <p>Phase 2 - Dropped. Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core access connections would be extremely difficult due to the height of the structure ➤ Goal #2, truck and freight mobility on surface streets would be hindered due to long ramps required for a high aerial structure ➤ Goal #5, construction risk is high and construction is difficult over an operating roadway ➤ Goal #7, historic structures likely impacted by large columns on either side of the existing viaduct ➤ Goal #7, the existing waterfront view corridor would be substantially impacted due to the width required for one level and the height required to build over the existing viaduct structure.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
				<ul style="list-style-type: none"> ➤ The screening criteria goals of the project are better met by Conceptual Alternatives C3, Double Stacked Aerial Structure; C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB; and C5, Staggered Aerial Structures with One Level NB and One Level SB.
A3b	New One-Level Aerial Structure Partially or Fully to West-Demo Existing Viaduct	DROPPED 8/01	DROPPED	<p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001.</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ “Covers most of AWV right-of-way; view issues; very difficult transitions at north end; intermediate access problematic; possible impacts to historic buildings.” <p>Phase 2 - Dropped</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, difficult to provide central downtown SB access connections due to the width of the structure ➤ Goal #7, the existing waterfront view corridor would be substantially impacted due to the width required for one level and the requirement for downtown access ramps. ➤ Goal #8, the expanded connections at the waterfront would be limited due to the width required for one level and the requirement for downtown access ramps.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A4a	Surface Roadway Concept - Multi-lane Boulevard	CARRIED FORWARD 8/01	DROPPED	<p>Phase 1 - Carried forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001, Section “Summary of Primary Concepts Carried Forward For Screening Analysis”</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the capacity functions within the corridor cannot be maintained. ➤ Goal #2, decrease in access connections and reduction in level of service ➤ Goal #2, the freight and truck mobility travel time through the AWV corridor is increased. ➤ Goal #2, there is a reduction in vehicular access for the ferry system due to increase in street width. ➤ Goal #2, pedestrian and non-motorized user mobility decreases due to multi-lane boulevard and resulting traffic ➤ Goal #7, detracts from neighborhood character and inhibits future development

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A4b	Surface Roadway Concept - Multi-lane Boulevard with Sections of Tunnel	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the capacity functions within the corridor cannot be maintained. ➤ Goal #2, decrease in access connections and reduction in level of service ➤ Goal #2, the freight and truck mobility travel time through the AWV corridor is increased. ➤ Goal #2, pedestrian and non-motorized user mobility decreases due to multi-lane boulevard and resulting traffic ➤ Goal #7, detracts from neighborhood character and inhibits future development

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A5	Cut-and-Cover Tunnel Concept			
A5a	Cut-and-Cover Tunnel Concept - One Level Under Existing Alaskan Way Surface Street	DROPPED 8/01	DROPPED	<p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001. Justification:</p> <ul style="list-style-type: none"> ➤ “Downtown ramps very difficult; requires removal of viaduct to complete construction; difficult transitions at north end.” <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, maintaining or providing access connections, can be better met by Conceptual Alternatives C1-A, Cut-and-Cover Tunnel, and C1-B, Cut-and Cover Tunnel with Aerial Structure. ➤ Goal #5 of minimizing adverse impacts during construction can be better achieved by Conceptual Alternatives C1-A, Cut-and-Cover Tunnel, and C1-B, Cut-and Cover Tunnel with Aerial Structure. ➤ Goal #7 of minimizing social and cultural impacts during construction can be better achieved by Conceptual Alternatives C1-A, Cut-and-Cover Tunnel, and C1-B, Cut-and Cover Tunnel with Aerial Structure.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A5b	Cut-and-Cover Tunnel Concept - Two Levels Under Existing Alaskan Way Surface Street	CARRIED FORWARD 8/01	CARRIED FORWARD	<p>Phase 1 - Carried forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001.</p> <p>Phase 2 - The concept is recommended to be carried forward in Phase 2 as Conceptual Alternative C1-A, Cut-and-Cover Tunnel.</p>
Combination Concepts				
A6	Combination Concept: One Level Aerial Structure One Direction and Surface Arterial One Direction	NO ACTION TAKEN	DROPPED	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the capacity functions within the corridor cannot be maintained. ➤ Goal #2, freight and truck mobility is reduced due to reduced capacity of the surface aerial ➤ Goal #2, the ferry vehicular and pedestrian access travel time in the AWV corridor would be increased due to the surface arterial. ➤ Goal #2, the pedestrian and non-motorized user mobility travel time in the AWV corridor would be increased due to the surface arterial.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A7	Combination Concept: One Level Tunnel One Direction Under Alaskan Way Street-Demo Existing Viaduct-One Level Aerial Structure One Direction	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Carried forward as Conceptual Alternative C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB.
A8	Combination Concept: One Level Tunnel One Direction Under Alaskan Way Street-Demo Existing Viaduct-Surface Arterial One Direction	NO ACTION TAKEN	DROPPED	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Dropped Justification: <ul style="list-style-type: none"> ➤ Goal #2, the capacity functions within the corridor cannot be maintained ➤ Goal #2, freight and truck mobility is reduced due to reduced capacity of surface arterial ➤ Goal #2, the ferry vehicular and pedestrian access travel time in the AWV corridor would be increased due to the surface arterial. ➤ Goal #2, the pedestrian and non-motorized user mobility travel time in the AWV corridor would be increased due to the surface arterial.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
A9	Bored Tunnels Under Alaskan Way	CARRIED FORWARD 8/01	DROPPED	<p>Phase 1 - Carried forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001.</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ A similar concept was carried forward outside of the existing AWV corridor as Conceptual Alternative C2-A, Twin Bored Tunnels.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	

B. ROADWAY IMPROVEMENTS OUTSIDE OF THE AWV CORRIDOR				
B1	Expressway Twin Bore Tunnel Concept Thru Downtown Seattle-Connect North: SR 99 and South: South of Downtown			
B1a	Twin Bored Tunnels: Western Ave.	NO ACTION TAKEN	CARRIED FORWARD	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - In Phase 2, a similar concept was carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st and Western Avenues</p>
B1b	Twin Bored Tunnel Routes: 1 ST / 2 ND Ave.	CARRIED FORWARD	CARRIED FORWARD	<p>Phase 1 - Carried forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001, Section “Summary of Primary Concepts Carried Forward For Screening Analysis”</p> <p>Phase 2 - Similar concept carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st Avenue and Western Avenue (avoids the metro sewer line under 2nd Avenue).</p>

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B1c	Twin Bored Tunnels at 3 RD Ave (below bus tunnel)	NO ACTION TAKEN	DROPPED	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown key access connections cannot be provided. ➤ A similar concept was carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st and Western Avenues (avoids the bus tunnel under 3rd Avenue)

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B1d	Twin Bored Tunnel Routes: 4 TH / 5 TH Ave. Alignment - East Portal	CARRIED FORWARD 8/01 & DROPPED 8/01	DROPPED	<p>Phase 1 - Carried Forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001, Section “Summary of Primary Concepts Carried Forward For Screening Analysis”</p> <p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001 Justification:</p> <ul style="list-style-type: none"> ➤ “5TH Avenue Alignment - Narrow street; does not meet SR 99 role and function - difficult transitions; deep bore required; possible transit corridor in future.” <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot directly be provided. ➤ Goal #2, the freight and truck mobility travel time through the AWV corridor is increased.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B1e	Twin Bored Tunnel Routes: 4 TH / 5 TH Ave. Alignment - South Portal	CARRIED FORWARD 8/01 & DROPPED 8/01	DROPPED	<p>Phase 1 - Carried Forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001, Section “Summary of Primary Concepts Carried Forward For Screening Analysis”</p> <p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001 Justification:</p> <ul style="list-style-type: none"> ➤ “5TH Avenue Alignment - Narrow street; does not meet SR 99 role and function - difficult transitions; deep bore required; possible transit corridor in future.” <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot directly be provided. ➤ Similar Concept carried forward as Conceptual Alternative C2-A, Twin Bored Tunnels, with routing on 1st Avenue and Western Avenue (avoids the BN tunnel under 4th Avenue).

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B1f	Twin Bored Tunnel Route: I-5 Alignment	DROPPED 8/01	DROPPED	<p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001. Justification:</p> <ul style="list-style-type: none"> ➤ “I-5 Alignment does not meet SR 99 role and function; possible future I-5 improvement option.” <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ Goal #2, the freight and truck mobility capacity within the AWV corridor is not maintained or improved, but decreased. ➤ Goal #4, the AWV corridor linkage between the areas northwest and southwest of downtown Seattle are not maintained.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B2	Bypass Bridge Concept-Signature Bridge Across Elliott Bay from West Seattle	DROPPED 8/01	DROPPED	<p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001. Justification:</p> <ul style="list-style-type: none"> ➤ “Handles only small portion of SR 99 corridor demand; construction problematic due to deep water; difficult to obtain permits; waterfront view concerns” <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ Goal #2, the freight and truck mobility capacity within the AWV corridor is not maintained or improved, but decreased. ➤ Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay ➤ Goal #7, the view corridor of Elliott Bay would be impacted by the bridge.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B3	Elliott Bay Submerged Tunnel Concept-Along Waterfront Area	NO ACTION TAKEN	DROPPED	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot reasonably be provided. ➤ Goal #5, constructability difficult due to Elliott Bay bathymetry. ➤ Conceptual Alternatives N2, Twin Bored Tunnels into Cut-and-Cover Tunnel, plus C2-A, Twin Bored Tunnels, better meet Goal #5.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B4	I-5 Improvements Concept-to Accommodate a Portion of SR 99 Demand	DROPPED 8/01	DROPPED	<p>Phase 1 - Dropped in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001. Justification:</p> <ul style="list-style-type: none"> ➤ “General widening of I-5 is impractical due to physical limitations through downtown Seattle. Does not meet SR 99 role and function. Future tunnel possibility.” <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ Goal #2, the freight and truck mobility capacity within the AWV corridor is not maintained or improved, but decreased. ➤ Goal #4, the AWV corridor linkage between the areas northwest and southwest of downtown Seattle are not maintained. ➤ Goal #5, widening of I-5 would be extremely difficult to construct

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B5	Elliott Bay Floating Tunnel Concept - Along Waterfront Area	NO ACTION TAKEN	DROPPED	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Dropped</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ Goal #5, freight mobility during construction would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay ➤ Goal #5, there are substantial construction risks associated with a floating tunnel. ➤ Conceptual Alternatives N2, Twin Bored Tunnels into Cut-and-Cover Tunnel, plus C2-A, Twin Bored Tunnels, better meets Goals #2 and #5.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B6	Signature Bridge from Stadium Area to Belltown via Elliott Bay	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be maintained. ➤ Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay ➤ Goal #7, the view corridor of Elliott Bay would be impacted by the bridge.
B7	Existing 4 th Avenue BNSF Tunnel Transitioning to Cut-and-Cover Tunnel	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped</p> <p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, adequate capacity cannot be provided in the BNSF tunnel. ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ Goal #2, the freight and truck mobility capacity within the AWV corridor is not maintained or improved, but decreased. ➤ Goal #2, vehicular and pedestrian access to the ferry system is not maintained or improved.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
B8a	Floating Bridge from Port of Seattle Property to Connect at Broad Street	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay. ➤ Goal #2, vehicular and pedestrian access to the ferry from downtown is decreased.
B8b	Floating Bridge from Port of Seattle Property to Connect at Seneca Street	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ Goal #2, the central downtown core and stadium key access connections cannot be provided. ➤ Goal #2, freight mobility would be decreased due to obstruction of ferry, shipping, and cruise ship navigation in Elliott Bay. ➤ Goal #2, vehicular and pedestrian access to the ferry from downtown is decreased.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	

C. MULTIMODAL SOLUTIONS				
C1	Transportation System/Demand Management (TSM/TDM) -Maximize Use of Existing Transportation Facilities in Combination with Modest Improvements to Several Facilities	CARRIED FORWARD 8/01	CARRIED FORWARD	<p>Phase 1 - Carried Forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001, Section “Summary of Primary Concepts Carried Forward For Screening Analysis, Boulevard with Multi-Modal Options”</p> <p>Phase 2 - TSM alone could not address the purpose and need of the project, specifically the mandatory goal #2 of maintaining or improving the transportation functions of the AWV corridor. TSM was therefore dropped as a stand-alone project. However, systems management and demand management strategies will be applied within each of the Conceptual Alternatives that are carried forward.</p>
C2	High Capacity Transit (HCT) Along Existing AWV Corridor-Combine a HCT Route with Roadway Replacement	CARRIED FORWARD 8/01	CARRIED FORWARD	<p>Phase 1 - Carried Forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001, Section “Summary of Primary Concepts Carried Forward For Screening Analysis, Boulevard with Multi-Modal Options”</p> <p>Phase 2 - Some level of HCT can be accommodated in all conceptual alternatives.</p>

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
C3	High Capacity Transit (HCT) Along New Corridor-Combine a HCT route with Tunnel and/or Bridge Concept	CARRIED FORWARD 8/01	CARRIED FORWARD	<p>Phase 1 - Carried Forward in “<i>Development and Screening of Concepts, Working Paper #7 and 8</i>”, dated August 2001, Section “Summary of Primary Concepts Carried Forward For Screening Analysis, Bored Tunnels”</p> <p>Phase 2 - Some level of HCT can be accommodated in all conceptual alternatives.</p>

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	

D. RELATED IMPROVEMENTS <small>(Noted that improvements could be combined with many of the concepts)</small>				
D1	Access Improvement Concepts			
D1a	Add missing ramps at the S. Spokane St./Alaskan Way Interchange (to and from the north)	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Carried forward in all south alignment Conceptual Alternatives.
D1b	Improve Access at Stadium Area	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Carried forward in all Conceptual Alternatives.
D1c	Add New Access at the Downtown Core	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Carried forward in Conceptual Alternatives C1-A, Cut-and-Cover Tunnel; C1-B, Cut-and Cover Tunnel with Aerial Structure; C2-B, Twin Bored Tunnels with Aerial Structure; C3, Double Stacked Aerial Structure; C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB; and C5, Staggered Aerial Structures with One Level NB and One Level SB.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D1d	Improve the Access at: Battery St., Western Ave., Elliott Ave.	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Carried forward in Conceptual Alternatives C1-A, Cut-and-Cover Tunnel; C1-B, Cut-and-Cover Tunnel with Aerial Structure; C2-A, Twin Bored Tunnels; C2-B, Twin Bored Tunnels with Aerial Structure; C3, Double Stacked Aerial Structure; C4, Split with One Level Cut-and-Cover Tunnel NB and One Level Aerial Structure SB; and C5, Staggered Aerial Structures with One Level NB and One Level SB.
D1e	Add S. Spokane Street Off-Ramp to 6 th Avenue South for Buses	N/A	DROPPED	Phase 1 - Not considered in Phase 1. Phase 2 - Dropped Justification: ➤ This concept is recommended to be dropped because it is not related to the purpose of the project.
D1f	Add S. Spokane Street Off-Ramp to 4 th Avenue South	N/A	DROPPED	Phase 1 - Not considered in Phase 1. Phase 2 - Dropped Justification: ➤ This concept is recommended to be dropped because it is not related to the purpose of the project.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D1g	Add Extension to the S. Spokane Street 4 th Avenue On-Ramp	N/A	DROPPED	Phase 1 - Not considered in Phase 1. Phase 2 - Dropped Justification: ➤ This concept is recommended to be dropped because it is not related to the purpose of the project.
D1h	Provide Southbound Access to SR 99 from West Seattle Bridge	N/A	DROPPED	Phase 1 - Not considered in Phase 1. Phase 2 - Dropped Justification: ➤ This concept is recommended to be dropped because it is not related to the purpose of the project.
D2	Regional Connection Concepts			
D2a	Add Connection to South Lake Union Area	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Carried forward in Conceptual Alternatives N1, Mined Tunnel into Cut-and-Cover Tunnel; N2, Twin Bored Tunnels into Cut-and-Cover Tunnel; N3, Cut-and-Cover Tunnel; and N4, Twin Mined Tunnels into Cut-and Cover Tunnel.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D2b	Extend Alaskan Way Expressway to I-5 thru Mercer St. Corridor	NO ACTION TAKEN	DROPPED	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Dropped Justification: ➤ This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.</p>
D2c	Extend SR 520 to meet Alaskan Way Expressway	NO ACTION TAKEN	DROPPED	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Dropped Justification: ➤ This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.</p>

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D2d	Extend SR 99 Grade Separation to SR 509, Over 1 st Ave. S. Br.	NO ACTION TAKEN	DROPPED	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Dropped Justification: ➤ This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.</p>
D2e	Improve Ballard / Interbay Connections	NO ACTION TAKEN	CARRIED FORWARD	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - Carried forward in Conceptual Alternatives N1, Mined Tunnel into Cut-and-Cover Tunnel; N2, Twin Bored Tunnels into Cut-and-Cover Tunnel; N3, Cut-and-Cover Tunnel; and N4, Twin Mined Tunnels into Cut-and Cover Tunnel.</p>
D2f	Improve I-90 / SR 519 / SR 99 Connections	NO ACTION TAKEN	CARRIED FORWARD (SR 519 to SR 99 Connection)	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - The concept of improving the connection between I-90 and SR 519 is not precluded, however it is not related to the purpose of the project. In Phase 2, the concept of connecting SR 519 to SR 99 is recommended to be carried forward in all Conceptual Alternatives.</p>

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D2g	Improve I-5 / SR 99 Connection at S. Spokane Street	NO ACTION TAKEN	CARRIED FORWARD (S. Spokane Street to SR 99 Connection)	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - The concept of improving the connection between I-5 and S. Spokane Street is not precluded, however it is not related to the purpose of the project. In Phase 2, the concept of improving the connection between S. Spokane Street and SR 99 is recommended to be carried forward.</p>
D2h	Improve Waterfront Access Between the West Seattle Bridge and Battery Street	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped Justification:</p> <ul style="list-style-type: none"> ➤ This concept is not precluded, however it is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept. All of the concepts recommended to be carried forward as conceptual Alternatives contribute in varying degrees to Goal #8, the continuing development of the downtown urban waterfront through expanded connections between downtown Seattle, the waterfront, and central Puget Sound for local citizens and visitors.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D2i	Locate Tunnel Portal at Roy Street to Reconnect Crossings at Thomas and Harrison	N/A	CARRIED FORWARD	Phase 1 - Not considered in Phase 1. Phase 2 - This concept can be accommodated in Conceptual Alternatives N1, Mined Tunnel into Cut-and-Cover Tunnel; N2, Twin Bored Tunnels into Cut-and-Cover Tunnel; N3, Cut-and-Cover Tunnel; and N4, Twin Mined Tunnels into Cut-and-Cover Tunnel.
D2j	Add Off-Ramp to Airport Way	N/A	DROPPED	Phase 1 - Not considered in Phase 1. Phase 2 - Dropped Justification: ➤ This concept is not related to the purpose of the project. All Conceptual Alternatives can accommodate the development of this concept.
D2k	Re-utilize Battery Street Tunnel as a Vehicular Connection to Alaskan Way	N/A	DROPPED	Phase 1 - Not considered in Phase 1. Phase 2 - Dropped Justification: ➤ This concept is not related to the purpose of the project, but can be accommodated in all build Conceptual Alternatives.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D3	Freight Improvement Concepts			
D3a	Grade Separation Crossing of SR 99 for Trucks Between S. Atlantic and S. Spokane Streets	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Recommended to be carried forward in Conceptual Alternatives S1, Aerial Structure with East Alignment; S2, Aerial Structure with West Alignment; S4, Twin Bored Tunnels; and S6, Cut-and-Cover Tunnel.
D3b	Add missing ramps at the S. Spokane St./Alaskan Way Interchange (to and from the north)	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Carried forward in all south alignment Conceptual Alternatives.
D3c	S. Hanford St. Ramps for General Traffic or Freight Access to/from North Bound SR 99.	NO ACTION TAKEN	DROPPED	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Dropped Justification: <ul style="list-style-type: none"> ➤ Goal #2, improvements in access connections are redundant due to S. Spokane Street connection improvements ➤ Goal #3, does not meet roadway design standards for ramps due to close proximity to S. Spokane Street

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D3d	Improve East - West Freight Access Between S. Spokane Street and S. Holgate Street	NO ACTION TAKEN	CARRIED FORWARD	<p>Phase 1 - No action was taken to either drop or carry forward the concept.</p> <p>Phase 2 - This concept is recommended to be carried forward in Conceptual Alternatives S1, Aerial Structure with East alignment; S2, Aerial Structure with West Alignment; S4, Twin Bored Tunnels, and S6, Cut-and-Cover Tunnel.</p>
D3e	Improve Broad Street Rail Crossing	N/A	DROPPED	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - Dropped Justification: ➤ This concept is not precluded, however it is not related to the purpose of the project.</p>
D3f	Move Truck Containers from Waterfront to I-90	N/A	CARRIED FORWARD	<p>Phase 1 - Not considered in Phase 1.</p> <p>Phase 2 - This concept was recommended to be carried forward. The concept of providing a connection to I-90 via SR 519 from the Alaskan Way Corridor would be accomplished in all conceptual alternatives carried forward.</p>

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D3g	Incorporate Existing Railroad Tracks Within the Cut-and-Cover Tunnel	N/A	DROPPED	Phase 1 - Not considered in Phase 1. Phase 2 - This concept is not related to the purpose of the project.
D4	Ferry Access Improvement Concepts			
D4a	Add Ferry Traffic Queuing Area on Existing Alaskan Way S.	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Recommended to be carried forward as part of Conceptual Alternatives S1, Aerial Structure with East Alignment; S2, Aerial Structure with West Alignment; S3, Surface Roadway with West Alignment; S4, Twin Bored Tunnels; S5, Surface Roadway with East Alignment; and S6, Cut-and-Cover Tunnel, by providing queuing out of the existing Alaskan Way S. ROW.
D4b	Expand Pedestrian Connections Between the Ferry Terminals and the Downtown Core	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Recommended to be carried forward with the urban design component of each Conceptual Alternative.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D4c	Improve Ferry Connections to AWV Corridor and Downtown	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Recommended to be carried forward in all Conceptual Alternatives via the SR 519 connection.
D5	Urban Design Concepts			
D5a	Improve Pedestrian Environment Along Waterfront	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Recommended to be carried forward with the urban design component of each Conceptual Alternative.
D5b	Improve Pedestrian Connections Between Waterfront and Downtown Core	NO ACTION TAKEN	CARRIED FORWARD	Phase 1 - No action was taken to either drop or carry forward the concept. Phase 2 - Recommended to be carried forward with the urban design component of each Conceptual Alternative.
D5c	Retail, Residential, and Public Space with Aerial Structure	N/A	CARRIED FORWARD PENDING ALTERNATIVE DEVELOPMENT	Phase 1 - Not considered in Phase 1. Phase 2 - This concept is carried forward pending alternative development and is not precluded by any of the aerial structure Conceptual Alternatives.

ALASKAN WAY VIADUCT (AWV) PROJECT

INITIAL CONCEPT STATUS SUMMARY TABLE

CONCEPT		STATUS		COMMENTS
NO.	DESCRIPTION	PHASE 1	PHASE 2	
D5d	Build Waterfront Pedestrian Park with Businesses	N/A	CARRIED FORWARD PENDING ALTERNATIVE DEVELOPMENT	Phase 1 - Not considered in Phase 1. Phase 2 - This concept is carried forward pending alternative development and is not precluded by any of the Conceptual Alternatives.

This Page Intentionally Left Blank

Appendix W

Screening Documents

2002 Seawall

This Page Intentionally Left Blank

SR 99: ALASKAN WAY VIADUCT AND SEAWALL PROJECT

Screening of Seawall Concepts



Submitted to:
Washington State Department of Transportation
Urban Corridors Office
401 Second Avenue, Suite 300
Seattle, WA 98104-2887

Submitted by:
Parsons, Brinckerhoff, Quade, and Douglas, Inc.



Prepared by:
BERGER/ABAM Engineers Inc.



March 2002

SR 99: Alaskan Way Viaduct and Seawall Project

Screening of Seawall Concepts

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

Parsons Brinckerhoff Quade & Douglas, Inc.

999 Third Avenue, Suite 2200
Seattle, WA 98104

In association with:

BERGER/ABAM Engineers Inc.
David Evans and Associates, Inc.
Entech Northwest
EnviroIssues, Inc.
Harvey Parker & Associates, Inc.
Jacobs Sverdrup
Larson Anthropological Archaeological Services Limited
Mimi Sheridan, AICP
PanGEO INCORPORATED
Parametrix, Inc.
Preston, Gates, Ellis, LLP
ROMA Design Group
RoseWater Engineering, Inc.
Shannon & Wilson, Inc.
Steven L. Kramer, PhD, Consulting Engineer
Taylor Associates, Inc.
Tom Warne and Associates, LLC
William P. Ott

TABLE OF CONTENTS

Executive Summary	1
Design Development and Overview of Seawall Concepts	4
Application of Screening Criteria	6
Replacement of Seawall.....	7
A1: Wharf with Fill Removed.....	7
A2: Wharf with Intertidal Beach.....	10
A3: Vertical Face Wall with Frame	12
Retrofit of Seawall	14
B1: Face Wall Only	14
B2: Anchored Wall	16
B3: Buttress Fill.....	18
Concepts Recommended to Be Carried Forward.....	20

APPENDIXES

APPENDIX A: FIGURES

APPENDIX B: CONCEPTUAL SEAWALL OPTIONS

APPENDIX C: ALTERNATIVES SCREENING CRITERIA
FOR THE ALASKAN WAY VIADUCT AND SEAWALL PROJECT

Screening of Seawall Concepts

EXECUTIVE SUMMARY

The existing Alaskan Way seawall is made up of a number of retaining wall types. All have been determined to have vulnerabilities to earthquakes, in varying degrees, as described in a separate report “Preliminary Analysis of Existing Alaskan Way Seawall.” In addition to describing the structural deficiencies of the walls, the preliminary analysis report also provides a complete description of all the wall types and an operational history of the maintenance problems with the walls. The preliminary analysis report should be consulted to obtain a more complete understanding of the condition and deficiencies of the wall. A brief summary of the wall types and deficiencies is provided below.

The majority of the length of the wall features an anchored bulkhead system constructed in 1934 and commonly referred to as the 1934 seawall. The upper portion of this wall consists of a precast concrete panel that is up to 20 feet high. Below the concrete portion of the wall is a steel bulkhead. The structural details and height of this bulkhead varies. In addition, the bulkhead is buried in fill in some locations and exposed in others. The steel bulkhead and concrete wall elements are anchored to a timber relieving platform supported by timber piles that are battered to provide lateral resistance to earth pressures acting on the wall. The relieving platforms support 13 feet of roadway fill and Alaskan Way. They rely on this weight to provide the lateral resistance required to stabilize the walls.

There are two types of 1934 seawall, one in shallow water and one in deeper water. The tall wall has the widest relieving platform and an exposed steel bulkhead. It is located just below the central business district and supports the greatest depth of fill. The shorter wall, which features a narrower relieving platform and a buried steel bulkhead, makes up the greatest length of existing seawall and is primarily along the north end of the waterfront. In addition to the 1934 seawalls, there exist unreinforced, or lightly reinforced, concrete gravity walls supported on piles and concrete sidewalks supported on piles. These are located in the area of the Colman ferry dock.

One of the primary vulnerabilities of the existing seawalls is their inability to resist the loads associated with liquefaction of the loose fills on which they are constructed. Liquefaction of waterfront fills is expected to begin at earthquake magnitudes similar to that of the Nisqually earthquake, an earthquake with a probability of occurrence of 50 percent in the next 50 years. More widespread liquefaction is expected for larger magnitude earthquakes and/or longer duration earthquakes.

For the deep-water portions of the 1934 seawall, liquefaction is anticipated to result in large displacements of the wall and/or complete failure of the wall. The resulting settlements could have catastrophic implications for all the major utilities buried in Alaskan Way, including major sewers and electrical utilities. The influence of the movements could be felt as far to the east as Western Avenue and/or First Avenue, the approximate location of the original shoreline. Any structures located in this zone of movement would be at risk for major settlement-related damage.

This technical memorandum describes the options considered for the replacement or retrofit of the Alaskan Way seawalls with structures that are capable of preventing the damage described above. The key features (advantages and disadvantages) are described and a recommendation to be carried forward or dropped is provided. These options were identified through a series of meetings involving WSDOT, the consultant team, and the City of Seattle.

The options considered for the seawall fall into two categories:

- Replacement Options and
- Retrofit Options

Replacement options entirely replace the existing wall, providing structural capacity to carry all vertical, as well as lateral, loads due to earthquakes and the associated liquefaction of the retained soils. Retrofit options are designed to address specific deficient features of the existing walls. Generally, these maintain the existing configuration of the wall, but add lateral capacity to withstand increased earth pressures during an earthquake. The retrofit options assume vertical capacity is maintained by the existing relieving platforms. This assumption is to be verified in ongoing studies and condition surveys of the existing structure. It may also be necessary to retrofit and/or rebuild the relieving platform. Should it be found necessary to retrofit the relieving platform, the distinction between retrofit and replacement will become less pronounced.

The wall options were developed at a level of detail sufficient to distinguish among concepts and are shown in Appendix A as they would apply to the tallest section of the 1934 seawall. Replacement and retrofit options for the shorter 1934 seawall and other seawalls are assumed to be similar. These concepts were developed without the detailed geotechnical knowledge required to fully assess their structural feasibility. In addition, the concepts were developed using estimates of the loads that are anticipated for an earthquake having a 10 percent probability of being exceeded in a 50-year period. The final replacement and retrofit concepts are likely to be designed for an earthquake having a 3 percent probability of occurring in 75 years. This is a significantly greater magnitude earthquake than is currently specified in current design codes. Significant modifications to the dimensions and layout of these concepts may be required to meet the more stringent design criteria contemplated for this project.

Screening criteria were developed based upon the project purpose and need statement as approved by WSDOT and the City of Seattle. The replacement and retrofit options were then evaluated and compared to the nine goals set in the Screening Criteria. The Screening Criteria for the seawall options are the same as those for the conceptual viaduct alternatives and are described in more detail in Appendix C. Those wall options that could not meet the goals described in Appendix C were eliminated from further consideration and the reasons documented. In general, the seawall options selected for further study were selected for their ability to minimize construction time, disruptions to waterfront businesses, and/or environmental impacts. The preferred options that are recommended to be carried forward in the Environmental Impact Statement are,

REPLACEMENT OF SEAWALL

- A1: Wharf with Fill Removed (Figure 1 in Appendix A)
- A3: Vertical Face Wall with Frame (Figure 6 in Appendix A)

RETROFIT OF SEAWALL

- B1: Face Wall Only (Figure 8 in Appendix A)

DESIGN DEVELOPMENT AND OVERVIEW OF SEAWALL CONCEPTS

The purpose of this technical memorandum is to provide options for replacing or retrofitting the existing Alaskan Way seawalls with structures that are capable of resisting the estimated loads that may occur due to an earthquake that has a 10 percent probability of being exceeded in 50 years, which is the current code specified earthquake. Seismic loads may include inertial pressures due to ground shaking, as well as increased pressures from soils that have been induced to “liquefy” by ground shaking.

Although the loads from the liquefied soils can impose lateral earth pressures on the walls that are similar to the inertia seismic overpressures that nonliquefied soils can cause, the liquefaction may occur during a earthquake of less magnitude. Preliminary investigations indicate that a significant portion of the soils behind the Seattle seawall will begin to liquefy in an earthquake with a 50 percent probability of being exceeded in 50 years, which is about the magnitude of the recent Nisqually earthquake. More widespread liquefaction will result for longer duration and/or greater magnitude earthquakes. Additional studies are being performed to determine the extent of potential liquefaction and the resulting loads on seawall structures.

Concepts that might meet these objectives were initially identified, along with some different construction methods that could be used to build them. The existing seawalls are constrained by the existing viaduct on the landside and many pier structures with buildings on the seaside. Structural concepts were identified that use proven construction technologies, as well as a few that used less common technologies. Combinations of deep foundation methods of slurry walls, drilled shafts, precast prestressed panel piles, and tiebacks were investigated that fit the constraints of the site. The range of conceptual seawall replacement and retrofit options that were considered is provided in Appendix B.

The options considered for the seawall fall into two categories:

- Replacement Options and
- Retrofit Options

Replacement options replace the existing wall entirely, providing structural capacity to carry all vertical, as well as lateral, loads due to earthquakes and the associated liquefaction. Retrofit options are designed to address specific deficient features of the existing walls. Generally, these maintain the existing configuration of the wall, but add lateral capacity to withstand increased earth pressures during an earthquake. The retrofit options assume vertical capacity is maintained by the existing relieving platforms. This assumption is to be verified in ongoing studies and condition surveys of the existing structure. It may also be necessary to retrofit and/or rebuild the relieving platform. Should it be found necessary to retrofit the relieving platform, the distinction between retrofit and replacement will become less pronounced.

There were 52 total suboptions considered for screening. These suboptions fall within the following major options under replacement or retrofit:

Replacement of Seawall

- A1. Wharf with Fill Removed
- A2. Wharf with Intertidal Beach
- A3. Vertical Faced Wall with Structural Frame

Retrofit of Seawall

- B1. Face Wall Only
- B2. Anchored Wall
- B3. Buttress Fill

It was determined that some of the suboptions were either impractical or had undesirable constructability issues associated with them while offering no benefit over the other options considered. Those concepts that could not meet the screening criteria as described in the following section, as well as other concepts, were eliminated from further consideration. In general, the concepts that used uncommon construction techniques, required cofferdams to isolate the construction from the water, and/or appeared to have more obvious impacts to the businesses located along the waterfront were eliminated.

The remaining seawall options are grouped into general options and suboptions of structural elements and can be viewed in more detail in Figures 1 to 12 as shown in Appendix A. From these options, only the preferred options will be carried forward in the environmental impact statement (EIS).

The wall options shown in Appendix A were developed at a level of detail sufficient to distinguish among concepts and are shown as they would apply to the tallest section of the 1934 seawall. Replacement and retrofit options for the shorter 1934 seawall and other seawalls are assumed to be similar. These concepts were developed without the detailed geotechnical knowledge required to fully assess their structural feasibility. In addition, the concepts were developed using estimates of the loads that are anticipated for an earthquake having a 10 percent probability of being exceeded in a 50-year period. The final replacement and retrofit concepts are likely to be designed for an earthquake having a 3 percent probability of occurring in 75 years. This is a significantly greater magnitude earthquake than is currently specified in current design codes as described above. Significant modifications to the dimensions and layout of these concepts may be required to meet the more stringent design criteria contemplated for this project.

APPLICATION OF SCREENING CRITERIA

Screening criteria were developed to assist the project team in the screening process. The criteria restate the project's Purpose and Need statement in a manner that can be directly implemented. This resulted in nine goals, approved by WSDOT and the City of Seattle. For each goal, the evaluation indicator, the evaluation criteria, source of the criteria indicator, and the evaluation matrix were specified. These project screening criteria are described in detail in a separate document called "Alternatives Screening Criteria." A copy of this document is attached as Appendix C.

The goals developed for the screening process to justify rejection of a concept were considered to be adequate rationale by the consultant team, WSDOT, and the City of Seattle. There may be other goals not specified that a rejected concept cannot fully meet, as well. A brief discussion and overview of how Screening Criteria were applied to the seawall options are provided below.

Goals 1 and 2 – Meeting current WSDOT and AASHTO seismic design standards, and maintaining or improving the transportation functions of the Alaskan Way Viaduct corridor are mandatory. These are criteria that must be met for both the replacement and retrofit of the existing seawalls. All seawall concepts meet these goals.

Goals 3 and 4 – Improving traffic safety and improving transportation linkages were not considered applicable or to be affected by the seawall concepts. These goals are more applicable to the viaduct.

Goals 5 and 6 – Minimizing adverse impacts during construction and minimizing environmental impacts after construction are two criteria that are directly applicable to seawall options and the methods of constructing them. Therefore, the screening of seawall options was primarily accomplished using the project screening criteria for Goals 5 and 6. Seawall options were sought to fulfill the goals of minimizing construction time and disruptions and/or minimizing environmental impacts during construction.

Goals 7 and 8 – The seawall options were considered equal with respect to social and cultural impacts and with respect to support of land use and shoreline plans. Therefore, the screening of seawall options did not consider these goals further.

Goal 9 - A few options were investigated to specifically address support of improved habitat in the marine and intertidal environment.

REPLACEMENT OF SEAWALL

The figures in Appendix A for retrofit options are all shown for the tallest portion of the 1934 seawall, which exists in the deep-water areas along the existing seawall. The retrofit options are also applicable to areas where the wall is not as tall.

A1: WHARF WITH FILL REMOVED

General Functional Description

The Wharf with Fill Removed is a seawall structure that replaces the existing relieving platform with a typical wharf, or pier, construction and replaces the seawall with the bulkhead located at the back of the wharf as shown in Figures 1, 2, and 3. The wharf consists of precast, prestressed concrete deck panels, supported on cast-in-place concrete pier caps that are supported by precast concrete piles. The piles considered for use are 3-foot-diameter hollow sections. The pile and bent cap spacing is regular and fits a spacing consistent with the bulkhead structure. The bulkhead is a concrete retaining wall located behind the existing relieving platform to minimize disruptions during construction and to eliminate the need for any temporary support of the existing seawall during construction. The bulkhead must be designed to support up to 60 feet of liquefied soil.

There are several ways to construct the bulkhead. One suboption, a cantilevered drilled shaft secant wall bulkhead, is shown on Figure 1 and in partial plan on Figure 3. This option has a 10-foot-diameter drilled shaft spaced at five-thirds of the diameter of the shaft to set the primary reinforced shaft overlapped with a secondary unreinforced shaft. This spacing suggests a pile cap spacing of 16 feet 8 inches. The unreinforced shaft acts as lagging between the reinforced shafts.

A tieback suboption is shown on Figure 2. The drilled shaft is smaller at 5-foot diameter because the tieback supports the top of the shaft bulkhead. This effectively reduces the internal moment in the shaft and allows the shaft to be shorter in depth. The shaft need only penetrate competent soil to provide lateral support, whereas the cantilevered drill shaft must penetrate deep to provide rotational (moment) support, as well as lateral support. The drawback is that a tieback must angle far back into competent soil where it can interfere with foundations of the new aerial viaduct and possibly with existing building foundations.

A slurry wall bulkhead is shown both as a tieback and cantilever bulkhead on Figures 2 and 3. Again, the major difference is the tieback and depth into competent soil. The slurry wall is T-shape in plan with the Ts cast side-by-side and the stem, or web, at 20-foot, on-center spacing. The pile bent caps are also 20 feet on-center, which is more typical of pier and wharf construction with precast deck panels.

Utilities are expected to be hung below the pile cap or placed in the ballast above the deck panels. Depending on the requirements for utilities, this may be difficult to do. If large diameter utility pipe are running parallel to the face of the wharf, some adjustment in the geometry of the wharf may be needed, or the utility relocated to the landside of the wharf. There are large diameter storm sewer pipes, 5 and 6 feet in diameter, running perpendicular to the wharf face. It is assumed that special framing could be accommodated at those locations.

Key Features

- Replaces the existing relieving platform with new horizontal structural deck to support vertical loads.
- Requires removal of existing and potentially contaminated fills.
- Places the new seawall construction behind the existing relieving platform, minimizing risk of weakening the existing structure during construction and minimizing the disruption to businesses along the waterfront.
- May be able to support the viaduct on the bulkhead.
- Uses proven construction methods and elements.
- Anticipated to require less time to construct than other replacement options.
- May require a temporary sheet pile wall to isolate the excavation work from the sea. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall.
- Utility relocations are required. Although many utilities can be buried in relatively shallow roadway ballast, larger utilities that parallel the waterfront will require deeper ballast that could force the wharf concrete down into the water, which would complicate construction and could potentially shorten the life of the structure. Alternately, the large utilities could be hung underneath the wharf or relocated behind the wharf.

Seawall Screening Results

This seawall option is recommended to be carried forward to the EIS for the following reasons:

- Construction of the seawall would be along the east side of Alaskan Way and could be accomplished while maintaining traffic on the west side.
- Places the new seawall construction behind the existing relieving platform, minimizing risk of weakening the existing structure during construction.
- Removes the relieving platform and potentially liquefiable soil that would otherwise need to be retained or improved.

- Open water is created below the wharf, adding potential for marine habitat.
- Places the primary lateral load carrying seawall structural element at the bulkhead where the height of soil to be retained is a little less, lowering the lateral load design requirements.
- The deck structure uses typical pier construction, common throughout the Pacific Northwest. Precast elements are manufactured offsite and installed quickly.

A2: WHARF WITH INTERTIDAL BEACH

General Functional Description

This option is intended to recreate marine habitat with an intertidal beach for potential migration of fish species. The proposed wharf structure is similar to the wharf structure for Option A1: Wharf with Fill Removed. In this case, the seaside edge of the wharf is supported on 5-foot-diameter drilled shafts that are part of a partial height wall as shown in Figures 4 and 5 in Appendix A. The wall is required to retain existing and replacement fills, which could damage the existing adjacent piers. The top of the wall is set at Elevation -4.0. The wall retains an intertidal beach of gravelly sand with a slope of 6:1 to approximately Elevation +6.0. The gravelly sand is placed over a granular backfill whose depth is to be determined to protect the beach from any contamination in the remaining timber piles and exposed soils after the excavation.

The rear bulkhead for this wharf is, like Option A1, proposed to carry a substantial portion of the anticipated lateral loads. However, unlike Option A1, this bulkhead may not be a continuous wall, but may rely on arching of the retained soil to transfer load to the bulkhead structure. The feasibility of this would need to be investigated. The suboptions for constructing the bulkhead would be the same as described for Option A1 and include cantilevered drilled shafts and slurry walls, with and without tiebacks, as was shown on Figures 2 and 3. The option shown in Figures 4 and 5 has 10-foot-diameter drilled shafts without tiebacks. The shafts are spaced at 16 feet 8 inches to match the double space of the 5-foot-diameter primary shafts of the secant wall in the seaside wharf support.

Key Features

- Replaces the existing relieving platform with new horizontal structural deck to support vertical loads.
- Places a portion of the new seawall construction behind the existing relieving platform, minimizing risk of weakening the existing structure during construction.
- Requires removal of potentially contaminated fills.
- Requires backfill to adequately blanket and seal potentially contaminated fills and remaining creosote timber piles.
- Requires a partial height seawall at approximately the same location as the existing wall.
- The partial height wall will complicate the construction and will most likely require more time and expense to construct than other replacement options.
- Requires a temporary sheet pile wall to isolate the excavation work from the sea. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall.

- The abrupt change in water depth at the partial height wall is expected to create substantial breaking wave activity. Scour protection may be required to prevent erosion of the intertidal beach at the top of the secant wall.
- A source of light is required to encourage juvenile salmon to use the area under the wharf and fully develop the potential of the proposed intertidal beach. The passive light collectors with clear domes, interior reflective light tubes, and portholes shown in Figure 4 are not likely to provide enough light. Glass blocks may be used in the pedestrian areas but are of limited use in the roadway area due to concerns with automobile safety for skid resistance.
- May be able to support the viaduct on the bulkhead.
- Uses proven construction methods and elements.
- Utility relocations are required.

Seawall Screening Results

This seawall option is not recommended to be carried forward to the EIS.

The primary reason for dropping this option is that value of the intertidal beach is marginal, at best, without a source of light. Further, the scour protection required to protect the beach would probably consist of riprap materials that are not conducive to the creation of the desired beach characteristics. If slope protection is not provided, constant maintenance of the beach slopes is likely to be required. The structural complications and the additional construction time and public disruption associated with this option do not seem warranted given the marginal benefits provided.

A3: VERTICAL FACE WALL WITH FRAME

General Functional Description

The Vertical Face Wall with Frame is a seawall structure that replaces the existing relieving platform with a concrete frame as shown in Figure 6 in Appendix A. The relieving platform is not entirely removed, but is covered with a concrete deck that frames into a 5-foot-diameter drilled shaft secant wall at the seaside support and a bulkhead at the landside of the relieving platform. A moment resisting frame is developed to provide lateral and vertical support. The concrete deck may be cast-in-place or precast, or a combination of both.

The landside bulkhead is shown on Figure 6 as a cantilevered, drilled shaft bulkhead. The shafts are estimated to be 10 feet in diameter and spaced at 16 feet 8 inches to match the double space of the 5-foot-diameter primary shafts of the secant wall in the seaside support. Drilled shafts with tiebacks or slurry wall, with or without tiebacks, as was shown on Figures 2 and 3 may also apply. Like the bulkhead for Option A2, this bulkhead may not be a continuous wall, but may rely on arching of the retained soil to transfer load to the bulkhead structure. The feasibility of this would need to be investigated.

The seaside drilled shaft secant pile wall is constructed inside, or landside, of the existing wall face. Alternatively, a precast panel pile face wall may be used at the seaside wharf support, similar to that shown on Figure 10, in place of the 5-foot-diameter drilled shaft secant wall. A cast-in-place concrete deck spans over the existing fill to the bulkhead. The vertical position of the deck may be higher or lower to accommodate utilities, although lowering it will impose more dead load on it unless lightened by voids or framing in the soil ballast above.

Key Features

- Replaces the existing relieving platform with new horizontal structural deck to support vertical loads.
- Does not require removal of all of the existing and potentially contaminated fills, except at the seaside wharf face, and except as required to lower the deck sufficient to accommodate utilities.
- A substantial portion of the construction can be located behind the existing relieving platform, minimizing the disruption to businesses along the waterfront.
- The new seawall can be constructed behind the existing seawall, allowing the work to be isolated from the sea. This would weaken the existing structure during construction. Temporary support for the existing wall would need to be devised.

- The alternative precast panel pile wall could be installed without weakening the existing structure. However, it would require a temporary sheet pile wall to isolate the excavation work from the sea. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall
- May be able to support the viaduct on the bulkhead.
- Uses mostly proven construction methods and elements.
- Utility relocations are required.

Seawall Screening Results

This seawall option is recommended to be carried forward to the EIS.

This option uses a moment resistant frame to provide redundancy and allow less required embedment of shafts and slurry wall into the competent soils, which may save time and expense. The bulkhead is not a full wall, but does resist partial lateral earth pressure. A full engineering analysis is required to determine if these advantages can be realized.

This option does not require removal of much of the existing fill, which may be contaminated. It also provides potential to perform all work in isolation from the sea, except for the removal of portions of the existing wall, which can be quickly accomplished within anticipated fish windows after the new wall is complete.

RETROFIT OF SEAWALL

The figures in Appendix A for retrofit options are all shown for the tallest portion of the 1934 seawall, which exists in the deep water areas along the existing seawall. The retrofit options are also applicable to areas where the wall is not as tall.

The retrofit options are designed to primarily carry the lateral earth pressure loads. The retrofit options assume vertical capacity is maintained by the existing relieving platforms. This assumption is to be verified in ongoing studies and condition surveys of the existing structure. It may also be necessary to retrofit and/or rebuild the relieving platform. Should it be found necessary to retrofit the relieving platform, the distinction between retrofit and replacement will become less pronounced.

The retrofit options are also designed to prevent access by marine borers, which have periodically caused major damage to the existing relieving platform. Access can only be assured if the existing wall face is covered or replaced with a structure that is not as susceptible as the existing steel bulkhead to the corrosive effects of seawater.

B1: FACE WALL ONLY

General Functional Description

The Face Wall Only option introduces a new vertical wall at the seaside wharf face to laterally support the relieving platform and to prevent intrusion by marine borers. Typical details are shown in Figures 7 and 8 in Appendix A. The suboptions shown are driven precast panel piles with tieback on the outboard side of the existing seawall, a cantilever shaft on the inboard side, or a drilled shaft with tieback on the inboard side of the existing seawall. Plan sections of these walls are shown on Figure 9. The relieving platform may need to be reconstructed to repair existing damage. It may be reconstructed with concrete rather than timber. Utilities are relatively unchanged with this option except where the tieback may interfere close to the wall face over the relieving platform.

Key Features

- Relies on the existing relieving platform to be in good condition to carry vertical loads. The relieving platform may need to be rebuilt and/or soil improvements may be required below the existing relieving platform to improve or maintain vertical capacity.
- Removal of existing and potentially contaminated fills is limited to the material excavated to construct the secant pile wall.
- A substantial portion of the construction can be located behind the existing relieving platform, minimizing the disruption to businesses along the waterfront.

- If the drilled shaft wall is used, the new seawall can be constructed behind the existing seawall, allowing the work to be isolated from the sea. This would weaken the existing structure during construction. Temporary support for the existing wall would need to be devised.
- The size of the drilled shaft can be reduced if tiebacks are used. However, the tiebacks will be difficult to install because the space available in front of the existing piers is limited.
- The alternative precast panel pile wall could be installed without weakening the existing structure. However, it would require a temporary sheet pile wall to isolate the excavation work from the sea. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall.
- The precast panel pile option with tieback is anticipated to need a section depth of about 6 feet, which is greater than the space available for placement outboard of the existing seawall face. This option will move the wall face out about 2 feet beyond the west margin of Alaskan Way and is likely to require removal of part of the existing piers.
- Uses mostly proven construction methods and elements.
- Utility relocations are possible but are not likely to be as extensive as for the replacement options.

Seawall Screening Results

This seawall option is recommended to be carried forward to the EIS, in particular, the drilled shaft suboptions that are placed behind the existing wall. The Precast Panel Pile suboption is not recommended as there is heavy riprap along most of the wall that would be an obstruction to driving the precast panel piles. Removal of the riprap and driving of the panel piles is expected to disturb potentially contaminated bottom sediments and would require a sheet pile cofferdam to isolate construction from the sea. The panel piles and the tieback required would probably require temporary structural modifications to the existing piers.

The drilled shaft secant wall suboptions provide a single line of deep wall to resist the lateral earth pressure from seismically liquefied soil. It takes up minimal space along the waterfront, providing the least disturbance to utilities and other structures to the landside. It will be installed behind the existing wall face panels. It is anticipated that the drilled shafts can be installed through the relieving platform, requiring stabilization of the wall face. A method of providing this stabilization needs to be developed.

B2: ANCHORED WALL

General Functional Description

The Anchored Wall option is shown on Figure 10 in Appendix A. It is similar to the Option B2: Face Wall Only, except the angled ground anchor tieback is replaced with a horizontal tieback to a large diameter drilled shaft bulkhead that acts as an anchor. Both structures would need to resist lateral loads. The relieving platform is still intact and assumed capable of carrying vertical loads.

The horizontal tieback is shown high to fit within the cast-in-place cap on the precast panel pile face wall and to keep the anchor and other construction work above the tidal zone. It may be located as low as the top of the relieving platform, if necessary, to accommodate the passage of utilities. Figure 10 shows the new wall being constructed with the precast panel pile, although a suboption using a drilled shaft located inboard of the existing seawall is possible.

The bulkhead anchor located behind the relieving platform is shown in Figure 10 as a 10-foot-diameter cantilever drilled shaft that would be closely spaced to facilitate arching of the soil between each shaft. Other bulkhead options may be used, similar to those shown on Figures 2 and 3. The bulkhead can be used to support the viaduct. Utilities are relatively unchanged with this option if the tieback can be placed through the fill without interfering.

Key Features

- Relies on the existing relieving platform to be in good condition to carry vertical loads. The relieving platform may need to be rebuilt and/or soil improvements may be required below the existing relieving platform to improve or maintain vertical capacity.
- Does not require removal of existing and potentially contaminated fills except for those excavated for construction of drilled shafts.
- A substantial portion of the construction can be located behind the existing relieving platform, minimizing the disruption to businesses along the waterfront.
- The new seawall can be constructed behind the existing seawall, allowing the work to be isolated from the sea. This would weaken the existing structure during construction. Temporary support for the existing wall would need to be devised.
- The alternative precast panel pile wall could be installed without weakening the existing structure. However, it would require a temporary sheet pile wall to isolate the excavation work from the sea. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall.

- May be able to support the viaduct on the bulkhead.
- Uses mostly proven construction methods and elements.
- Relatively minor impacts to utilities anticipated. Will take more time to construct than the Face Wall Only option but less than the Buttress Fill option.

Seawall Screening Results

This seawall option is not recommended to be carried forward to the EIS because it will take longer than Option B1: Face Wall Only and offers no apparent advantages, except that it makes the tieback installation easier. However, the reduction in face wall size afforded by the tieback is offset by the introduction of another major structure behind the relieving platform. The savings in time and effort associated with the reduction in the size of the face wall will not offset the time and effort required to build the drilled shaft bulkhead anchor. In addition, the tieback is likely to be an obstruction to utilities and susceptible to increased stress from settlement of soil.

B3: BUTTRESS FILL

General Functional Description

The Buttress Fill option uses soil fill against the existing relieving platform to provide the lateral restraint needed for the seismic earth pressures from the liquefiable soils. To prevent marine borer attack, the fill would need to be placed high enough to cover the joint between the existing steel bulkhead and the concrete face wall of the relieving platform near the west margin of Alaskan Way. Assuming that the joint should be covered by 5 feet of fill, the height of the fill would be approximately 36 feet as shown in Figure 11 for the deep water section of the 1934 seawall.

Figure 11 shows the anticipated buttress fill required to achieve an intertidal beach. The ideal intertidal beach would have a slope of 6 horizontal to 1 vertical from the relieving platform down to Elevation -4.0 and a 3:1 slope continuing on to the seaward side from Elevation -4.0. As can be seen from Figure 11, the buttress fill may extend hundreds of feet from the relieving platform before it would intercept the existing ground line. It may be likely that the 3:1 slope of the fill will not intercept at some location along the waterfront making it impractical, or requiring a retaining structure underwater.

A suboption of this option is shown in Figure 12 as the Minimum Buttress Fill. The Minimum Buttress compromises the intertidal beach slightly by using steeper slopes. Even with steeper slopes, this fill would be extensive for the deep-water sections of the 1934 seawall. Although not shown, the minimum buttress fill may be applicable to the shallow-water sections of the 1934 seawall north of Pier 70 where there are no pier structures to interfere with its placement.

Key Features

- Relies on the existing relieving platform to be in good condition to carry vertical loads.
- Does not require removal of existing and potentially contaminated fills.
- Places new construction of the face wall to the outboard side of the existing relieving platform, minimizing risk of weakening the existing structure during construction.
- Can be accomplished with minimal disruptions to traffic on Alaskan Way.
- Little or no utility relocations required.
- May disrupt boat traffic during construction, particularly for the WSDOT ferry system if used at Colman dock.
- Placement of fill around and under the existing piers could cause substantial down-drag on the existing piles, possibly overloading them, and breaking the batter piles.

- Filling slips between piers may impact the operation of waterfront businesses and the fire boats.
- Native soils supporting the fill may be liquefiable, although they will be densified by the weight of the fill. Improvement methods would most likely involve the introduction of cementitious material, which could also be introduced into the seawater.
- Fill slopes would require riprap to protect against erosion.
- Placement of fill, and particularly the large riprap required to anchor it, will be difficult under the piers, which occupy a significant portion of the length of the waterfront.
- The Minimum Buttress Fill has the same deficiencies as the Buttress Fill, although to a lesser degree.
- The Minimum Buttress Fill may be applicable in limited areas north of Pier 70, where shallower, unobstructed water exists and where it is anticipated that design loads will be lower.

Seawall Screening Results

The Buttress Fill is not recommended to be carried forward to the EIS as a general seawall retrofit option. It would be difficult to construct around the existing piers and carries a significant risk of damaging the pier structures by creating additional loads on the piling of the piers, particularly the batter piles, and filling of the slips would adversely affect waterfront businesses that use them. In addition, the fill would be placed over existing soil that needs improvement in order to support the weight of the fill. Few methods of soil improvement could be performed on these soils and they would be time consuming and difficult at the depth of water at this site. Any kind of soil improvement in the tidal zone would have significant adverse environmental impacts during construction.

The Minimum Buttress Fill may be applicable to limited areas in open water at the north end of the project where wall heights are minimal, stability is more favorable, and down-drag on piles is not a concern. However, the need to protect the slopes with riprap will diminish the environmental benefits of constructing the fill.

CONCEPTS RECOMMENDED TO BE CARRIED FORWARD

REPLACEMENT OF SEAWALL

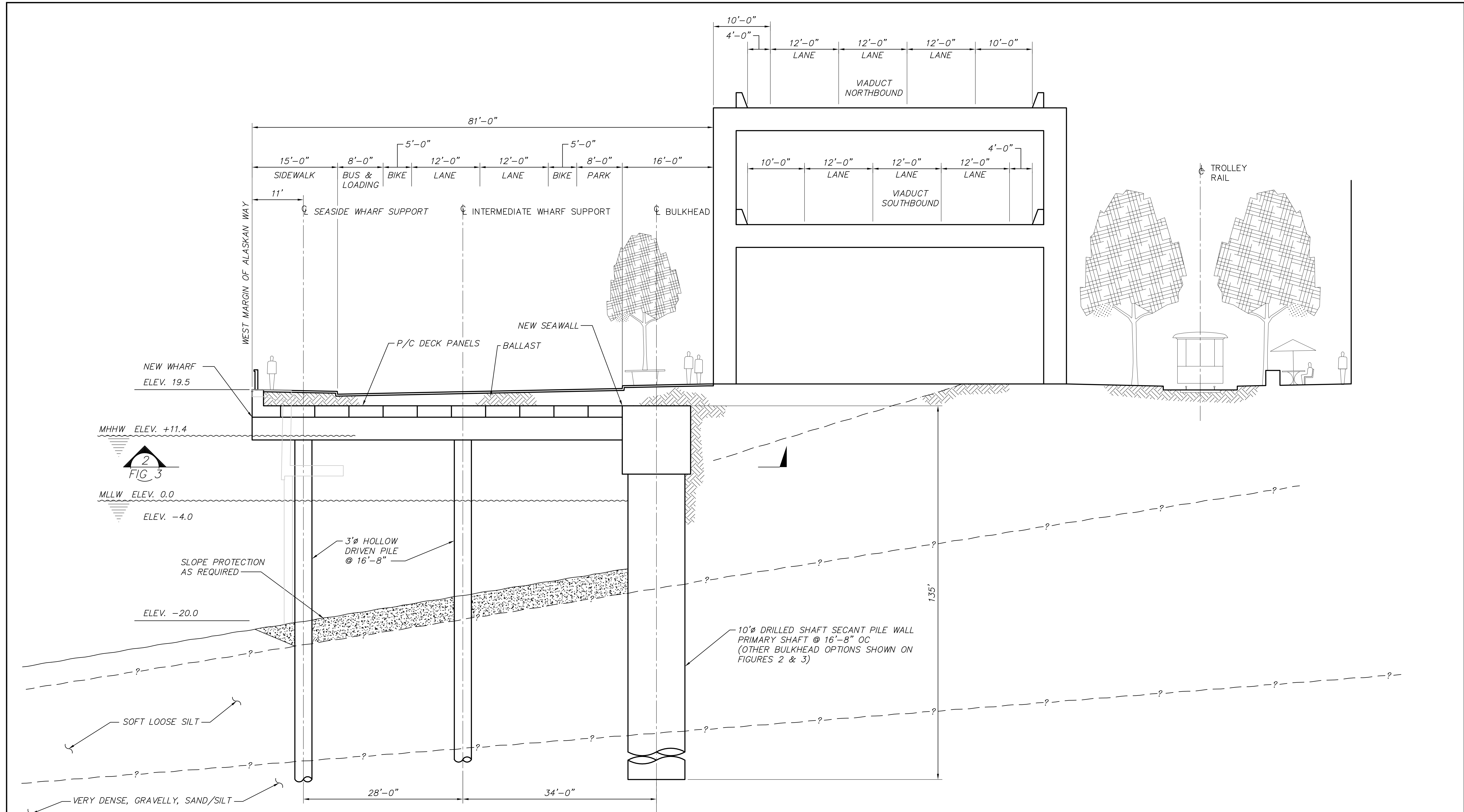
- A1: Wharf with Fill Removed
- A3: Vertical Face Wall with Frame

RETROFIT OF SEAWALL

- B1: Face Wall Only

APPENDIX A: FIGURES

APPENDIX B: CONCEPTUAL SEAWALL OPTIONS



1
-
TYPICAL SECTION - W/CANTILEVER DRILLED SHAFT SECANT WALL BULKHEAD
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

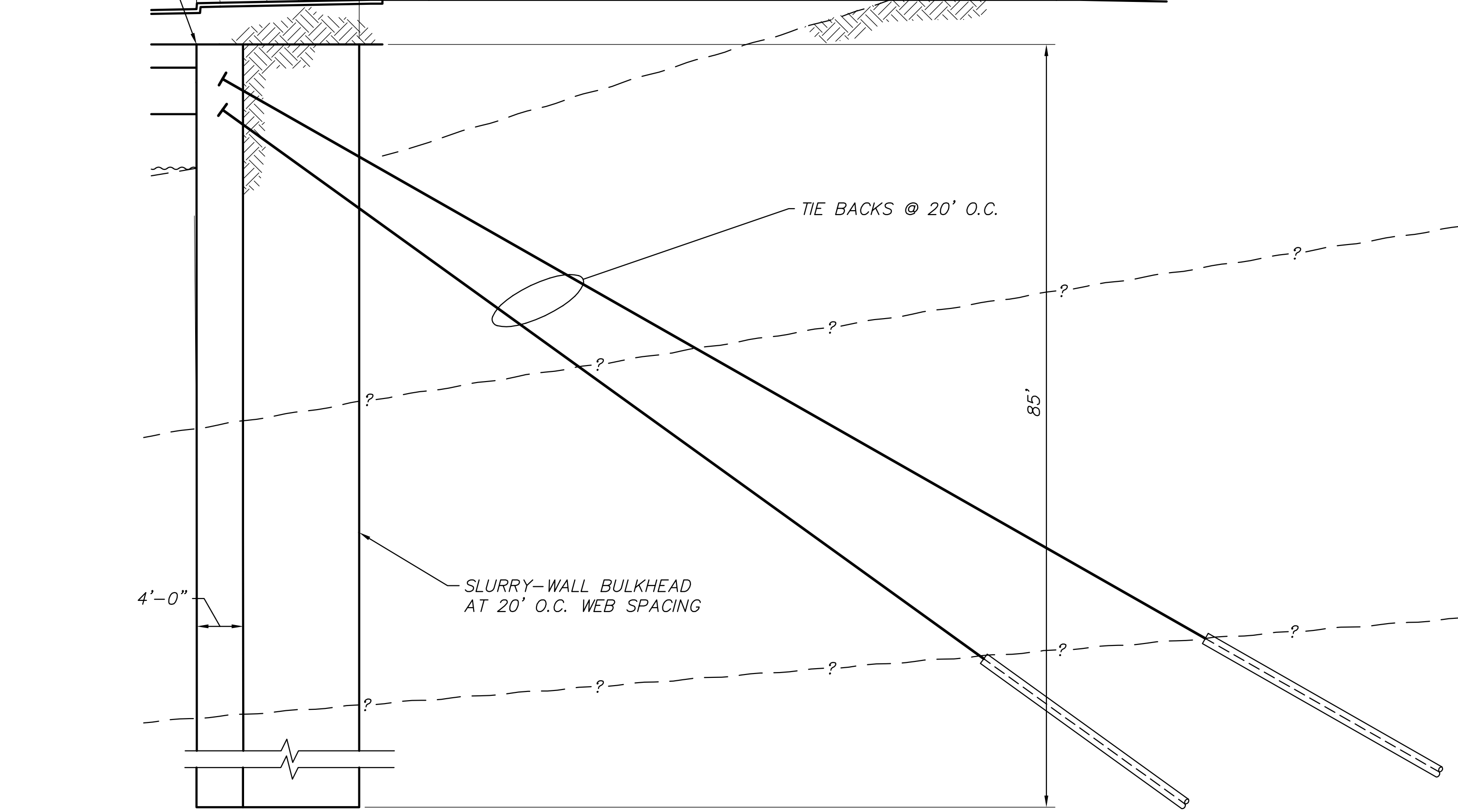
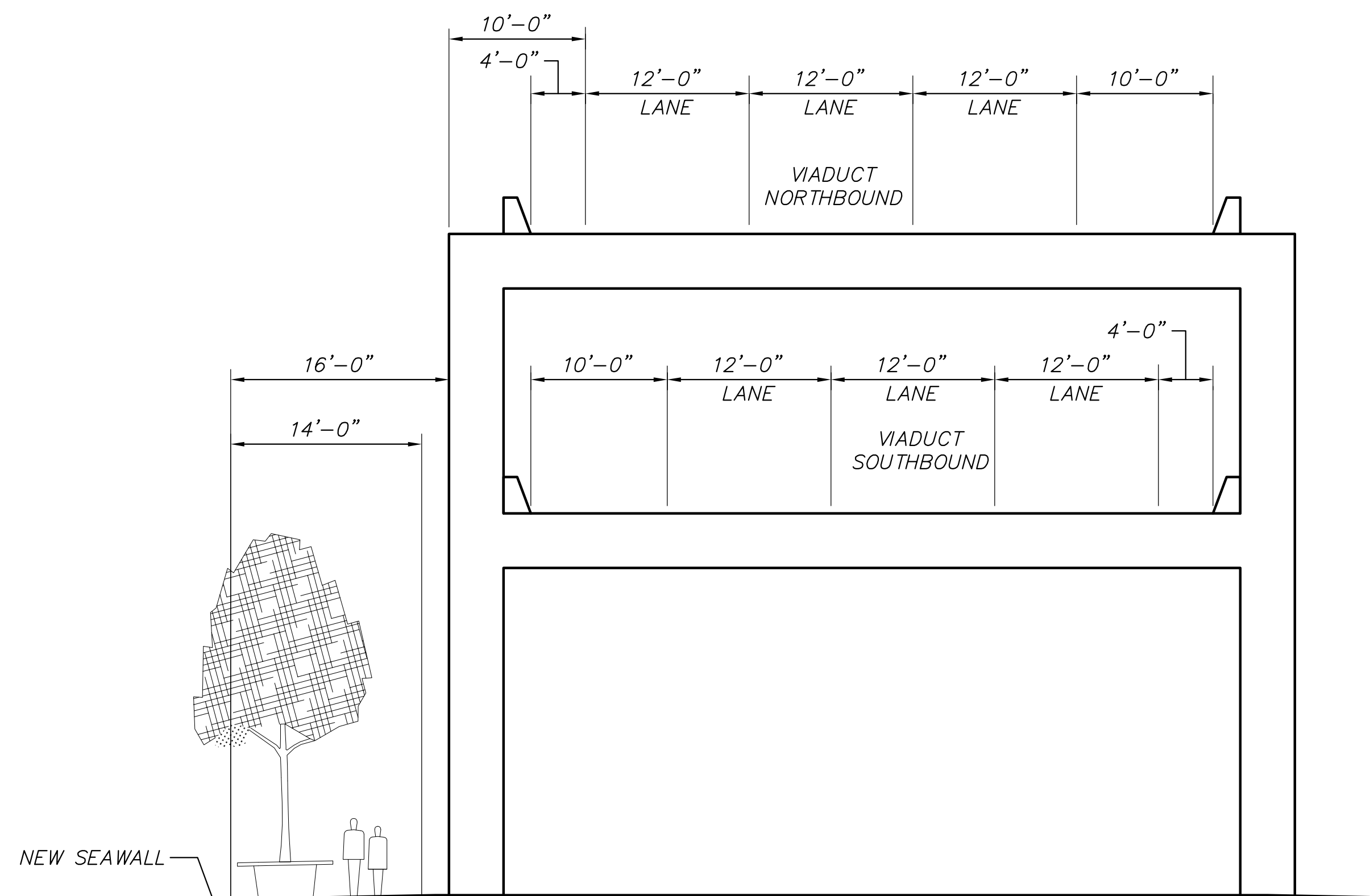
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				
-				



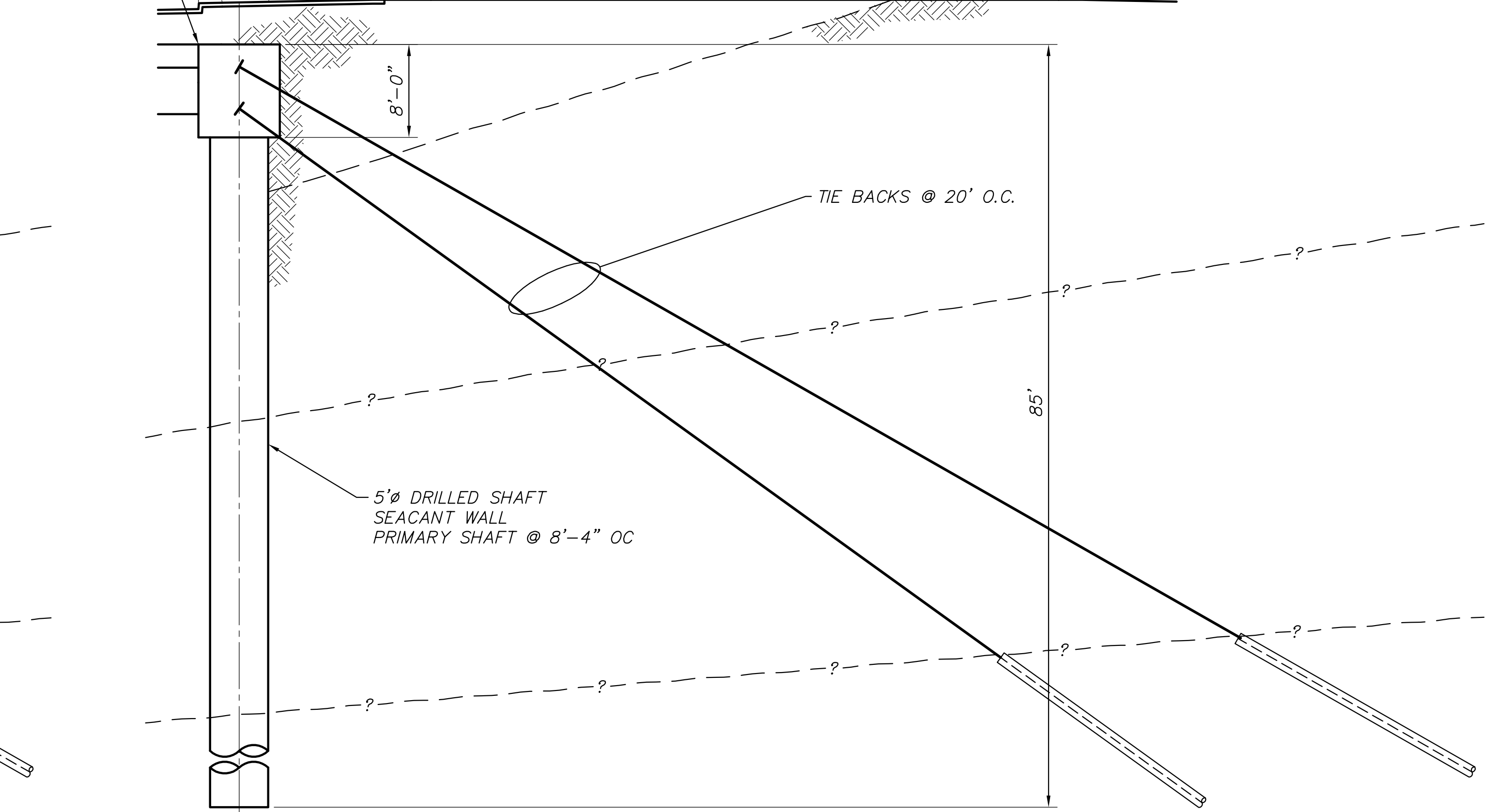
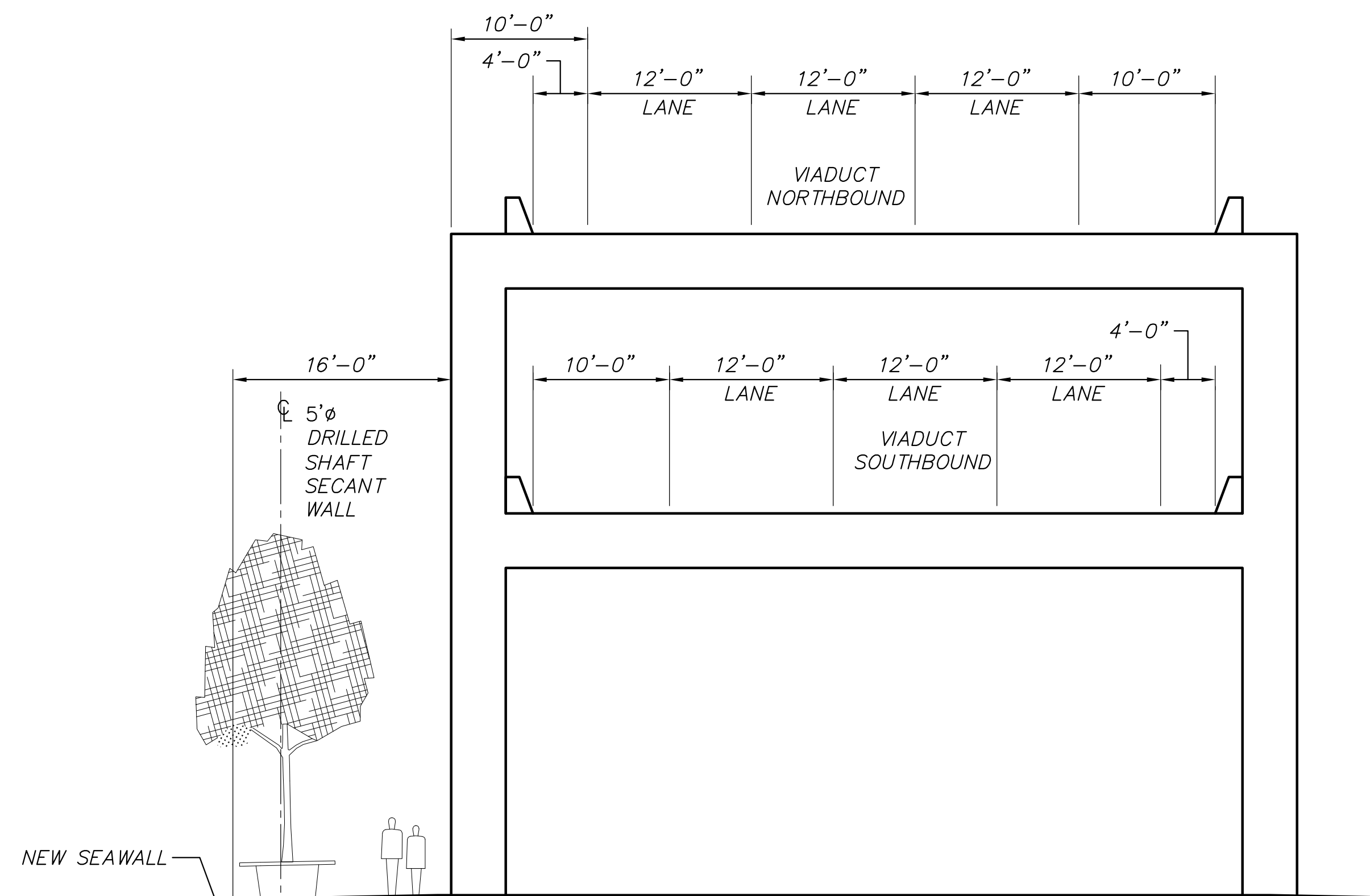
**SEAWALL OPTION B3
WHARF WITH FILL REMOVED**

TYPICAL SECTION

FIG 1
SHEET
OF
SHEETS



1 SLURRY-WALL BULKHEAD W/TIE BACKS
SCALE: N.T.S.



2 DRILLED SHAFT SECANT WALL BULKHEAD W/TIE BACKS
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
	DATE	REVISION	BY	APPR	

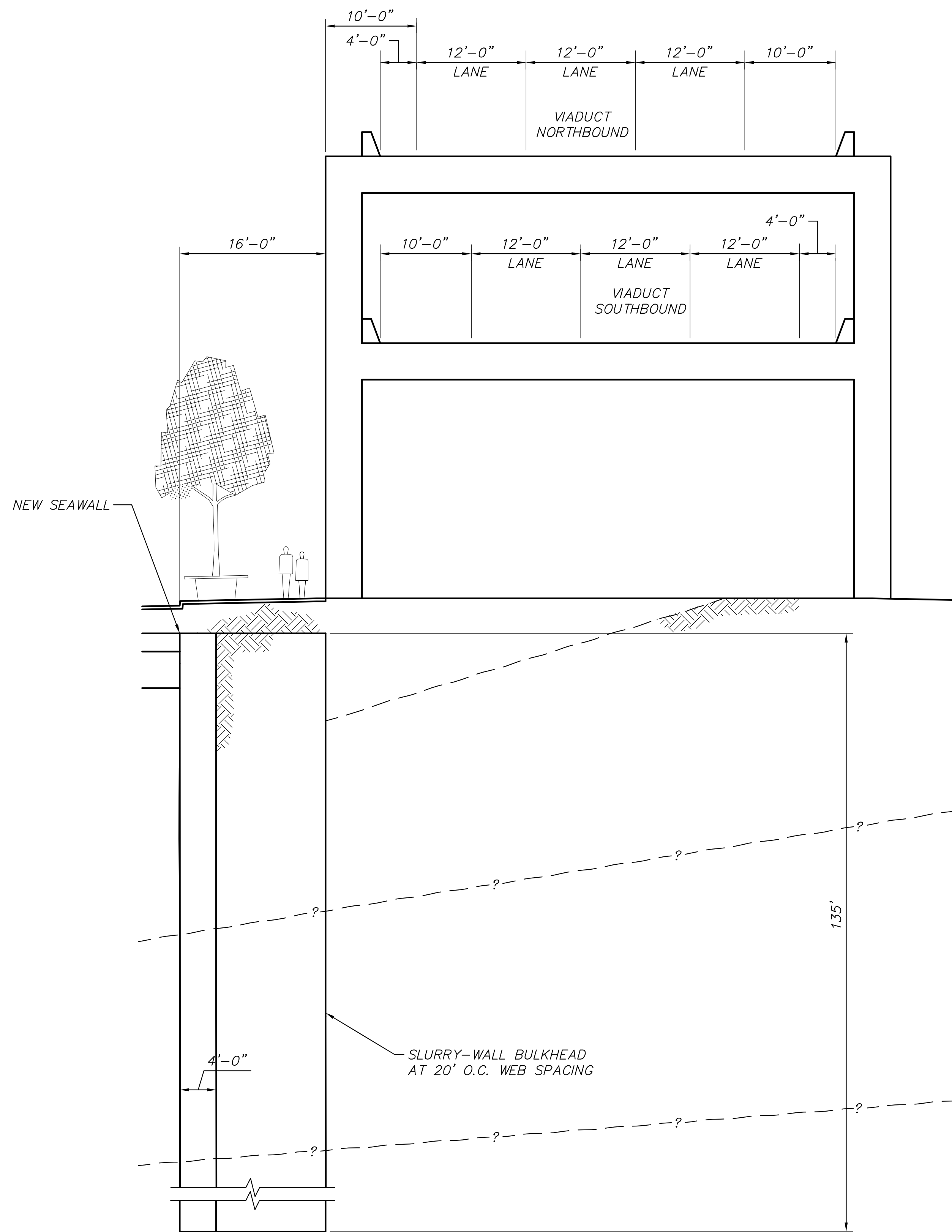
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				



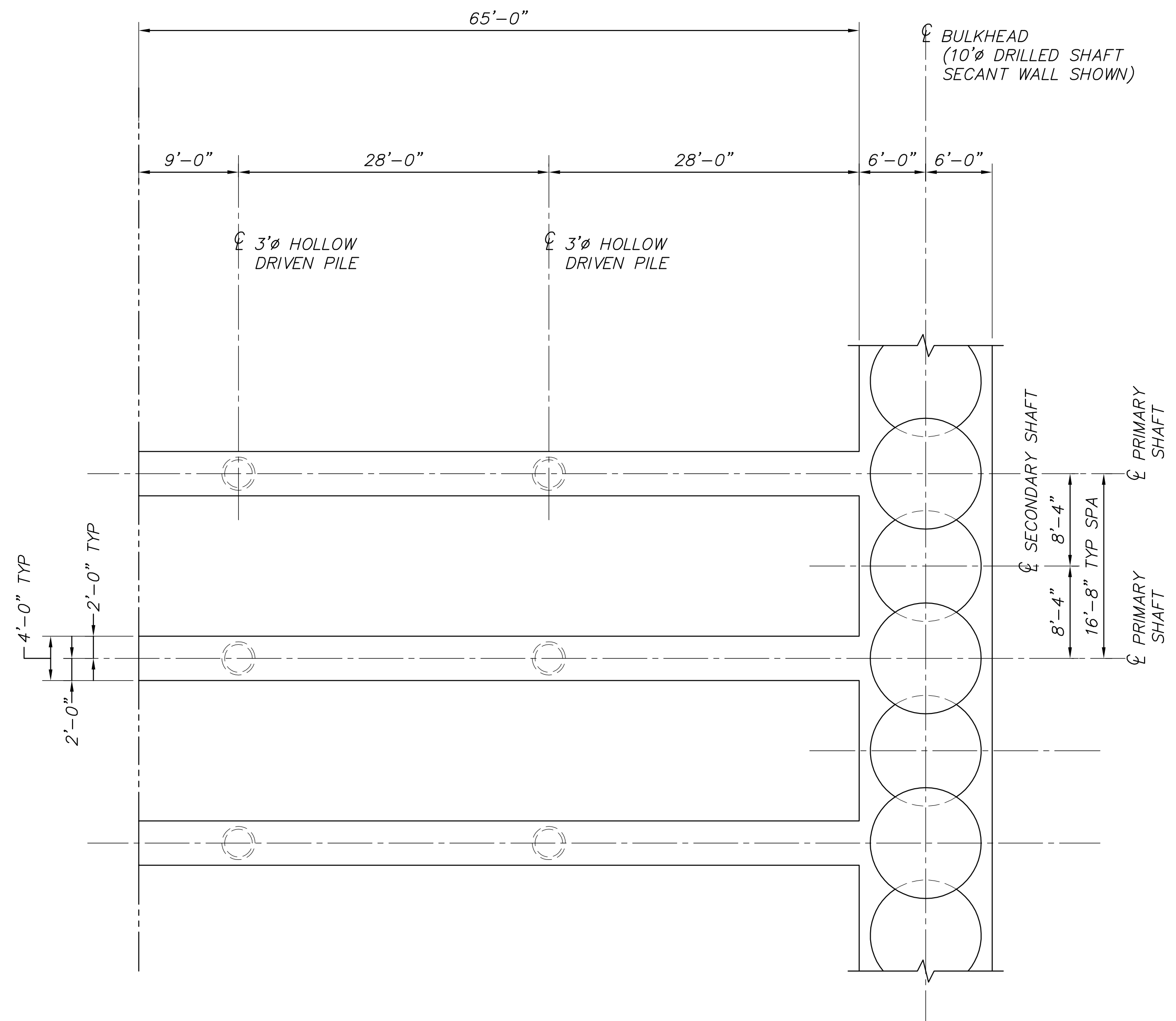
SEAWALL OPTION B3
WHARF WITH FILL REMOVED

BULKHEAD OPTIONS

FIG 2
SHEET
OF
SHEETS



1 CANTILEVER SLURRY-WALL BULKHEAD
SCALE: N.T.S.



2 PARTIAL FRAMING PLAN
CANTILEVER DRILLED SHAFT
SECANT WALL BULKHEAD SHOWN
(OTHER BULKHEAD OPTIONS SIMILAR)
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
	DATE	REVISION	BY	APPR	

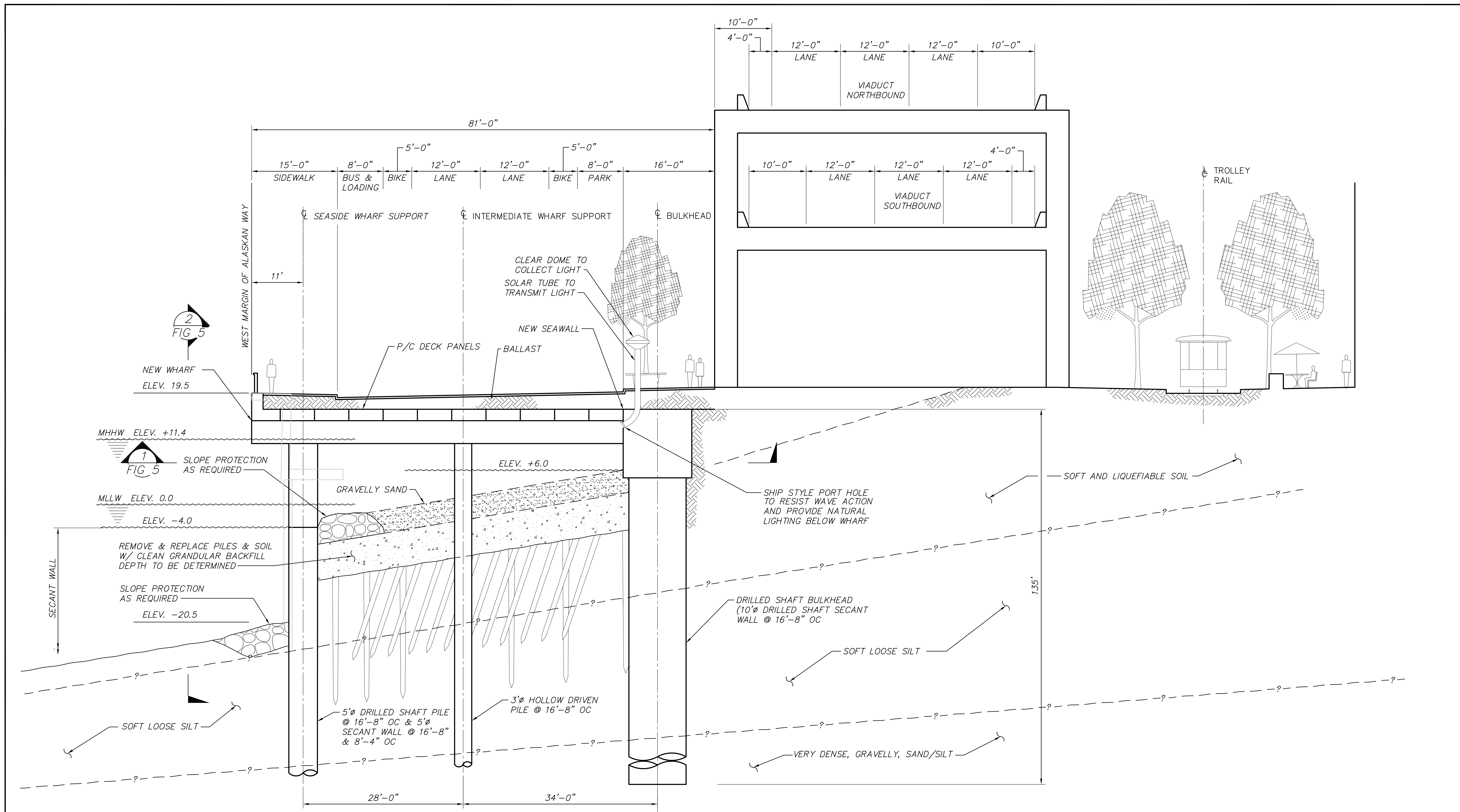
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH			
JOB NUMBER				
-				



SEAWALL OPTION A2
WHARF WITH FILL REMOVED

BULKHEAD OPTIONS

FIG 3
SHEET
OF
SHEETS



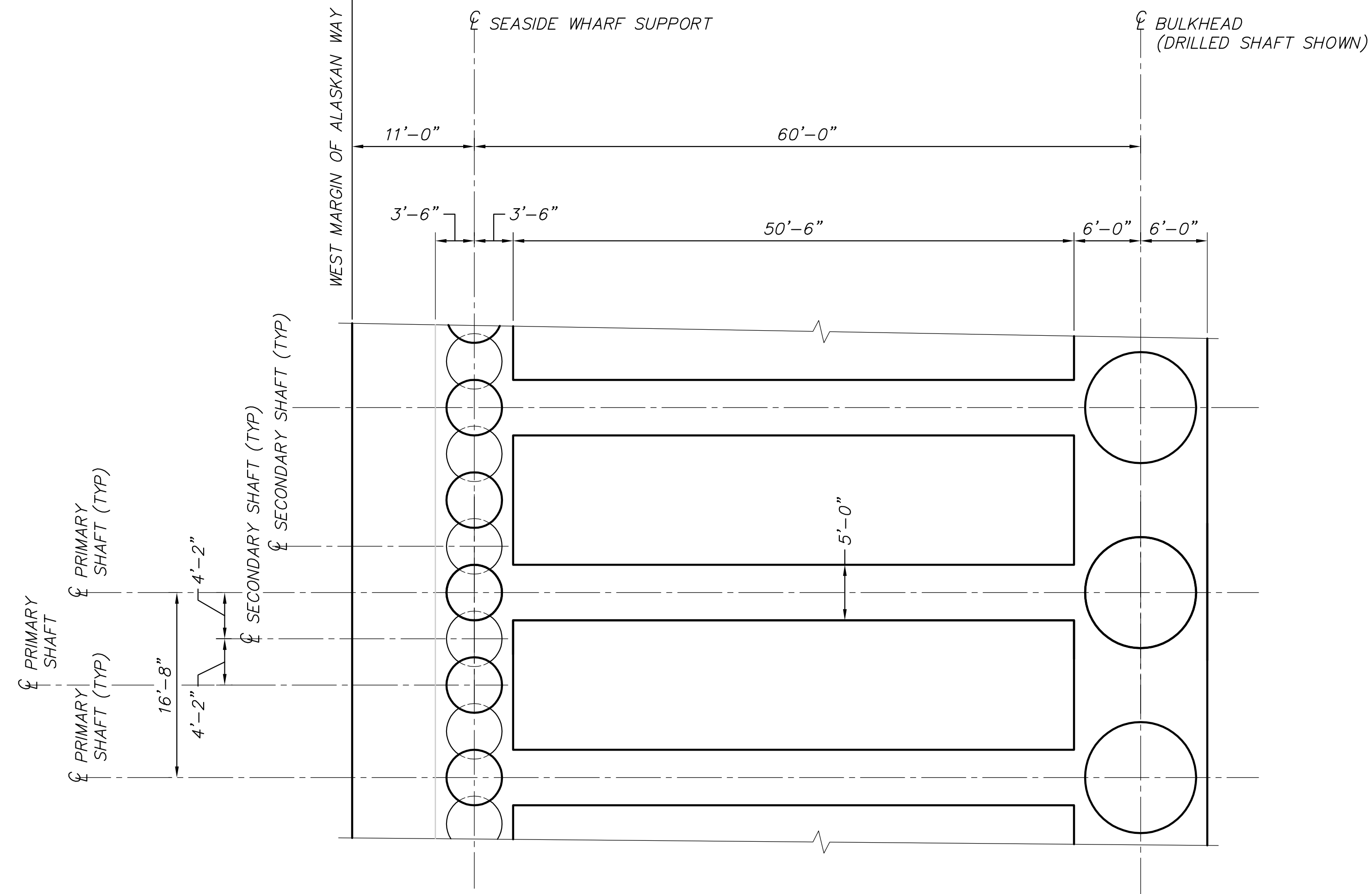
1
-
TYPICAL SECTION - WHARF W/PARTIAL FILL REMOVED
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

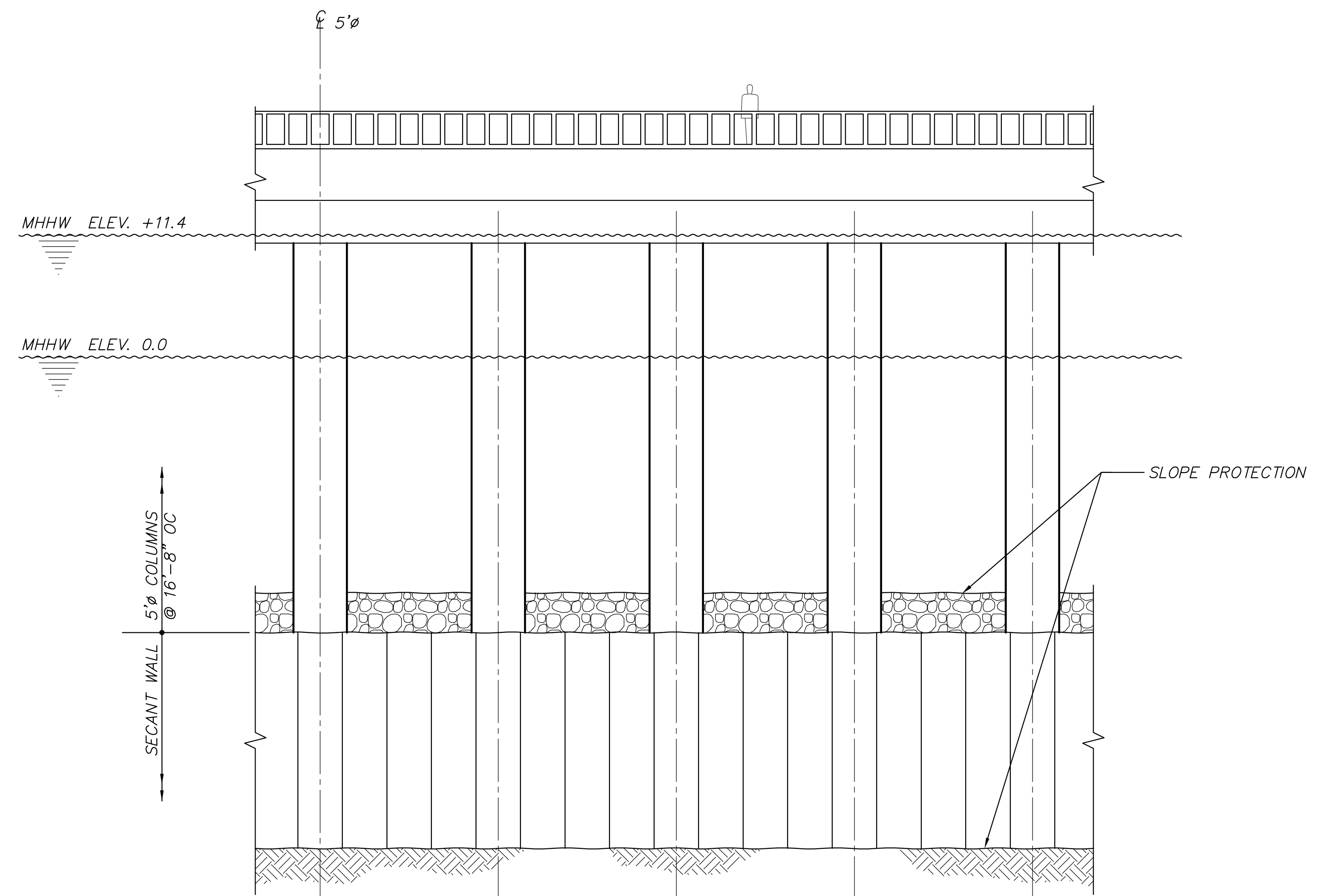
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH			
JOB NUMBER				
-				



SEAWALL OPTION A2 WHARF WITH INTERTIDAL BEACH		FIG 4 SHEET OF SHEETS
TYPICAL SECTION		

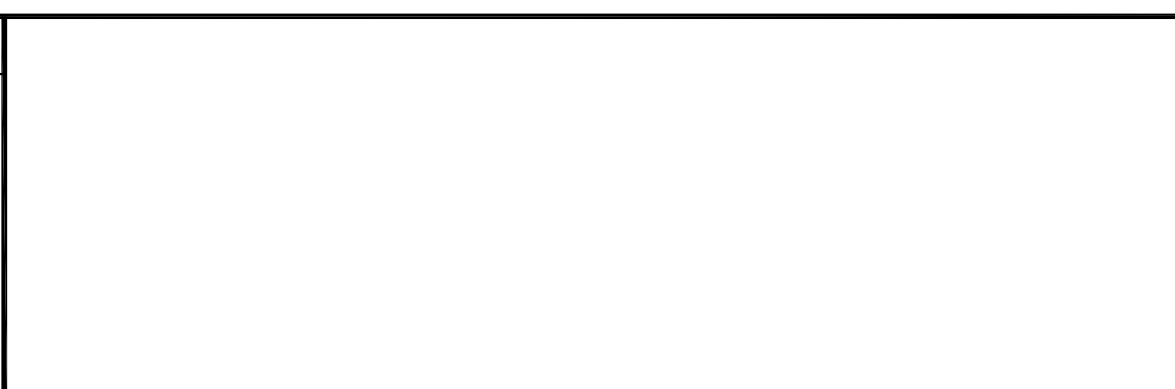


1 PARTIAL FRAMING PLAN
 FIG 4 SCALE: N.T.S.



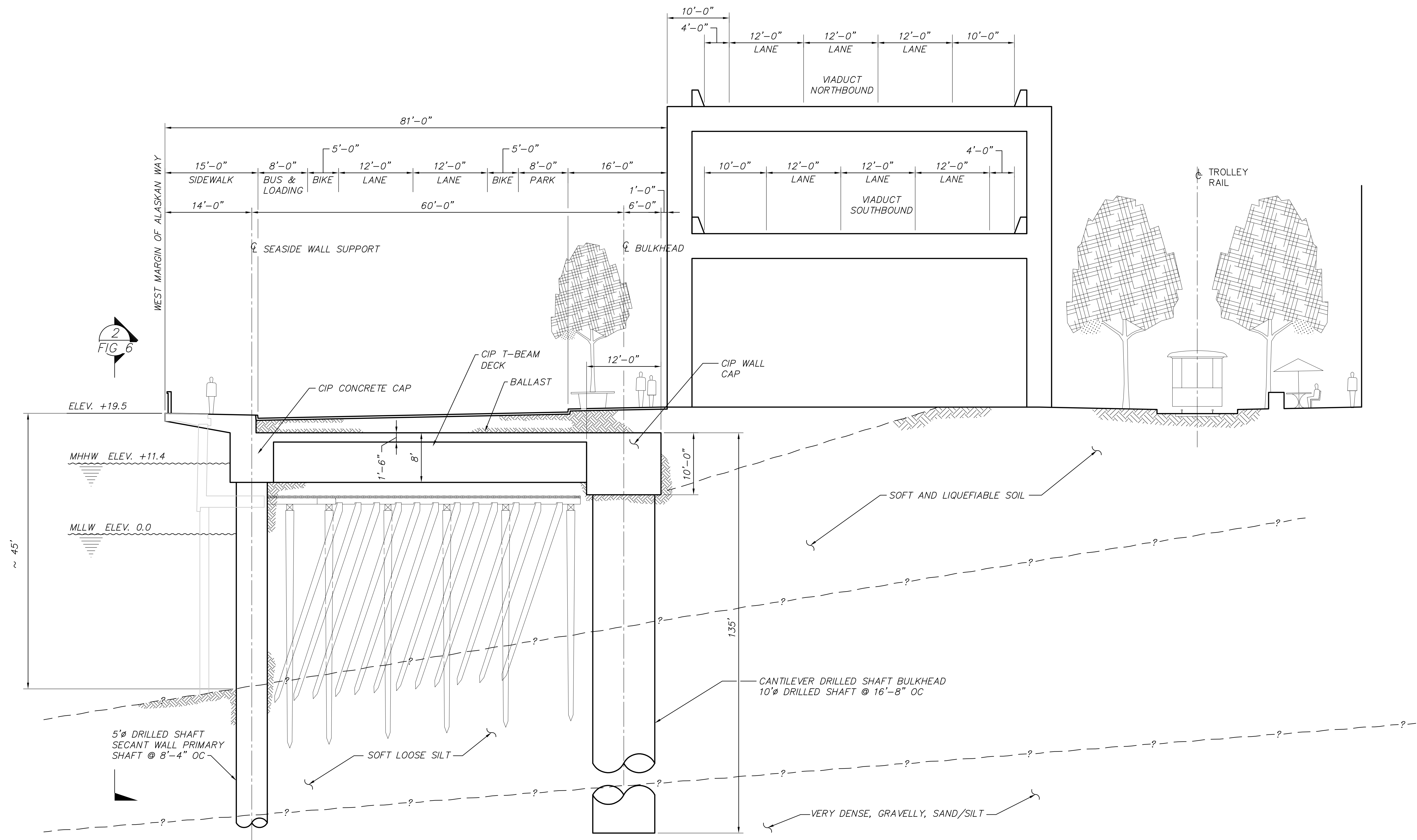
2 ELEVATION
 FIG 4 SCALE: N.T.S.

REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				
-				
DATE	REVISION	BY	APPR	

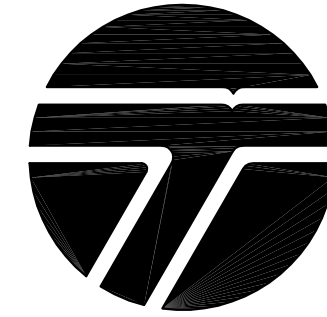



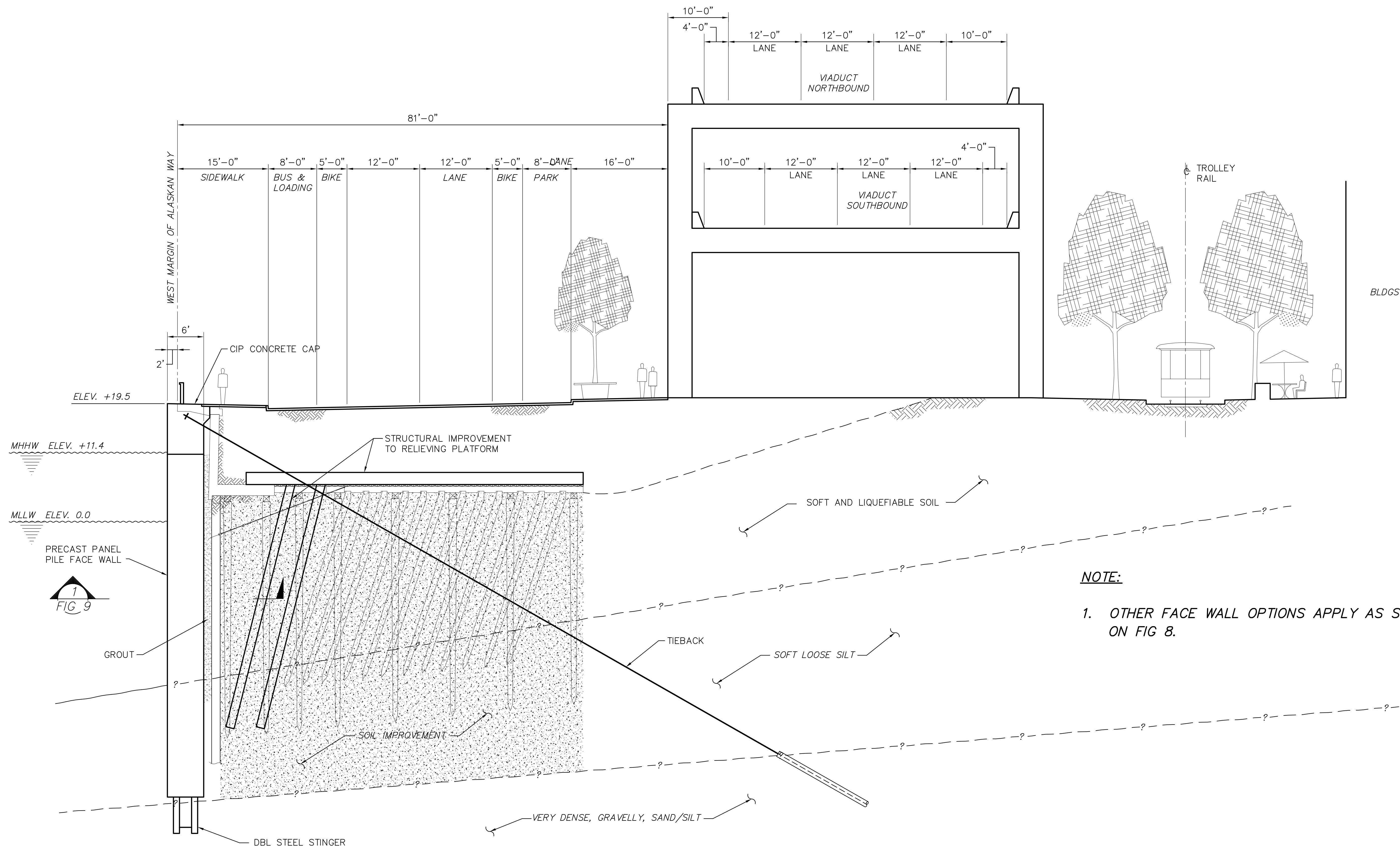
SEAWALL OPTION A3
 WHARF WITH INTERTIDAL BEACH

FIG 5
 SHEET
 OF
 SHEETS



1
-
TYPICAL SECTION - VERTICAL FACE W/ FRAME
SCALE: N.T.S.

DRAWN ERM				REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS	 	SEAWALL OPTION A3 VERTICAL FACE WALL W/ FRAME	FIG 6	
DESIGNED WEW				10	WASH	-						SHEET
CHECKED				JOB NUMBER								
PROJ ENGR RLF												
REG ADM												
DATE				REVISION				BY		APPR		



NOTE:
 1. OTHER FACE WALL OPTIONS APPLY AS SHOWN ON FIG 8.

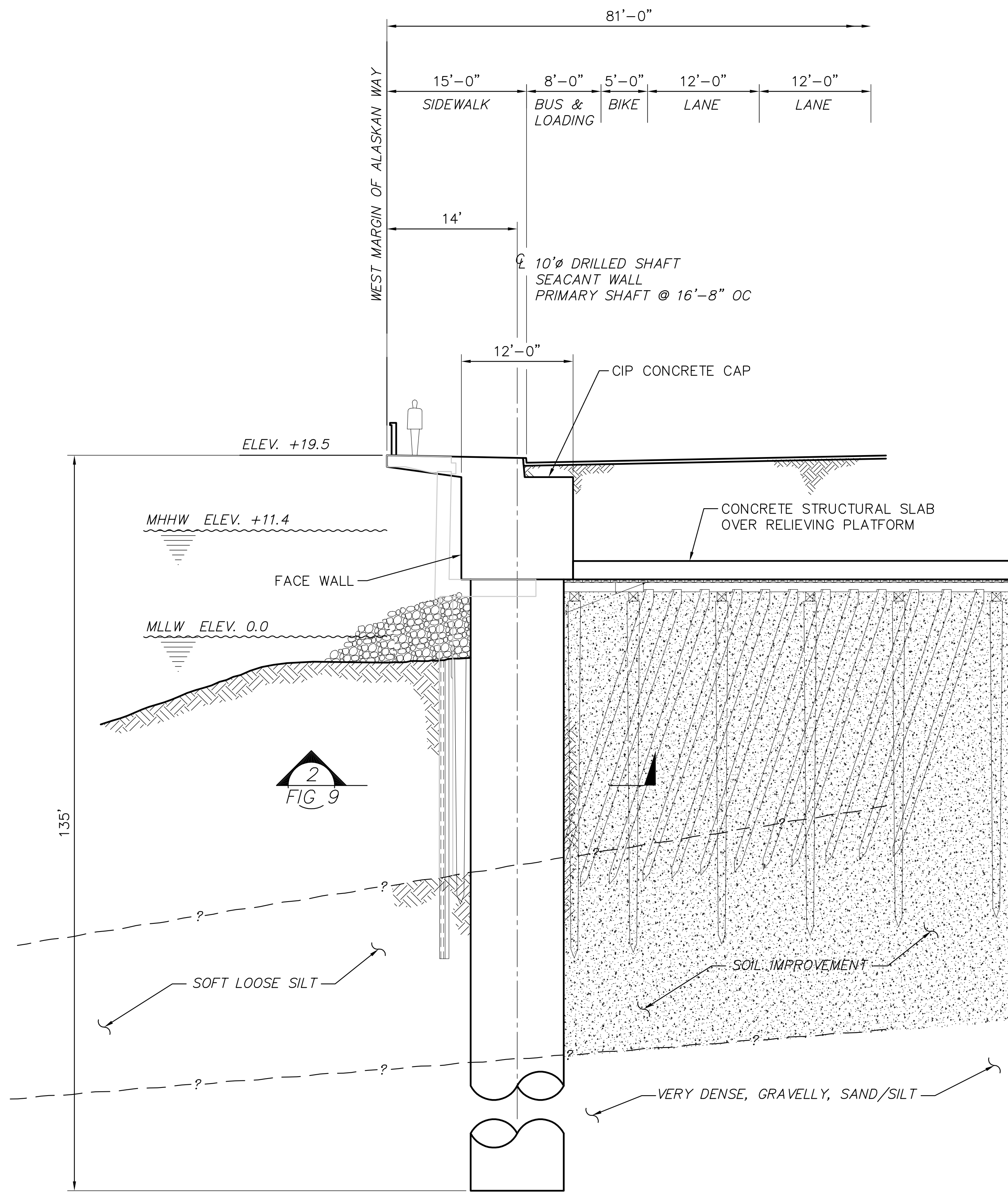
1
 -
 TYPICAL SECTION - FACE WALL ONLY
 SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

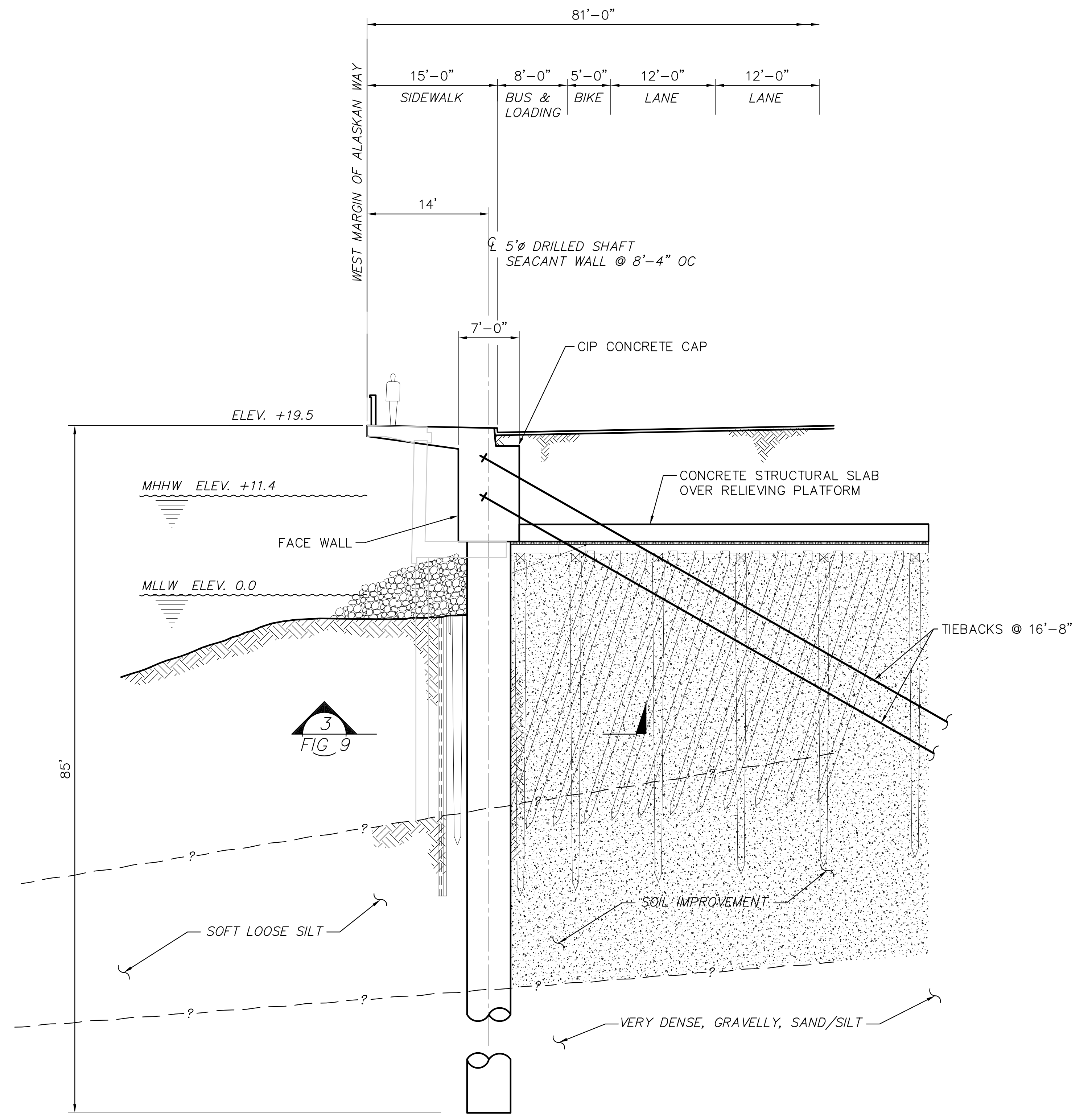
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				



SEAWALL OPTION B1 FACE WALL ONLY		FIG 7 SHEET OF SHEETS
TYPICAL SECTION		

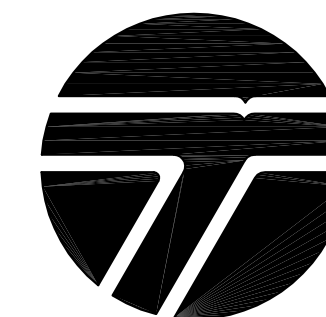


1
-
FACE WALL ONLY - W/ CANTILEVER DRILLED SHAFT
SCALE: N.T.S.



1
-
FACE WALL ONLY - DRILLED SHAFT W/ TIEBACKS
SCALE: N.T.S.

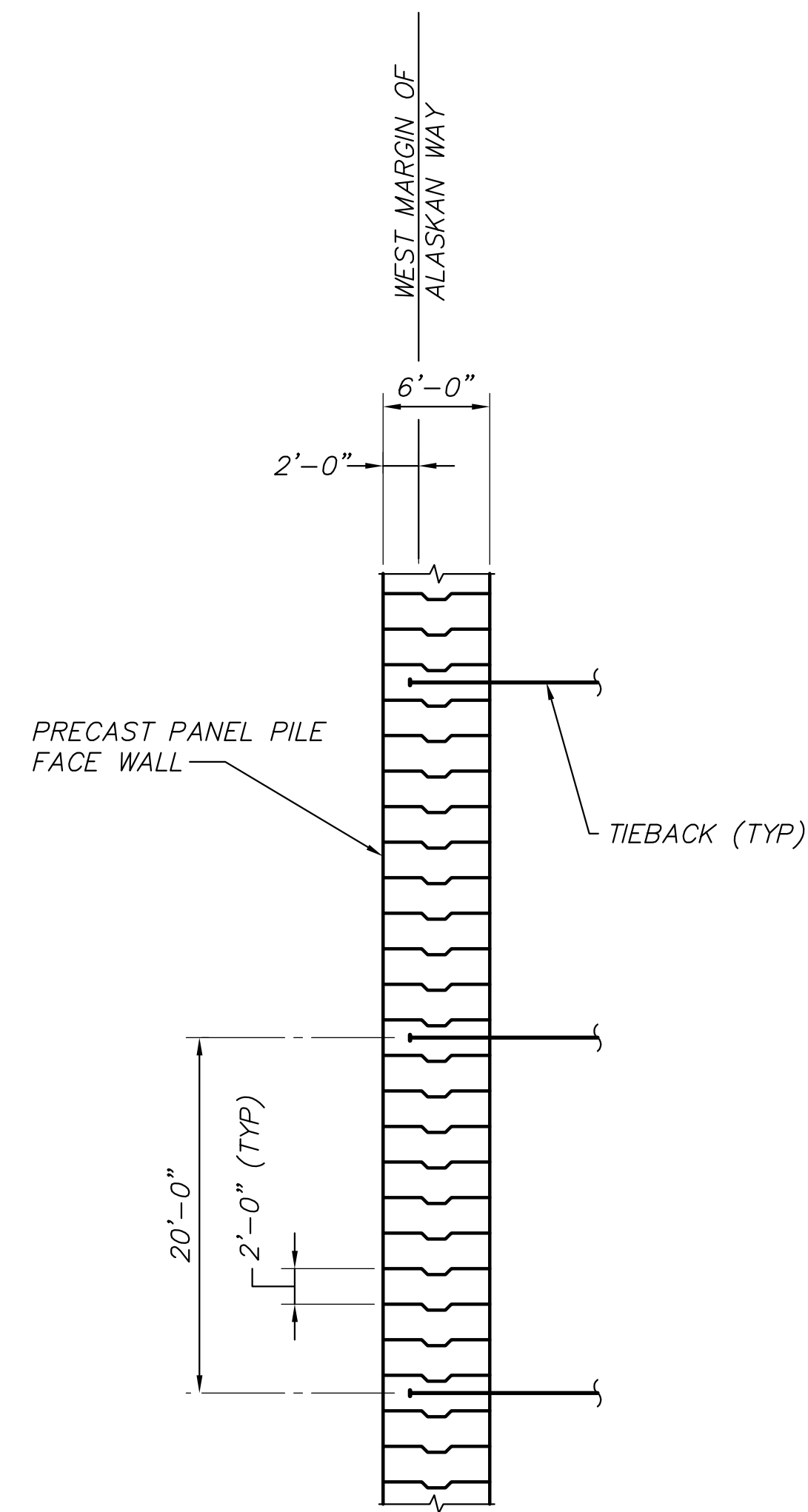
DRAWN	ERM	REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
DESIGNED	WEW	10	WASH	-		
CHECKED		JOB NUMBER				
PROJ ENGR	RLF					
REG ADM						
	DATE	REVISION	BY	APPR		



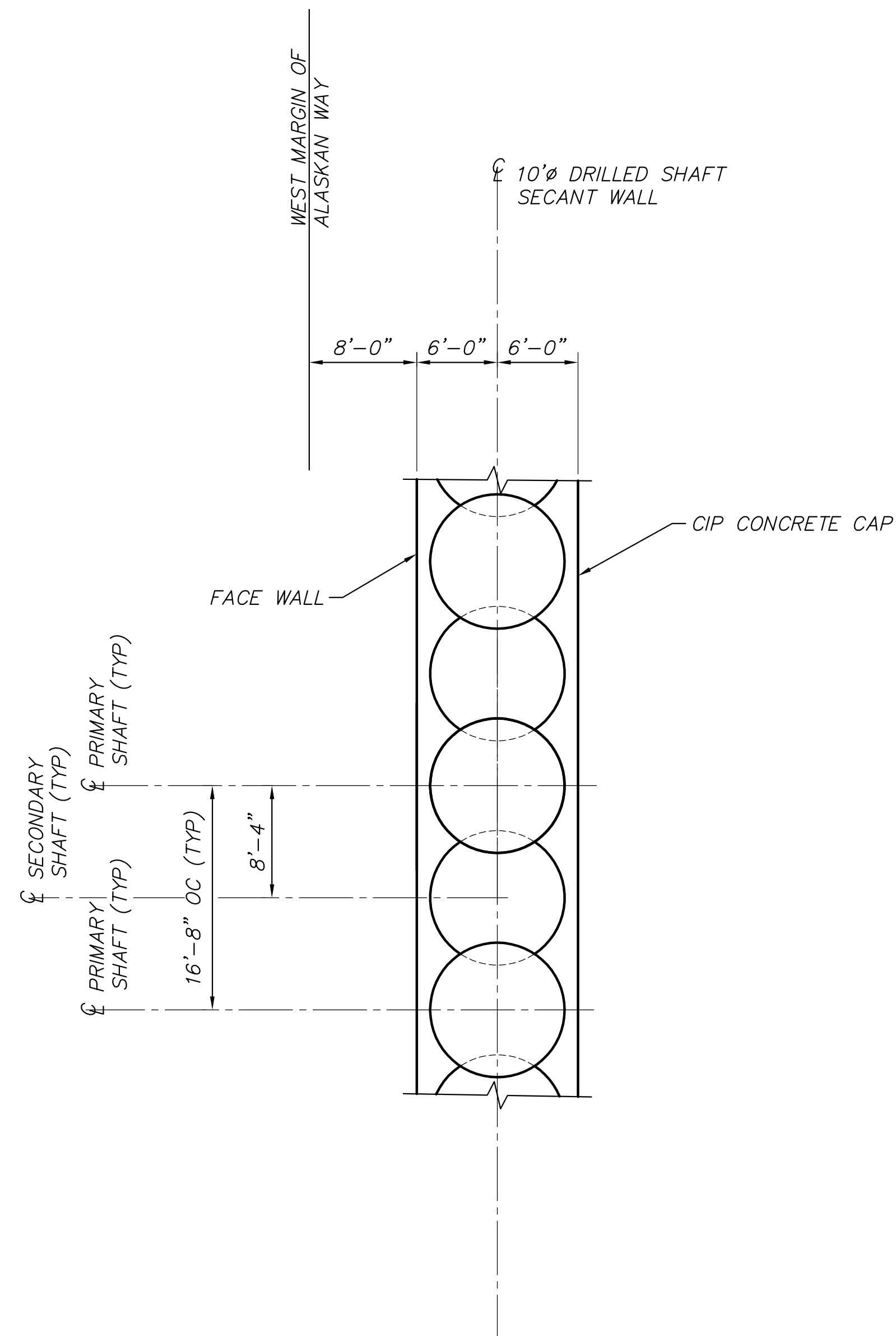
SEAWALL OPTION B1
FACE WALL ONLY

FACE WALL ONLY - OPTIONS

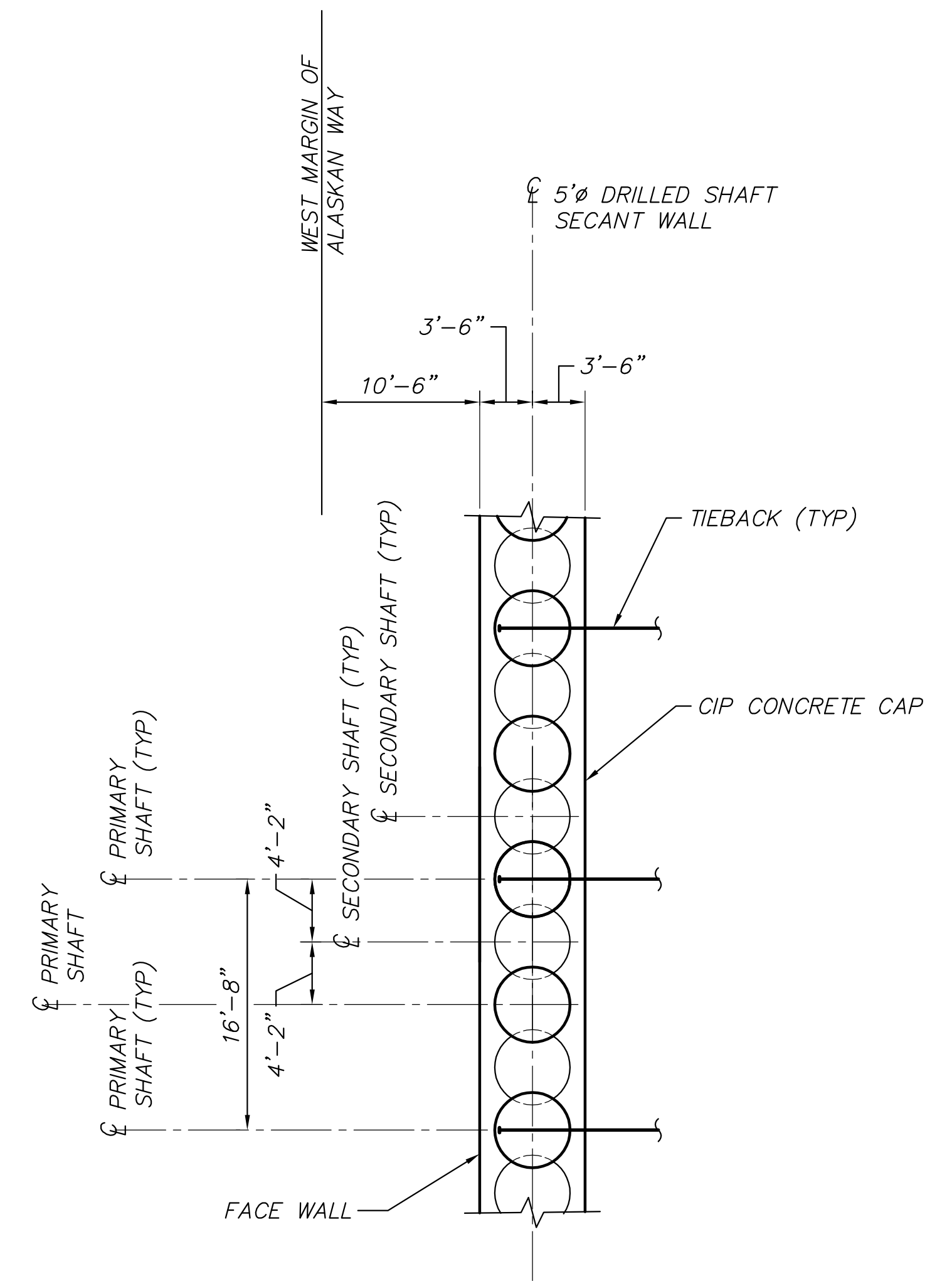
FIG 8
SHEET
OF
SHEETS



1
FIG 7 PLAN SECTION - PRECAST PANEL PILE
SCALE: N.T.S.



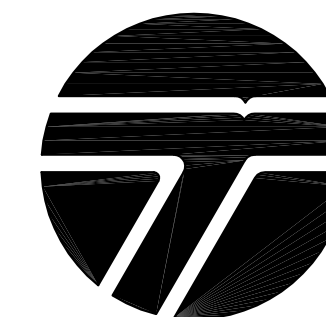
2
FIG 8 PLAN SECTION - CANTILEVER DRILLED SHAFT
SCALE: N.T.S.



3
FIG 9 PLAN SECTION - DRILLED SHAFT W/ TIEBACKS
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
	DATE	REVISION	BY	APPR	

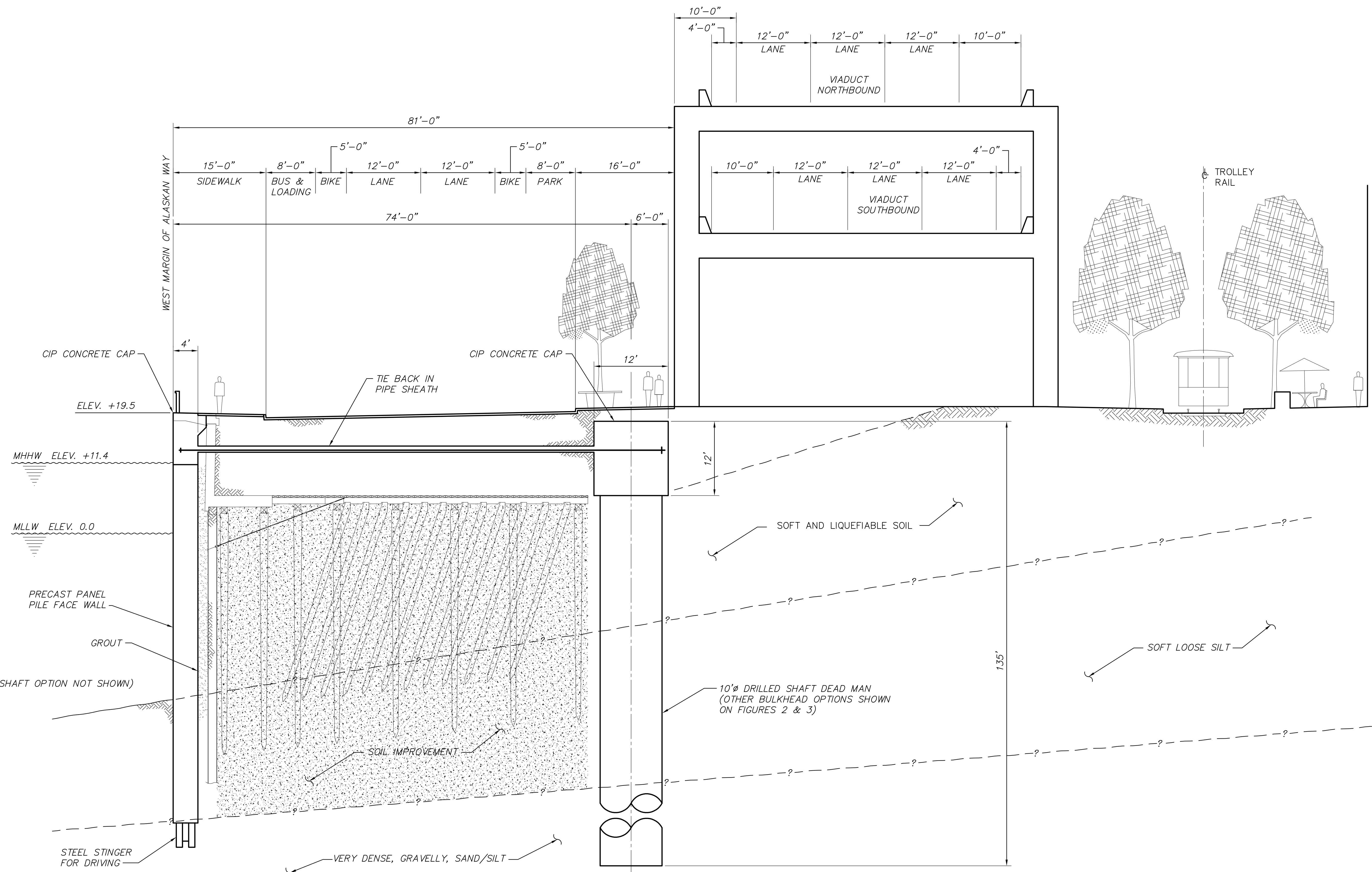
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				



SEAWALL OPTION B1
FACE WALL ONLY

PLAN SECTIONS

FIG 9
SHEET
OF
SHEETS



1
-
TYPICAL SECTION - ANCHORED WALL
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

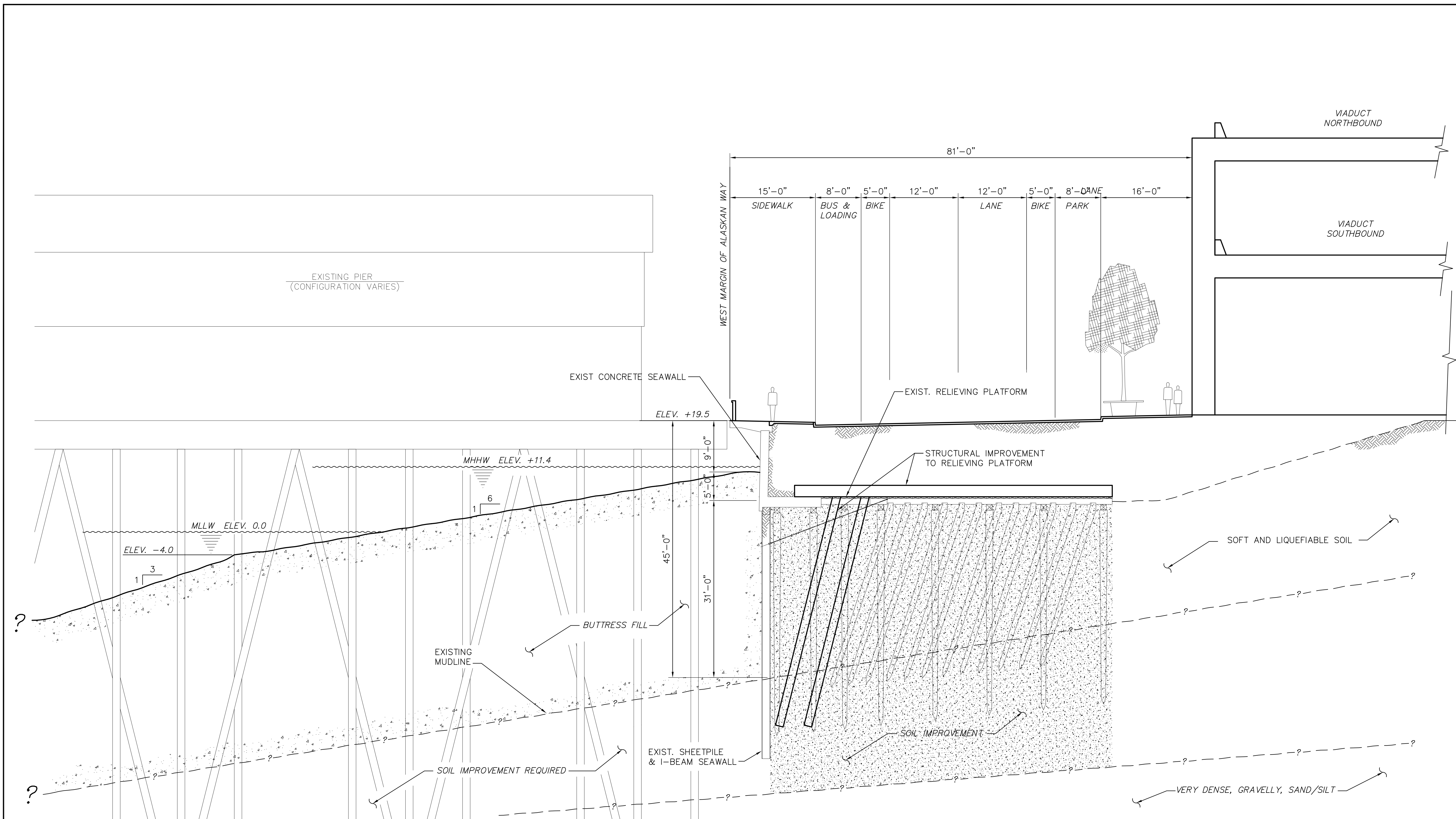
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER		-		



SEAWALL OPTION B2
ANCHORED WALL

TYPICAL SECTION

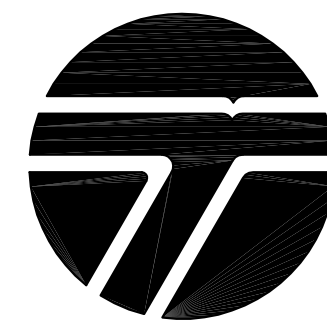
FIG 10
SHEET
OF
SHEETS



1
-
TYPICAL SECTION - BUTTRESS FILL
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

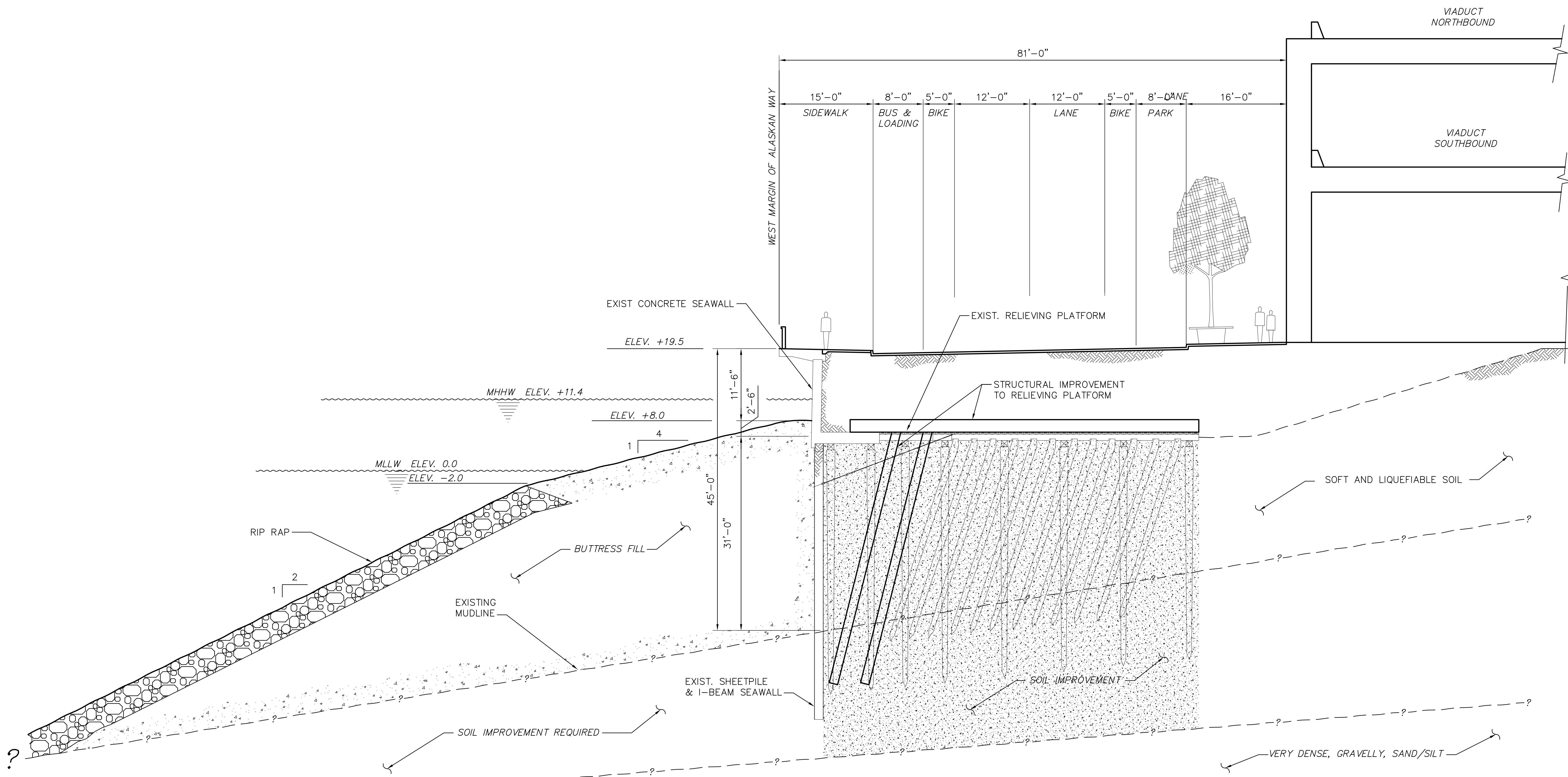
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				



**SEAWALL OPTION B3
BUTTRESS FILL**

TYPICAL SECTION

FIG 11
SHEET
OF
SHEETS



1
-
TYPICAL SECTION - BUTTRESS FILL
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER		-		



SEAWALL OPTION B3
MINIMUM BUTTRESS FILL

TYPICAL SECTION

FIG 12
SHEET
OF
SHEETS

Alaskan Way Seawall Replacement Options

Base Replacement Option	Sub-Option	Seaside Seawall/Face Wall Construction		Landside Bulkhead Construction	
		Outboard of Exist. Wharf Wall	Inboard of Exist. Wharf Wall	Bulkhead w/ Tieback	Bulkhead No Tieback
A1: Wharf w/ Fill Removed					
	a1		Pile	Shaft	
	a2		Pile		Shaft
	a3		Pile	Slurry Wall	
	a4		Pile		Slurry Wall
	b1		Shaft	Shaft	
	b2		Shaft		Shaft
	b3		Shaft	Slurry Wall	
	b4		Shaft		Slurry Wall
	c1	Pile		Shaft	
	c2	Pile			Shaft
	c3	Pile		Slurry Wall	
	c4	Pile			Slurry Wall
	d1	Shaft		Shaft	
	d2	Shaft			Shaft
	d3	Shaft		Slurry Wall	
	d4	Shaft			Slurry Wall
A2: Wharf w/ Intertidal Beach					
	a1		Shaft	Shaft	
	a2		Shaft		Shaft
	a3		Shaft	Slurry Wall	
	a4		Shaft		Slurry Wall
	b1	Shaft		Shaft	
	b2	Shaft			Shaft
	b3	Shaft		Slurry Wall	
	b4	Shaft			Slurry Wall
A3: Vertical Faced Wall w/ Structural Frame					
	a1		Shaft	Shaft	
	a2		Shaft		Shaft
	a3		Shaft	Slurry Wall	
	a4		Shaft		Slurry Wall
	b1	Driven PC Pile		Shaft	
	b2	Driven PC Pile			Shaft
	b3	Driven PC Pile		Slurry Wall	
	b4	Driven PC Pile			Slurry Wall
	c1	Shaft		Shaft	
	c2	Shaft			Shaft
	c3	Shaft		Slurry Wall	
	c4	Shaft			Slurry Wall

Sub-Options eliminated early from further consideration

Alaskan Way Seawall Replacement Options

Base Retrofit Option	Sub-Option	Seaside Seawall/Face Wall Construction		Landside Bulkhead Construction	
		Outboard of Exist. Wharf Wall	Inboard of Exist. Wharf Wall	Bulkhead w/ Tieback	Bulkhead No Tieback
B1: Face Wall Only					
	a	Driven Pile w/ Tieback			
	b1		Shaft w/ Tieback		
	b2		Cantilever Shaft		
B2: Anchored Wall					
	a1		Shaft	Shaft	
	a2		Shaft	Slurry Wall	Shaft
	a3		Shaft		Slurry Wall
	a4		Shaft		
	b1	Driven Piles		Shaft	
	b2	Driven Piles		Slurry Wall	Shaft
	b3	Driven Piles			Slurry Wall
	b4	Driven Piles			
	c1	Shaft		Shaft	
	c2	Shaft			Shaft
	c3	Shaft		Slurry Wall	
	c4	Shaft			Slurry Wall
B3: Buttress Fill					
	a1	Embankment Fill			

Sub-Options eliminated early from further consideration

APPENDIX C: SCREENING CRITERIA

Alternatives Screening Criteria



Submitted to:
Washington State Department of Transportation
Urban Corridors Office
401 Second Avenue, Suite 300
Seattle, WA 98104-2887

Prepared by:
Parsons Brinckerhoff Quade & Douglas, Inc.



January 2002

SR 99: Alaskan Way Viaduct Project

Alternatives Screening Criteria

Agreement No. Y-7888

Task E3.2

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

Parsons Brinckerhoff Quade & Douglas, Inc.

999 Third Avenue, Ste 2200
Seattle, WA 98104

In association with:

BERGER/ABAM Engineers Inc.
David Evans and Associates, Inc.
Entech Northwest
EnviroIssues, Inc.
Harvey Parker & Associates, Inc.
Jacobs Sverdrup
Larson Anthropological Archaeological Services Limited
Mimi Sheridan, AICP
PanGEO INCORPORATED
Parametrix, Inc.
Preston, Gates, Ellis, LLP
ROMA Design Group
RoseWater Engineering, Inc.
Shannon & Wilson, Inc.
Steven L. Kramer, Ph.D., Consulting Engineer
Taylor Associates, Inc.
Tom Warne and Associates, LLC
William P. Ott

Alternatives Screening Criteria

INTRODUCTION

The Washington State Department of Transportation and City of Seattle (STATE/CITY) are considering multiple options for transportation corridor alignments, profiles (tunnel, surface, elevated) and connections generated through public comment and by the design development process for the replacement or upgrade of the Alaskan Way Viaduct and City of Seattle Seawall. These options will be evaluated against a set of screening criteria. The criteria will be used to evaluate the relative ability of each option to satisfy the defined project purpose and need, established policies and regulations, and to meet the needs and interests of the community. The evaluation of options against these criteria will be quantitative and qualitative, as appropriate. This level of screening is expected to identify options that can be eliminated from further and more detailed evaluation. The screening process will help define the build alternatives (in addition to the NEPA/SEPA-required No Action Alternative) that are the most suited for the corridor, and which will be carried forward to more detailed analysis in the EIS. The Screening Criteria have been reviewed and revised through working discussions with State and City staff.

The screening criteria are expressed as a series of goals. Two goals, seismic safety and transportation functions, must be met for any alternative to be advanced. During the screening process options will first be evaluated against these mandatory criteria. If they do not meet these criteria they will be dropped from consideration without further evaluation. Options that meet the mandatory criteria will be evaluated against the remaining criteria. Where similar options are available, the concept providing the greatest benefit with the least impacts will be advanced for further consideration.

SCREENING CRITERIA

Goal 1: An alternative must provide a facility that meets current seismic design standards.

STATE/CITY seek an alternative that will meet current seismic design standards for transportation facilities and other associated structures. STATE/CITY also seek an alternative that will improve the structural integrity of the existing Alaskan Way Seawall. Evaluation of this goal will note the characteristics of an option that appear seismically vulnerable.

Goal 2: An alternative must maintain or improve the transportation functions of the Alaskan Way Viaduct corridor.

STATE/CITY seek an alternative that will improve the transportation-related functions of the existing Alaskan Way Viaduct corridor. STATE/CITY seek an alternative that will equal or increase the people and good carrying capacity of the corridor. We also seek an alternative that provides equal or improved access to key locations such as the central downtown core, the stadiums, the Ballard-Interbay area, and the Duwamish manufacturing and industrial centers. Furthermore, we seek an alternative that will equal or improve the mobility of freight and trucks in the Alaskan Way corridor; the access of vehicles and pedestrians to the ferry system; and the mobility of pedestrians and other non-motorized users within the Alaskan Way corridor itself. Evaluation of this goal will list transportation functions that an option cannot provide.

Goal 3: An alternative should improve traffic safety.

STATE/CITY seek an alternative that will improve traffic safety throughout the corridor. High accident rates characterize a number of locations within the corridor due to substandard design features. STATE/CITY seek an alternative that will reduce the potential for traffic accidents by meeting WSDOT-approved roadway design standards for lane widths, shoulder widths, and ramp connections. Evaluation of this goal will list locations where an option does not appear to meet roadway design standards and briefly describe the safety implications of not meeting the standards.

Goal 4: An alternative should maintain or improve transportation system linkages regionally and should allow for future linkages.

STATE/CITY seek an alternative that will integrate functionally with other transportation projects that are currently underway or planned, including SR 519, the widening of the Spokane Street Viaduct, the South Lander Street Overpass, and SR 509. Further, STATE/CITY seek an alternative that will improve regional linkages to I-5, Trans-Lake/SR 520, and South Lake Union. Finally, STATE/CITY seek an alternative that will improve high-capacity transit such as monorail, light rail, bus rapid transit, and HOV lanes through the Alaskan Way corridor. Evaluation of this goal will list transportation system linkages that are precluded or restricted.

Goal 5: An alternative should minimize adverse impacts during construction.

STATE/CITY seek an alternative that will minimize the construction-related impacts of the project. First, STATE/CITY seek an alternative with reduced construction time, and that will rely on proven construction methods to avoid or minimize construction risks. STATE/CITY seek an alternative that will minimize construction-related impacts on local businesses and communities and on the

mobility of vehicles and pedestrians within and through the corridor during construction. STATE/CITY seek an alternative that will promote effective traffic management during construction. Finally, STATE/CITY seek an alternative that will minimize construction-related impacts on water, sewer, power and communication utilities within the corridor. Evaluation of this goal will list and briefly describe areas where construction impacts appear particularly severe.

Goal 6: An alternative should minimize environmental impacts during and after construction.

STATE/CITY seek an alternative that will avoid, minimize or mitigate environmental impacts during and after construction, including impacts on noise, water quality and fish and wildlife resources. Evaluation of this goal will list and briefly describe areas where impacts appear particularly severe.

Goal 7: An alternative should minimize social and cultural impacts during and after construction.

STATE/CITY seek an alternative that will avoid or minimize impacts on historic or cultural resources, cultural activities and neighborhoods during and after construction. STATE/CITY seek an alternative that will avoid, minimize or mitigate impacts on parks, trails, recreation areas, historic sites, and cultural resources within the area. STATE/CITY also seek an alternative that will minimize the displacement of residences, commercial establishments, or other valued community assets such as churches, schools, community centers, and view corridors. Evaluation of this goal will list and briefly describe areas where impacts appear particularly severe.

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

STATE/CITY seek an alternative that will contribute to the continuing development of the downtown urban waterfront through expanded visual, physical and aesthetic connections between downtown Seattle, the waterfront and central Puget Sound for local citizens and visitors alike. STATE/CITY also seek an alternative that will maintain or improve accessible public open spaces. Evaluation of this goal will list and briefly describe areas where continued development of the waterfront would be inhibited.

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

STATE/CITY seek an alternative that will provide improved habitat in the marine and intertidal environment. Evaluation of this goal will briefly describe how an alternative could support or inhibit habitat improvements.

This Page Intentionally Left Blank

Appendix W

Screening Documents

2003 Screening

This Page Intentionally Left Blank

Final Revised Screening of Design Concepts



Submitted to:
Washington State Department of Transportation
Urban Corridors Office
401 Second Avenue S, Suite 560
Seattle, WA 98104-3850

Submitted by:
Parsons Brinckerhoff Quade & Douglas, Inc.

Prepared by:
Parametrix, Inc.



SR 99: Alaskan Way Viaduct & Seawall Replacement Project

Revised Screening of Design Concepts

Agreement No. Y-7888

Task 3.18

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:

Parsons Brinckerhoff Quade & Douglas, Inc.

999 Third Avenue, Ste 2200
Seattle, WA 98104

In association with:

BERGER/ABAM Engineers Inc.
BJT Associates
David Evans and Associates, Inc.
Entech Northwest
EnviroIssues, Inc.
Harvey Parker & Associates, Inc.
Jacobs Civil Inc.
Larson Anthropological Archaeological Services Limited
Mimi Sheridan, AICP
Parametrix, Inc.
Preston, Gates, Ellis, LLP
ROMA Design Group
RoseWater Engineering, Inc.
Shannon & Wilson, Inc.
Taylor Associates, Inc.
Tom Warne and Associates, LLC
William P. Ott

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
BACKGROUND	2
Alaskan Way Viaduct Corridor Description.....	2
Phase 1 Screening Process.....	5
Phase 2 Screening Process.....	7
Seawall Screening Process.....	8
REVISED SCREENING PROCESS	9
Purpose of Revised Screening Process.....	9
Design Concept Development.....	9
Screening Criteria Development.....	10
Screening Results.....	11
OVERVIEW OF DESIGN CONCEPTS AND SCREENING RESULTS	12
A: AWW IMPROVEMENTS FROM S. HOLGATE STREET TO THE BATTERY STREET TUNNEL	14
A1a: RETROFIT EXISTING DOUBLE-LEVEL STRUCTURE.....	14
A1b: RETROFIT EXISTING SINGLE-LEVEL STRUCTURE.....	15
A1c: RETROFIT EXISTING STRUCTURE - LIMITED TO PASSENGER VEHICLES AND TRANSIT	15
A1d: REBUILD EXISTING STRUCTURE.....	16
A2a: TWO-LEVEL AERIAL REPLACEMENT – WEST OF EXISTING.....	17
A2b: TWO-LEVEL AERIAL REPLACEMENT – EXISTING LOCATION.....	18
A2c: ENCLOSED TWO -LEVEL AERIAL REPLACEMENT – WEST OF EXISTING LOCATION.....	18
A3a: ONE-LEVEL AERIAL WITH SIX LANES – OVER EXISTING	20
A3b: ONE-LEVEL AERIAL WITH SIX LANES – WEST OF EXISTING.....	21
A4a: MULTI-LANE BOULEVARD SURFACE ROADWAY	22
A4b: MULTI-LANE BOULEVARD SURFACE ROADWAY WITH SECTIONS OF TUNNEL AND/OR OVERPASSES	23
A5a: ONE-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY.....	24
A5b: TWO-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY.....	25
A6: COMBINE ONE-LEVEL, ONE-WAY AERIAL AND ONE-WAY SURFACE ARTERIAL	26
A7: COMBINE ONE-LEVEL, ONE-WAY TUNNEL AND ONE-LEVEL, ONE-WAY AERIAL.....	27
A8: COMBINE ONE-LEVEL, ONE-WAY TUNNEL AND ONE-WAY SURFACE ARTERIAL.....	28
A9: COMBINE ONE-LEVEL, TWO-WAY BYPASS TUNNEL WITH TWO-WAY SURFACE ARTERIAL	29
A10: COMBINE TWO-WAY BYPASS AERIAL WITH TWO-WAY SURFACE ARTERIAL.....	30
A11: BORED TUNNELS UNDER ALASKAN WAY.....	30
B. BATTERY STREET TUNNEL IMPROVEMENTS	32
B1a: FIRE, LIFE, AND SAFETY UPGRADE TO THE EXISTING BATTERY STREET TUNNEL.....	32
B1b: SEISMIC UPGRADE TO THE EXISTING BATTERY STREET TUNNEL.....	32

B2: TWO-LEVEL, CUT -AND-COVER TUNNEL THROUGH BELLTOWN.....	33
B3a: BORED OR MINED TUNNEL UNDER BELLTOWN	33
B3b: BORED OR MINED TUNNELS UNDER BELLTOWN	34
C. ROADWAY IMPROVEMENTS OUTSIDE OF THE AWW CORRIDOR.....	36
C1a: TWIN BORED TUNNELS AT WESTERN AVE.	36
C1b: TWIN BORED TUNNEL ROUTES AT 1 ST AVE. AND 2 ND AVE.	37
C1c: TWIN BORED TUNNELS AT 3 RD AVE.	38
C1d: TWIN BORED TUNNEL ROUTES AT 4 TH AVE. AND 5 TH AVE. – EAST PORTAL	40
C1e: TWIN BORED TUNNEL ROUTES AT 4 TH AVE. AND 5 TH AVE. – SOUTH PORTAL	41
C1f: TWIN BORED TUNNEL ROUTE AT I-5.....	42
C2: SIGNATURE BRIDGE ACROSS ELLIOTT BAY FROM WEST SEATTLE.....	44
C3: ELLIOTT BAY SUBMERGED TUNNEL ALONG WATERFRONT AREA.....	45
C4: I-5 IMPROVEMENTS TO ACCOMMODATE A PORTION OF SR 99 DEMAND	46
C5: ELLIOTT BAY FLOATING TUNNEL ALONG WATERFRONT AREA.....	47
C6: SIGNATURE BRIDGE FROM STADIUM AREA TO BELLTOWN VIA ELLIOTT BAY	49
C7: EXISTING 4 TH AVENUE BNSF TUNNEL TRANSITIONING TO CUT -AND-COVER TUNNEL.....	50
C8a: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT BROAD STREET	51
C8b: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT SENECA STREET	52
D. MULTIMODAL SOLUTIONS.....	54
D1: TRANSPORTATION SYSTEM / DEMAND MANAGEMENT TO MAXIMIZE EXISTING SYSTEM	54
D2: HIGH CAPACITY TRANSIT ALONG EXISTING AWW CORRIDOR WITH NEW CONCEPT	54
E. RELATED IMPROVEMENTS (WOULD BE COMBINED WITH OTHER VIADUCT REPLACEMENT CONCEPTS)	56
E1a: ADD MISSING RAMPS AT S.SPOKANE ST. / ALASKAN WAY INTERCHANGE.....	56
E1b: IMPROVE ACCESS AT STADIUM AREA.....	56
E1c: ADD NEW ACCESS AT THE DOWNTOWN CORE.....	57
E1d: IMPROVE ACCESS AT BATTERY ST./WESTERN AVE./ELLIOTT AVE.....	58
E1e: ADD S. SPOKANE STREET OFF-RAMP TO 6 TH AVENUE S. FOR BUSES	58
E1f: ADD S. SPOKANE STREET OFF-RAMP TO 4 TH AVENUE S.	59
E1g: ADD EXTENSION TO THE S. SPOKANE STREET 4 TH AVENUE ON-RAMP.....	59
E1h: PROVIDE SOUTHBOUND ACCESS TO SR 99 FROM WEST SEATTLE BRIDGE.....	60
E2a: ADD CONNECTION TO SOUTH LAKE UNION AREA	60
E2b: EXTEND ALASKAN WAY VIADUCT CORRIDOR TO I-5 THRU MERCER ST. CORRIDOR.....	61
E2c: EXTEND SR 520 TO ALASKAN WAY VIADUCT CORRIDOR.....	61
E2d: EXTEND SR 99 GRADE SEPARATION OVER 1 ST AVE. S. BRIDGE TO SR 509.....	62
E2e: IMPROVE BALLARD / INTERBAY CONNECTIONS.....	62
E2f: IMPROVE I-90 / SR 519 / SR 99 CONNECTIONS.....	63
E2g: IMPROVE I-5 / SR 99 CONNECTION AT S.SPOKANE STREET	64
E2h: IMPROVE WATERFRONT ACCESS BETWEEN THE WEST SEATTLE BRIDGE AND BATTERY STREET	64

E2i: LOCATE TUNNEL PORTAL AT ROY STREET TO RECONNECT CROSSINGS AT THOMAS AND HARRISON.....	65
E2j: ADD OFF-RAMP TO AIRPORT WAY	65
E2k: RE-UTILIZE BATTERY STREET TUNNEL AS A VEHICULAR CONNECTION TO ALASKAN WAY	66
E2l: LOWERED AURORA/SR 99.....	66
E2m: WIDENED MERCER.....	67
E2n: EXISTING MERCER WITH SIGNALS ON SR 99 NORTH OF THE BATTERY STREET TUNNEL.....	68
E3a: ADD SR 99 GRADE SEPARATION CROSSING BETWEEN S. ATLANTIC AND S. SPOKANE STREETS	69
E3b: ADD MISSING RAMPS AT S. SPOKANE ST. / ALASKAN WAY INTERCHANGE.....	69
E3c: S.HANFORD ST. RAMPS TO/FROM SR 99 FOR GENERAL TRAFFIC / FREIGHT	70
E3d: IMPROVE EAST -WEST FREIGHT ACCESS BETWEEN S. SPOKANE ST. AND S. HOLGATE ST.....	70
E3e: IMPROVE BROAD STREET RAIL CROSSING	71
E3f: MOVE TRUCK CONTAINERS FROM WATERFRONT TO I-90.....	71
E3g: INCORPORATE EXISTING RAILROAD TRACKS WITHIN THE CUT -AND-COVER TUNNEL.....	72
E4a: ADD FERRY TRAFFIC QUEUING AREA.....	72
E4b: EXPAND PEDESTRIAN CONNECTIONS BETWEEN THE FERRY TERMINAL AND DOWNTOWN	73
E4c: IMPROVE FERRY CONNECTIONS TO AWV CORRIDOR AND DOWNTOWN	73
E5a: IMPROVE PEDESTRIAN ENVIRONMENT ALONG WATERFRONT.....	74
E5b: IMPROVE PEDESTRIAN CONNECTIONS BETWEEN WATERFRONT AND DOWNTOWN	74
E5c: RETAIL, RESIDENTIAL, AND PUBLIC SPACE WITH AERIAL STRUCTURE.....	75
E5d: BUILD WATERFRONT PEDESTRIAN PARK WITH BUSINESSES.....	75
CONCEPTS RECOMMENDED TO BE DROPPED FROM FURTHER CONSIDERATION.....	77
A: AWV Improvements from S. Holgate Street to the Battery Street Tunnel.....	77
B: Battery Street Tunnel Improvements within the AWV Corridor	77
C: Roadway Improvements Outside of the AWV Corridor	77
D: Multimodal Solutions.....	78
E: Related Improvements (Combine with other Concepts).....	78
CONCEPTS RECOMMENDED TO BE CARRIED FORWARD.....	79
A: AWV Improvements from S. Holgate Street to the Battery Street Tunnel.....	79
B: Battery Street Tunnel Improvements.....	79
C: Roadway Improvements Outside of the AWV Corridor	79
D: Multimodal Solutions.....	79
E: Related Improvements (Combine with Other Concepts).....	79

APPENDICES

Appendix A: Design Concepts Developed in Phase 1 and Phase 2

Appendix B: Screening Evaluation Table

Appendix C: Screening Results Table

Appendix D: Screening Results Summary Table

LIST OF FIGURES

Figure 1: Corridor Map.....3

Revised Screening of Design Concepts

EXECUTIVE SUMMARY

The Alaskan Way Viaduct and Alaskan Way Seawall are both at the end of their useful lives. Improvements to both are required to protect public safety and maintain the transportation corridor. Because these facilities are at risk of sudden and catastrophic failure in an earthquake, the Washington State Department of Transportation (WSDOT), City of Seattle (City), and Federal Highway Administration (FHWA) are proposing major improvements to the Alaskan Way Viaduct (AWV) Corridor and Alaskan Way Seawall. The AWV Corridor includes portions of East Marginal Way, the SR 99 roadway from S. Spokane Street to S. Holgate Street, the Alaskan Way Viaduct structure, the Battery Street Tunnel, a section of SR 99 north of the Battery Street Tunnel, the Alaskan Way surface street, and the Alaskan Way Seawall. In the project area SR 99 includes an at-grade section from S. Spokane Street to S. Holgate, the Alaskan Way Viaduct structure, the Battery Street Tunnel, and the at-grade roadway section north of the Battery Street Tunnel.

WSDOT, the City, and FHWA have considered dozens of options designed to improve the Alaskan Way Viaduct Corridor and the Alaskan Way Seawall. The purpose of this memorandum is to present the design options that were considered, and to describe the screening process utilized to determine the alternatives that will be evaluated in the project Environmental Impact Statement (EIS).

Seventy-six design concepts were developed through a collaborative process with WSDOT, the City, FHWA, other public agencies, and the public. The 76 concepts were considered in this screening evaluation. They were screened using screening criteria developed and approved by WSDOT, FHWA, City of Seattle, and participating agencies in the Resource Agency Leadership Forum¹. The screening process resulted in 26 design concepts that will be incorporated into alternatives evaluated in the project EIS.

¹ The Resource Agency Leadership Forum is comprised of regulatory agencies party to the Signatory Agency Committee (SAC) Agreement and local agencies having jurisdiction in the project area.

BACKGROUND

The Alaskan Way Viaduct and Alaskan Way Seawall are both at the end of their useful lives. Improvements to both are required to protect public safety and maintain the transportation corridor. Because these facilities are at risk of sudden and catastrophic failure in an earthquake, the Washington State Department of Transportation (WSDOT), City of Seattle (City), and Federal Highway Administration (FHWA) are proposing major improvements to the Alaskan Way Viaduct (AWV) Corridor and Alaskan Way Seawall. The AWV Corridor includes portions of East Marginal Way, the SR 99 roadway from S. Spokane Street to S. Holgate Street, the Alaskan Way Viaduct structure, the Battery Street Tunnel, a section of SR 99 north of the Battery Street Tunnel, the Alaskan Way surface street, and the Alaskan Way Seawall. In the project area SR 99 includes an at-grade section from S. Spokane Street to S. Holgate, the Alaskan Way Viaduct structure, the Battery Street Tunnel, and the at-grade roadway section north of the Battery Street Tunnel (Figure 1).

WSDOT, the City, and FHWA have considered dozens of options designed to improve the Alaskan Way Viaduct Corridor and the Alaskan Way Seawall. The purpose of this memorandum is to present the design options that were considered, and to describe the screening process utilized to determine the alternatives that will be evaluated in the project Environmental Impact Statement (EIS).

Alaskan Way Viaduct Corridor Description

The Alaskan Way Viaduct (AWV) Corridor includes State Route (SR) 99 from Spokane Street on the south to Ward Street north of the Battery Street Tunnel. Specifically, the AWV Corridor includes portions of East Marginal Way, an at-grade section of SR 99 from Spokane Street to S. Holgate Street; the Alaskan Way Viaduct structure; the Battery Street Tunnel; a section north of the Battery Street Tunnel to Ward Street; the Alaskan Way surface street; and the Alaskan Way Seawall.

East Marginal Way

East Marginal Way runs parallel to SR 99 in the south end of the project area from approximately S. Spokane Street to S. Holgate Street. It is an at-grade roadway operating with signalized intersections. Surface street connections contribute to the AWV Corridor in this segment.

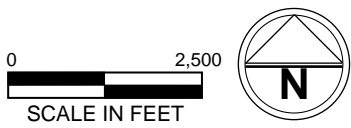


Figure 1
AWV Corridor Map

SR 99 from Spokane Street to South Holgate Street

This section of SR 99 runs between S. Spokane Street and S. Holgate Street. It is an at-grade, limited-access roadway operating with signalized intersections and driveways. Surface street connections contribute to the AWW Corridor in this segment. This portion of the AWW Corridor currently operates adequately because the signalized intersections effectively regulate traffic volume

Alaskan Way Viaduct

The existing Alaskan Way Viaduct is a segment of State Route (SR) 99 connecting S. Holgate Street in the south to the Battery Street Tunnel in the north. The Viaduct is a double-decked, reinforced concrete structure from S. Holgate Street to approximately Pike Street. From Pike Street to the Battery Street Tunnel the Viaduct is a single-level structure. The Viaduct carries 2 to 4 lanes of NB (NB) and 2 to 3 lanes of southbound (SB) traffic through downtown Seattle. There are ramp connections provided to and from local streets at Railroad Way South (near the stadiums), Columbia Street, Seneca Street, Elliott Avenue, Western Avenue, and Battery Street.

The existing Viaduct structure from S. Holgate Street up to the Battery Street Tunnel does not meet current design standards for earthquakes or traffic safety and is nearing the end of its design life. The existing structure has narrow lane widths, vehicle load restrictions, nonstandard roadway shoulders, and ramps with inadequate sight distance and lane lengths.

Battery Street Tunnel

The Battery Street Tunnel is located on the north end of the Alaskan Way Viaduct and runs under Battery Street from 1st Avenue to the surface at John Street just north of Denny Way. The Battery Street Tunnel contains two lanes in each direction.

The Battery Street Tunnel also does not meet current design standards for traffic, fire, and life safety. Options for the Battery Street Tunnel are presented in Section B, Battery Street Tunnel Improvements within the AWW Corridor.

North of the Battery Street Tunnel to Ward Street

The segment north of the Battery Street Tunnel considered as part of the project area extends from where the Battery Street Tunnel emerges near John Street to approximately Ward Street. Surface street connections contribute to the AWW Corridor in this segment. At this section of the AWW Corridor, SR 99 is a limited

access surface street with three lanes in each direction. This segment of the AWV Corridor does not meet current design standards for traffic safety.

Alaskan Way Surface Street

The Alaskan Way surface street is a three to five lane street with signalized intersections providing access along the Seattle waterfront. This roadway parallels Elliott Bay on the west and the Alaskan Way Viaduct to the east. Its southern boundary is S. Royal Brougham Way and its northern boundary is Broad Street. Surface street connections contribute to the AWV Corridor in this segment.

Alaskan Way Seawall

The Alaskan Way Seawall is located along Seattle's downtown waterfront from South Washington Street on the south to Myrtle Edwards Park (near Pier 70) on the north. The Seawall supports the fill soils that the Alaskan Way surface street is built upon. In an earthquake, the Seawall provides support to soils the Alaskan Way Viaduct is built upon.

The Alaskan Way Seawall was constructed in 1916 and 1934. The majority of the Seawall is an anchored bulkhead system. The upper 20 feet of the Seawall is constructed with a pre-cast concrete panel. The concrete panel is supported by a steel bulkhead. The structural details and height of the bulkhead varies. In some places the bulkhead is buried in fill, in other locations it is exposed to the marine waters in Elliott Bay. The steel bulkhead and concrete wall are anchored to a timber relieving platform supported by timber batter piles. The relieving platform supports approximately 13 feet of roadway fill that the Alaskan Way surface street is built upon. A small section of the Seawall in the south end near the Colman ferry dock is constructed of unreinforced, or lightly reinforced, concrete gravity walls supported on piles and concrete sidewalks supported on piles.

The Alaskan Way Seawall is in a state of disrepair and is nearing the end of its useful life. Due to its poor condition, it is vulnerable to earthquakes and unable to resist loads associated with liquefaction of the loose fills on which it is constructed. In an earthquake, liquefaction of these soils is anticipated to result in large displacements of the wall and/or complete failure of the wall. This type of seawall failure could result in damage to adjacent waterfront piers, significant damage to utilities, and potential collapse of Viaduct sections.

Phase 1 Screening Process

Two screening processes called Phase 1 and Phase 2 were conducted to screen design concepts for the Alaskan Way Viaduct Corridor prior to the screening process described in this memorandum. The Phase 1 and Phase 2 screening

processes, and the reasons for the various screening processes are summarized and referenced in the sections below.

WSDOT led the Phase 1 screening process, which was completed in August 2001. The AWV project and Phase 1 screening began as a result of the Nisqually earthquake. The earthquake, which occurred on February 28, 2001, damaged the Viaduct and resulted in closure of the Viaduct for a brief period. The Viaduct was repaired, but structural evaluations were conducted. These structural investigations indicated that the Viaduct was vulnerable to future earthquakes and was nearing the end of its usable design life. Due to its seismic vulnerability, WSDOT began the Phase 1 screening process to develop a range of concepts for retrofitting or replacing the Alaskan Way Viaduct and improving areas located in the AWV Corridor. WSDOT's Phase 1 screening process included the following:

- Developing design concepts
- Developing screening criteria
- Screening initial concepts
- Summarizing primary concepts

Design Concept Development

WSDOT and the Phase 1 consultant team developed an initial list of design concepts in May 2001. The range of concepts listed included corridor-wide concepts as well as concepts specific to the existing elevated Viaduct structure. The initial list was presented to a project Technical Advisory Committee, the Leadership Group², the public, various agencies, and local tribes in June 2001 for input and refinement. This resulted in a comprehensive list of 20 concepts with several design sub-options that were narrowed in the Phase 1 screening process.

Screening Criteria Development

Screening criteria were developed based on the project purpose and need. Concepts not meeting the screening criteria were dropped from further evaluation. The following four criteria were used to screen Phase 1 concepts.

- Does the concept meet the program's objectives?
- Is the concept feasible to implement?
- Are the construction impacts manageable?
- Would the concept likely receive required permits and approvals?

² The Leadership Group represents a broad group of stakeholders including WSDOT, the City of Seattle, FHWA, area neighborhoods, business interests, and other organizations and agencies.

Screening Initial Concepts and Summarizing Primary Concepts

The initial list of Phase 1 concepts were screened using the criteria above. The screening process resulted in a list of concepts to be considered for further evaluation. Additional details on the Phase 1 Screening Process are found in a report titled "*Alaskan Way Viaduct Study Development and Screening of Concepts, Working Paper #7 and 8*", dated August 2001 by Mirai Associates.

Phase 2 Screening Process

Design Concept Development

Further project definition and refinement took place in Phase 2, which began shortly after the end of Phase 1 in August 2001 and continued through January 2002. In addition, the Federal Highway Administration and the City of Seattle became project co-leads with WSDOT. At this time, additional information was collected regarding the condition of the Alaskan Way Seawall. The information showed that the Seawall was also seismically vulnerable and in a state of disrepair. The information also showed that the structural integrity of the Viaduct is dependent on the Seawall. As a result, the project purpose and need statement was revised to include the Seawall, and the project screening criteria were revised to support the new purpose and need statement. Additional design concepts were developed and evaluated as part of the Phase 2 screening process to consider both the AWV Corridor and the Seawall. These concepts were suggested in meetings involving WSDOT, the City of Seattle, FHWA, neighborhood groups, business interests, organizations and agencies, and the public.

Phase 1 design concepts and Phase 2 design concepts for the Viaduct structure were merged into a list of 64 total concepts to be evaluated in the Phase 2 screening process. These 64 design concepts are listed in Appendix A. Seawall concepts were developed and evaluated separately in the Phase 2 process and are discussed in a separate section below.

Screening Criteria Development

The Phase 2 screening criteria were developed based upon the draft project Purpose and Need statement dated November 2, 2001. The project purpose as stated in the November 2, 2001 statement was "to maintain or improve mobility for people and goods along the existing SR 99 corridor and to improve safety, including the ability of the transportation facilities and the Seawall to resist earthquakes." With this project purpose in mind, the screening criteria were developed to include nine goals. These nine goals were agreed upon by WSDOT, the City, and FHWA.

Phase 2 Screening Results

The Phase 2 screening criteria in combination with qualitative and quantitative analyses were used to reduce the number of design concepts for the Viaduct and related improvements from 64 to 19. Details related to the Phase 2 screening activities are documented in the *Screening of Initial Concepts Technical Memorandum*, dated January 2002 by Parsons, Brinckerhoff, Quade, and Douglas Inc.

The 19 design concepts that made it through the screening process were refined into five conceptual alternatives for further evaluation and engineering analysis. Additional information regarding the development of conceptual alternatives is documented in the *Development of Conceptual Alternatives Technical Memorandum*, dated February 2002 by Parsons, Brinckerhoff, Quade, and Douglas, Inc.

Seawall Screening Process

Seawall design concepts were screened as a part of the overall Phase 2 screening process. The results of that process are documented in the *SIR: Alaskan Way Viaduct and Seawall Project Screening of Seawall Concepts*, dated March 2002 written by Berger/Abam Engineers.

REVISED SCREENING PROCESS

Purpose of Revised Screening Process

Conceptual engineering conducted as part of the Phase 2 process resulted in additional information on design options and cost. This information indicated that the estimated cost of constructing several of the conceptual Viaduct and Seawall alternatives were high given potential funding sources. In addition, in November 2002, voters rejected Referendum 51, a tax plan that would have provided some funding for the Alaskan Way Viaduct and Seawall Replacement Project. Due to the lack of project funding, conceptual design options were re-examined to identify additional design options that might be more financially feasible to implement. To broaden the range of options that could be considered, the screening criteria were revised. Because the screening criteria were changed, all of the design concepts from Phase 1 and Phase 2 were re-screened.

Information related to screening for the Viaduct design options are contained in this memorandum. Information related to screening for the Seawall options are contained in a separate memorandum called *SR 99 Alaskan Way Viaduct and Seawall Project Revised Screening of Seawall Concepts*, dated June 2003 submitted by Parsons, Brinckerhoff, Quade, and Douglas.

Design Concept Development

Design Concepts from Phases 1 and 2

A total of 64 design concepts were developed and evaluated in the Phase 1 and Phase 2 screening processes. These 64 concepts are listed in Appendix A and were included for re-evaluation using the new screening criteria. Two of the concepts were merged into one, leaving 63 concepts that were re-evaluated.

Design Concepts Added

Thirteen additional concepts were developed as a result of ongoing conceptual engineering and additional public input. These additional concepts are described in greater detail in this document and include the following:

- Retrofit the existing single-level Viaduct structure
- Rebuild the existing double-level Viaduct structure
- Enclosed one-level aerial replacement – west of existing location
- Combined one-level, two-way express tunnel with two-way surface street
- Combined one or two-level, two-way express aerial with two-way surface street

- Fire, life, safety upgrade to the existing Battery Street Tunnel
- Seismic upgrade to the existing Battery Street Tunnel
- Lowered SR 99/ Aurora
- Widened Mercer
- Existing Mercer with Signals on SR 99 north of Battery Street Tunnel

Three concepts previously developed have been further refined in to specific design options. These refined design options include the following:

- Double-level cut-and-cover tunnel through Belltown
- Single bored or mined tunnel under Belltown
- Multiple bored or mined tunnels under Belltown

Screening Criteria Development

To determine the range of options to be included in the EIS, the screening criteria were revised to reflect changed financial conditions. The screening criteria were revised to support the project purpose and need and are expressed as a series of ten goals. The revised screening criteria were approved by WSDOT, FHWA, City of Seattle, and participating agencies in the Resource Agency Leadership Forum³, and are listed below.

- Goal 1: An alternative must provide facilities that meet current seismic design standards.
- Goal 2: An alternative must maintain the current transportation functions of the Alaskan Way Viaduct Corridor.
- Goal 3: An alternative should not further degrade the operation of other major transportation facilities.
- Goal 4: An alternative should improve traffic safety.
- Goal 5: An alternative should maintain regional transportation linkages.
- Goal 6: An alternative should support bicycle and pedestrian accessibility and mobility.
- Goal 7: An alternative should be compatible with local, express, and high-capacity transit.
- Goal 8: An alternative should support land use and shoreline plans and policies pertaining to development of the downtown Seattle waterfront.
- Goal 9: An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall.

³ The Resource Agency Leadership Forum is comprised of regulatory agencies party to the Signatory Agency Committee (SAC) Agreement and local agencies having jurisdiction in the project area.

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

All design concepts were screened using the ten goals above. Goals 1 and 2 had to be met for an alternative to be advanced. Concepts that did not meet goals 1 and 2 were dropped. Options that met goals one and two were evaluated against the remaining goals. Where similar options were available, the concept that best met the screening criteria goals and project purpose and need were advanced for further consideration. The screening results are summarized in Appendix C.

Screening Results

All 76 design concepts have been screened using the criteria outlined above. The rest of this memorandum describes the design options, their key features, and screening results. The Screening Evaluation Table contained in Appendix C shows how the ten screening criteria goals were used to evaluate the design concepts. The 76 design concepts evaluated were screened to 26 concepts to be carried forward for further analysis in the project EIS.

OVERVIEW OF DESIGN CONCEPTS AND SCREENING RESULTS

There are 76 design concepts identified for rebuilding, replacing, or improving the Alaskan Way Viaduct and its associated corridor. These design concepts have been grouped into five main categories as outlined below. Refer to Appendix C for a summary of the design concepts and results.

A. AWV Improvements from S. Holgate Street to the Battery Street Tunnel

- Retrofit or rebuild the existing Alaskan Way Viaduct
- Replace the Viaduct with an aerial structure
- Replace the Viaduct with a tunnel
- Replace the Viaduct with a surface boulevard
- Replace the Viaduct with a combination of aerial, tunnel, and surface concepts

B. Battery Street Tunnel Improvements within the Existing AWV Corridor

- Upgrade existing Battery Street Tunnel
- Construct a new tunnel through Belltown

C. Roadway Improvements Outside of the AWV Corridor

- Replace the Viaduct with a tunnel outside of the AWV Corridor
- Replace the Viaduct with a bridge across Elliott Bay
- Replace the Viaduct with a submerged or floating tunnel along the waterfront on Elliott Bay
- Replace the Viaduct with a floating bridge along the waterfront on Elliott Bay
- Replace the Viaduct with I-5 improvements
- Replace the Viaduct with combined use of the existing BNSF tunnel under downtown Seattle

D. Multimodal Solutions

- Implement transit and trip reduction measures to maximize efficiency and people-moving capacity in the AWV Corridor

E. Related Improvements (would be combined with other Viaduct replacement concepts)

- Add ramps and improve access
- Extend Alaskan Way Corridor
- Extend SR 99 grade separation

- Improve connections
- Improve freight access
- Improve ferry connections
- Improve pedestrian connections and environment
- Incorporate retail, residential, and public space into aerial structure

In addition to the concepts considered in this screening process, the No Action alternative will be evaluated in the project Environmental Impact Statement (EIS), as required by the National Environmental Policy Act (NEPA).

A: AWW IMPROVEMENTS FROM S. HOLGATE STREET TO THE BATTERY STREET TUNNEL

A1a: RETROFIT EXISTING DOUBLE-LEVEL STRUCTURE

General Functional Description

Under this retrofit design concept, the existing double-level Viaduct structure from S. Holgate Street to approximately Pike Street would be reinforced with additional columns and other structural supports to meet earthquake design standards. The existing deck structure would be replaced. The nonstandard Viaduct lane widths, shoulder widths, and ramps would remain.

Key Features

- Maintains connections to the waterfront, downtown, and Ballard/Interbay
- Substantially less reliable than a replacement structure because of the deterioration that has occurred with age and the different design standards for new construction.
- Requires moderate risk construction methods
- Does not address the nonstandard traffic safety issues (lane widths, shoulder widths, and ramps)
- Requires additional structural support columns that would increase the visual impact and bulk of the structure

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason.

- An April 2003 report entitled *Rebuild/Retrofit 500, 500-Year Design Earthquake*, written by Parsons, Brinckerhoff, Quade, & Douglas, Inc. compares the retrofit and rebuild design concepts for a current standard design level earthquake. The comparison clearly demonstrated that the rebuild design option for the double-level structure from S. Holgate Street to Pike Street is superior to retrofitting the existing double-level structure when seismic performance, aesthetics, cost, and risk are balanced. Therefore, the project purpose and screening criteria goals are better met with Rebuild option A1d, Rebuild Existing Structure.

A1b: RETROFIT EXISTING SINGLE-LEVEL STRUCTURE

General Functional Description

Under this retrofit design concept, the existing single-level Viaduct structure from approximately Pike Street to the Battery Street Tunnel would be strengthened with additional columns and other structural upgrades to meet the project's structural design criteria. The existing deck structure would be replaced. Existing ramps at Elliott and Western Avenues would be strengthened. The nonstandard Viaduct lane widths, shoulder widths, and ramps would be slightly improved.

Key Features

- Ramps at Elliott and Western would be strengthened
- Requires moderate risk construction methods
- Slightly improves existing nonstandard traffic safety issues such as nonstandard lane widths, shoulder widths, and ramps; however, these nonstandard features would remain
- Requires additional structural support columns that would slightly increase the visual impact and bulk of the structure

Screening Results

This option will be carried forward for further evaluation in the EIS.

A1c: RETROFIT EXISTING STRUCTURE - LIMITED TO PASSENGER VEHICLES AND TRANSIT

General Functional Description

Under this concept, the existing structure would be maintained and retrofitted where needed. Facility use would be limited to passenger vehicles and transit only, freight usage would not be provided. Note that buses are similar to trucks in terms of impact on the Viaduct.

Key Features

- Would hinder freight mobility
- Maintains connections to the waterfront, downtown, and Ballard/Interbay
- Relatively short timeframe for implementation as compared to other build alternatives
- Shortest design life

- Substantially less reliable than a replacement structure because of the deterioration that has occurred with age and the different design standards for new construction.
- Requires moderate risk construction methods
- Does not address the nonstandard traffic safety issues (lane widths, shoulder widths, and ramps).

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 2 – This option would create unbalanced access between freight, passenger, and vehicular traffic. It would limit linkages for freight traffic traveling to and from Downtown, through Downtown, and between the Duwamish industrial area and Ballard/Interbay area.
- An April 2003 report entitled *Rebuild/Retrofit 500, 500-Year Design Earthquake*, written by Parsons, Brinckerhoff, Quade, & Douglas, Inc. compares the retrofit and rebuild design concepts for a current standard design level earthquake. The comparison clearly demonstrated that the rebuild design option for the double-level structure from S. Holgate Street to Pike Street is superior to retrofitting the existing double-level structure when seismic performance, aesthetics, cost, and risk are balanced. Therefore, the project purpose and screening criteria goals are better met with Rebuild option A1d, Rebuild Existing Structure.

A1d: REBUILD EXISTING STRUCTURE

General Functional Description

Under this concept, the entire Viaduct structure would be rebuilt in-place. The rebuilt Viaduct structure would be constructed to meet the project's structural design criteria. Nonstandard lane widths, shoulder widths, and ramps would remain, though they would be slightly improved.

Key Features

- Maintains connections to the waterfront, downtown, and Ballard/Interbay
- Slightly improves existing nonstandard traffic safety issues such as nonstandard lane widths, shoulder widths, and ramps; however, these nonstandard features would remain
- Requires high risk construction methods

Screening Results

This option will be carried forward for further evaluation in the EIS.

A2a: TWO-LEVEL AERIAL REPLACEMENT - WEST OF EXISTING

General Functional Description

The existing Alaskan Way Viaduct would be replaced with a split-level structure west of the existing structure. There would be three SB and three NB lanes of traffic through downtown Seattle. Existing access connections near the stadium area, Columbia Street, Seneca Street, Elliott Avenue, and Western Avenue would be replaced. The new SB structure would be built to the west of the existing Alaskan Way Viaduct. The structure would be constructed to meet design standards for lane widths, shoulder widths, and ramps, where feasible.

Key Features

- Provides multiple connections to the waterfront, downtown, and Ballard/Interbay
- Impacts visual quality with a new aerial structure wider than the current Viaduct.
- Limits urban design opportunities in the downtown waterfront area
- Improves traffic safety issues related to nonstandard lane widths, shoulder widths, and ramps

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 8 - This option would move visual impacts of the Viaduct structure closer to the waterfront, which would not be compatible with existing land use and shoreline plans.
- The intent of this design concept and the project purpose and screening criteria goals are better met with Aerial options A1d, Rebuild Existing Structure or A2b, Two-Level Aerial Replacement - Existing Location. These options are being carried forward for further evaluation in the EIS.

A2b: TWO-LEVEL AERIAL REPLACEMENT - EXISTING LOCATION**General Functional Description**

The existing Alaskan Way Viaduct would be replaced with a two-level aerial structure in the same location as the existing Viaduct. There would be 3 SB and 3 NB lanes of traffic through downtown Seattle. The existing access connections near the stadium area, Columbia Street, Seneca Street, Elliott Avenue, and Western Avenue would be replaced. The structure would be constructed to meet design standards for lane widths, shoulder widths, and ramps, where feasible.

Key Features

- Provides multiple connections to the waterfront, downtown, and Ballard/Interbay
- Impacts visual quality with a new aerial structure that would be wider than the existing Viaduct
- Limits urban design opportunities in the downtown waterfront area
- Improves traffic safety issues related to nonstandard lane widths, shoulder widths, and ramps

Screening Results

This option will be carried forward for further evaluation in the EIS.

A2c: ENCLOSED TWO-LEVEL AERIAL REPLACEMENT - WEST OF EXISTING LOCATION**General Function Description**

This design option would replace the current Viaduct with an aerial structure enclosed by transparent material. The new structure would be constructed west of the existing Viaduct. The Alaskan Way surface street would be relocated to the east side of the new Viaduct structure. The structure would be enclosed from King Street to Pike Street; areas south of King Street and from Pike Street to the Battery Street Tunnel would be open.

The structure would have 3 lanes in each direction. Lane and shoulder widths would be reduced as compared with current design standards. Ramps providing access to downtown and Ballard/Interbay could be provided in the vicinity of King Street and at Elliott and Western Avenues. The Alaskan Way surface street would provide additional waterfront, downtown, and Ballard/Interbay access.

Key Features

- Ramps providing access to downtown and Ballard/Interbay could be provided in the vicinity of King Street and at Elliott and Western Avenues. The Alaskan Way surface street would provide additional waterfront, downtown, and Ballard/Interbay access.
- Reduces noise
- Adds cost to the overall aerial alternative by adding the box-like structure and associated ventilation system
- Requires increased facility maintenance
- Impacts visual quality with a new aerial structure that would be wider and taller than the existing Viaduct
- Enclosure would require state-of-the-art transparent materials, there may be issues related to fire safety
- Limits urban design opportunities in downtown waterfront area and impacts existing waterfront connections to Colman Dock and waterfront businesses
- Lane, shoulder and ramp widths would be improved over existing conditions, but would be nonstandard

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 8 – This option would move visual impacts of the Viaduct structure closer to the waterfront and the enclosed structure would be approximately nine stories (90 feet) in height. This design option would not allow for improved visual, physical, and aesthetic connections between downtown and the waterfront, and would not be compatible with existing land use and shoreline plans.
- Goal 10 – Construction techniques for this structure are unknown and state-of-the-art, increasing overall project risk. In addition, it is unknown whether or not this option is technically feasible to properly engineer for fire, life, and safety risks. Long-term operations and maintenance of the enclosed structure is also a concern.
- The project purpose and screening criteria goals are better met with Aerial options A1d, Rebuild Existing Structure; A2b, Two-Level Aerial Replacement – Existing Location; A5a One-Level Cut-and-Cover Tunnel, or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These options are being carried forward for further evaluation in the EIS.

A3a: ONE-LEVEL AERIAL WITH SIX LANES - OVER EXISTING**General Functional Description**

The existing Alaskan Way Viaduct would be replaced with a one-level aerial structure. The aerial structure would have three NB and three SB lanes. The structure would be constructed to meet design standards for lane widths, shoulder widths, and ramps, where feasible.

Access connections to/from downtown would be precluded for SB traffic traveling on the western portion of the one-level facility due to the physical constraint of Elliott Bay. However, access to the waterfront, downtown, and Ballard/Interbay could be provided through Alaskan Way surface street connections. Access connections could be provided for NB traffic. In the southern segment of the project area access ramps could be provided in key locations because they are not physically constrained by Elliott Bay.

Key Features

- Ramp connections in the downtown waterfront area for SB traffic would be precluded, but access to the waterfront, downtown, and Ballard/Interbay could be provided through Alaskan Way surface street connections. Ramps could be provided for NB traffic, and ramp connections in the southern portion of the project area would be feasible
- Impacts visual quality with a new aerial structure substantially wider than the existing Viaduct
- Improves traffic safety issues related to nonstandard lane widths, shoulder widths, and ramps

Screening Results

This option will be carried forward for further evaluation in the EIS for only the south end of the project area from S. Holgate Street to King Street. In the downtown waterfront segment from King Street to the Battery Street Tunnel, this option has been dropped because it does not meet the following goals:

- Goal 8 - In the downtown waterfront portion of the project area, the existing waterfront view corridor would be substantially impacted by this design option due to the width required for a one-level structure. This would not be consistent with existing land use and shoreline plans, and would not allow for improved visual, physical, and aesthetic connections between downtown and the waterfront. However, from S. Holgate Street to S. Royal Brougham Way, views are not as sensitive due to industrial

land uses, therefore, in this segment of the project area, a single-level structure would be feasible.

- In the downtown waterfront area, the project purpose and screening criteria goals are better met by options A1d, Rebuild Existing Structure or A2b, Two-Level Aerial Replacement – Existing Location. However, this option meets the screening criteria goals for the southern portion of the project area, thus for the southern portion of the project area it will be carried forward in the EIS.

A3b: ONE-LEVEL AERIAL WITH SIX LANES – WEST OF EXISTING

General Functional Description

The existing Alaskan Way Viaduct would be replaced with a new one-level aerial structure. The aerial structure would be partially or fully west of the existing structure and have three NB and three SB lanes. The structure would be constructed to meet design standards for lane widths, shoulder widths, and ramps, where feasible.

Ramps to/from downtown would be precluded for SB traffic traveling on the western portion of the one-level facility due to the physical constraint of Elliott Bay. Waterfront, downtown, and Ballard/Interbay access could be provided through Alaskan Way surface street connections, and ramps providing access to downtown and Ballard/Interbay could be provided for NB traffic. In the southern section ramps would not be physically constrained by Elliott Bay.

Key Features

- Ramp connections in the downtown waterfront area for SB traffic would be precluded, but access to the waterfront, downtown, and Ballard/Interbay could be provided through Alaskan Way surface street connections. NB access could be provided. Ramp connections in the southern portion of the project area would be feasible.
- Impacts visual quality with a new aerial structure substantially wider than the existing Viaduct
- Improves traffic safety issues related to nonstandard lane widths, shoulder widths, and ramps

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

South End of Project Area

- From S. Holgate Street to approximately King Street, this option would require the purchase and relocation of extensive railroad facilities and Port of Seattle property. The acquisition and/or displacement of these activities would be minimized by option A3a, One-Level Aerial with Six Lanes – Over Existing. Therefore, in the southern section of the project area the intent of this design concept and the project purpose and screening criteria goals are better met by option A3a.

Central Portion of Project Area

- Goal 8 – From King Street to the Battery Street Tunnel the existing waterfront view corridor would be substantially impacted by this design option due to the width required for a one-level structure. This would not be consistent with existing land use and shoreline plans, and would not allow for improved visual, physical, and aesthetic connections between downtown and the waterfront.
- In the downtown waterfront area, the project purpose and screening criteria goals are better met by options A1d, Rebuild Existing Structure or A2b, Two-Level Aerial Replacement – Existing Location.

A4a: MULTI-LANE BOULEVARD SURFACE ROADWAY

General Functional Description

The surface roadway concept would replace the Alaskan Way Viaduct with an expanded Alaskan Way surface street (a multi-lane boulevard). Signalized intersections would be provided throughout the AWV Corridor to manage traffic movements. Surface street connections would replace existing downtown ramps and project access to the waterfront, downtown, and Ballard/Interbay. Road capacity would be reduced and improvements to transit and implementation of trip reduction measures would be included as mitigation. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Alaskan Way surface street connections would replace existing downtown ramps and provide access to the waterfront, downtown, and Ballard/Interbay.
- Shorter construction time frame for relative to other concepts
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- In some locations east/west movements across Alaskan Way may be restricted, mitigation would be provided as needed

- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Reduces roadway capacity, improvements to transit and implementation of trip reduction measures would be included as mitigation

Screening Results

This option will be carried forward for further evaluation in the EIS.

A4b: MULTI-LANE BOULEVARD SURFACE ROADWAY WITH SECTIONS OF TUNNEL AND/OR OVERPASSES

General Functional Description

This surface roadway design concept is similar to design concept A4a only short sections of tunnel and/or aerial overpasses would be incorporated where needed to facilitate east/west traffic movements across the surface roadway.

Key Features

- Alaskan Way surface street connections would replace existing downtown ramps and provide access to the waterfront, downtown, and Ballard/Interbay.
- Shorter construction time frame for relative to other concepts
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Improves east/west access issues across Alaskan Way where overpasses and/or tunnels are incorporated for access
- Utilities, hazardous soils, and groundwater issues would be challenges for tunnel sections
- Tunnel segments may require a ventilation system
- Reduces roadway capacity, improvements to transit and implementation of trip reduction measures would be included as mitigation

Screening Results

This option will be carried forward for further evaluation in the EIS.

A5a: ONE-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY

General Functional Description

This concept proposes to replace the Viaduct with a one-level cut-and-cover tunnel under the existing Alaskan Way surface street along the downtown waterfront. A tunnel is not proposed in the south end of the project area because geotechnical investigations determined that poor soil conditions in this area would pose both extreme technical difficulties and additional expense. These findings are documented in a July 25, 2002 Technical Memorandum written by Shannon and Wilson titled *Geology and Subsurface Characterization for the Alaskan Way Viaduct Project* and an August 2002 Technical Memorandum by Parsons, Brinckerhoff, Quade, & Douglas, Inc. titled *Design Plans C & D Recommendation to Replace Cut and Cover Tunnels in South with Aerial or At-Grade*.

Under this design concept, three lanes would be provided in each direction for NB and SB traffic. Existing ramps at Seneca, Columbia, Elliott, Western, and Battery Street would be replaced by ramps in the vicinity of King Street and Union Street. Additional downtown ramps would likely be precluded by this option. In addition, waterfront, downtown, and Ballard/Interbay access would be provided through Alaskan Way surface street connections. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown and Ballard/Interbay would be provided near King Street and Union Street. Additional access to the waterfront, downtown, and Ballard/Interbay would be possible through Alaskan Way surface street connections
- Additional downtown ramps would likely be precluded by this option
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Western tunnel wall becomes new seawall
- Lengthy construction period
- Construction risks are high due to hazardous soils and groundwater
- Tunnel requires ventilation system
- Improves traffic safety issues related to nonstandard lane and shoulder widths

Screening Results

This option will be carried forward for further evaluation in the EIS.

A5b: TWO-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY

General Functional Description

This concept proposes a replace the Viaduct with a two-level cut-and-cover tunnel under the existing Alaskan Way surface street along the downtown waterfront⁴.

Under this design concept, three lanes provided in each direction for NB and SB traffic. Existing ramps at Seneca, Columbia, Elliott, Western, and Battery Street would be replaced by ramps in the vicinity of King Street and Union Street. Under this design option it would be feasible to add downtown ramps in a later construction phase, if desired. In addition, waterfront, downtown, and Ballard/Interbay access would be provided through Alaskan Way surface street connections. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown and Ballard/Interbay would be provided near King Street and Union Street. Additional access to the waterfront, downtown, and Ballard/Interbay would be possible through Alaskan Way surface street connections
- Additional ramps to downtown could be constructed at a later phase, but would be expensive and difficult to construct
- Removes visual barrier to waterfront
- Removal of Viaduct structure allows for a variety of urban design options for the area
- Western tunnel wall becomes the new seawall
- Lengthy construction period
- Construction risks are high due to hazardous soils and groundwater
- Tunnel requires ventilation system
- Improves traffic safety issues related to nonstandard lane and shoulder widths

⁴ A tunnel is not proposed in the south end of the project area because geotechnical investigations determined that poor soil conditions in this area would pose both extreme technical difficulties and additional expense. These findings are documented in a July 25, 2002 Technical Memorandum written by Shannon and Wilson titled *Geology and Subsurface Characterization for the Alaskan Way Viaduct Project* and an August 2002 Technical Memorandum by Parsons, Brinckerhoff, Quade, & Douglas, Inc. titled *Design Plans C & D Recommendation to Replace Cut and Cover Tunnels in South with Aerial or At-Grade*.

Screening Results

This option has been dropped and will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – This option carries more construction risk than option A5a, One-Level Cut-and-Cover Tunnel because deeper underground tunnel construction would be required. In addition, traffic management during construction would be more difficult with this option as compared with option A5a.
- The intent of this design concept and the project purpose and screening criteria goals can be better met by option A5a, One-Level Cut-and-Cover Tunnel.

A6: COMBINE ONE-LEVEL, ONE-WAY AERIAL AND ONE-WAY SURFACE ARTERIAL

General Functional Description

This is a combination concept that proposes to replace the Viaduct with a one-level aerial structure in one direction and a surface street in the other direction. Connections to the waterfront, downtown, and Ballard/Interbay would be provided either by ramps from the aerial structure or through connections from the Alaskan Way surface street. The facility would be constructed to meet design standards for lane widths, shoulder widths, and ramps, where feasible.

Key Features

- Provides access to the waterfront, downtown, and Ballard/Interbay through either ramps or Alaskan Way surface street connections.
- Reduces visual barrier along waterfront, but does not remove it
- Improves traffic safety issues related to nonstandard lane widths, shoulder widths, and ramps

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option would provide unbalanced access and travel times between NB and SB traffic. The direction of traffic traveling on the surface arterial would have increased travel times, but more downtown access through Alaskan Way surface street connections. The direction of traffic traveling on the aerial structure would have fewer possible downtown access points, but travel times would be

comparable to existing conditions. The intent of this design concept and the project purpose and screening criteria goals can be better met by other design options such as A2b, Two-Level Aerial Replacement – Existing Location and/or A9 Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial.

A7: COMBINE ONE-LEVEL, ONE-WAY TUNNEL AND ONE-LEVEL, ONE-WAY AERIAL

General Functional Description

This is a combination concept that proposes to replace the Viaduct along the downtown waterfront⁴ with a one-level tunnel in one direction under the Alaskan Way surface street and a one-level aerial structure in the other direction in the Viaduct's existing location.

With this concept, access from the aerial structure to downtown and Ballard/Interbay could be provided by multiple ramp connections. Ramps to downtown from the one-way tunnel could be provided near King Street. Additional access to the waterfront, downtown, and Ballard/Interbay could be provided through Alaskan Way surface street connections. The facility would be constructed to meet design standards for lane widths, shoulder widths, and ramps, where feasible.

Key Features

- Ramps to downtown from the aerial structure could be provided at multiple locations to access downtown and Ballard/Interbay. Ramps to downtown from the tunnel could be provided near King Street, and additional access to the waterfront, downtown, and Ballard/Interbay would be possible through Alaskan Way surface street connections
- Reduces visual barrier along waterfront, but does not remove it
- Possible reduction in noise impacts
- Western tunnel wall becomes new seawall
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Tunnel requires ventilation system
- Improves traffic safety issues related to nonstandard lane widths, shoulder widths, and ramps

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- The intent of this design option and the project purpose and screening criteria goals can be better met by other design options such as A2b, Two-Level Aerial Replacement – Existing Location; A5a, One-Level Cut-and Cover Tunnel; and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial.

A8: COMBINE ONE-LEVEL, ONE-WAY TUNNEL AND ONE-WAY SURFACE ARTERIAL

General Functional Description

This is a combination concept that proposes to replace the Viaduct with a one-level tunnel in one direction under the Alaskan Way surface street along the downtown waterfront⁴ and a surface street in the opposite direction.

Ramps to downtown from the one-way tunnel could be provided near King Street, and additional access would be possible through street connections near the ends of the tunnel portals. Access to the waterfront, downtown, and Ballard/Interbay would be provided through surface street connections to the one-way traffic traveling on the Alaskan Way surface street. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown from the tunnel could be provided near King Street and additional access could be provided through street connections at the tunnel portals. Access to the waterfront, downtown, and Ballard/Interbay would be provided through surface street connections to the one-way traffic traveling on the Alaskan Way surface street.
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Western tunnel wall becomes new seawall
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Tunnel requires ventilation system
- Improves traffic safety issues related to nonstandard lane and shoulder widths

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option would provide unbalanced access and travel times between NB and SB traffic. The direction of traffic traveling on the surface arterial would likely have increased travel times, but more downtown access through surface street connections. The direction of traffic traveling in the tunnel would have fewer possible access points to the waterfront, downtown and Ballard/Interbay, but travel times would likely be comparable to existing conditions. The intent of this design concept and the project purpose and screening criteria goals can be better met by other design options such as A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial.

A9: COMBINE ONE-LEVEL, TWO-WAY BYPASS TUNNEL WITH TWO-WAY SURFACE ARTERIAL

General Functional Description

This is a combination concept that proposes to replace the Viaduct with a one-level, two-way tunnel under the Alaskan Way surface street along the downtown waterfront⁴ and a two-way surface street on the top. The tunnel would serve as an express route for through traffic and would have two lanes in each direction. Downtown ramps would be provided in the vicinity of King Street. The Alaskan Way surface street would provide access to the waterfront, downtown, and Ballard/Interbay. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Downtown ramps would be provided in the vicinity of King Street. Access to the waterfront, downtown, and Ballard/Interbay would be provided through multiple surface street connections
- Separates through and local traffic
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Western tunnel wall becomes new seawall
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Tunnel requires ventilation system
- Improves traffic safety issues related to nonstandard lane and shoulder widths

Screening Results

This option will be carried forward for further evaluation in the EIS.

A10: COMBINE TWO-WAY BYPASS AERIAL WITH TWO-WAY SURFACE ARTERIAL**General Functional Description**

This is a combination concept that proposes to replace the Viaduct along the downtown waterfront with a two-way bypass aerial structure and a two-way surface street. The new aerial facility could be either single-level or double-level aerial structure. The aerial structure would serve as an express route for through traffic and would have two lanes in each direction. Downtown ramps could be provided in the vicinity of King Street. The Alaskan Way surface street would provide access to the waterfront, downtown, and Ballard/Interbay. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Downtown ramps could be provided in the vicinity of King Street. Access to the waterfront, downtown, and Ballard/Interbay would be provided through multiple surface street connections
- May shorten duration of construction compared with other concepts
- Separates through and local traffic
- Provides access to downtown at multiple locations
- May reduce existing visual impacts along waterfront, though visual impacts would remain
- May improve noise over existing conditions
- Improves traffic safety issues related to nonstandard lane and shoulder widths

Screening Results

This option will be carried forward for further evaluation in the EIS.

A11: BORED TUNNELS UNDER ALASKAN WAY**General Functional Description**

Bored tunnels under the existing Alaskan Way surface street along the downtown waterfront⁴ would replace the Viaduct. The concept includes two lanes in each direction, and the tunnel would accommodate through traffic. Access to the waterfront, downtown, and Ballard/Interbay would be provided through Alaskan Way surface street connections, a ramp near the King Street area might be feasible. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Access to the waterfront, downtown, and Ballard/Interbay would be provided through multiple surface street connections. Ramps near King Street might be feasible.
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition to construction risk, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

B. BATTERY STREET TUNNEL IMPROVEMENTS

B1a: FIRE, LIFE, AND SAFETY UPGRADE TO THE EXISTING BATTERY STREET TUNNEL

General Functional Description

The Battery Street Tunnel would be upgraded with necessary fire, life, and safety improvements to meet current requirements for fire, ventilation, electrical, and emergency egress.

Key Features

- Does not address nonstandard traffic safety issues (lane and shoulder widths)
- Does not provide a seismic upgrade to the tunnel

Screening Results

This option will be carried forward for further evaluation in the EIS.

B1b: SEISMIC UPGRADE TO THE EXISTING BATTERY STREET TUNNEL

General Functional Description

The Battery Street Tunnel would be seismically upgraded under this design option.

Key Features

- Does not address nonstandard traffic safety issues (lane and shoulder widths)
- Does not provide a tunnel meeting current requirements for fire, ventilation, electrical, and emergency egress (fire, life, and safety)

Screening Results

This option will be carried forward in the EIS pending further investigation.

B2: TWO-LEVEL, CUT-AND-COVER TUNNEL THROUGH BELLTOWN

General Functional Description

A new cut-and-cover tunnel would be constructed through Belltown under Bell Street to connect to a replacement Viaduct structure on the south and SR 99 on the north. The new tunnel would be a two-level, cut-and-cover tunnel with three lanes in each direction. The existing Battery Street Tunnel would be abandoned. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Provides additional capacity to the AWV Corridor by adding one-lane in each direction through the new tunnel
- Construction duration is lengthy
- Construction risks are high due to hazardous soils and groundwater issues
- Improves traffic safety issues related to nonstandard lane and shoulder widths

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 - The risk of constructing a cut-and-cover tunnel through Belltown would be high because the width of the tunnel would come very close to existing footings of both historic and high-rise buildings.
- This concept is dropped because conceptual engineering analysis of this option revealed that it would cost more to build a new Battery Street Tunnel than what could reasonably be funded in the foreseeable future. Therefore, the project purpose and screening criteria goals can be better met by the No Action option to continue utilizing the Battery Street Tunnel; option B1a, Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel; and/or option B1b Seismic Upgrade to the Existing Battery Street Tunnel.

B3a: BORED OR MINED TUNNEL UNDER BELLTOWN

General Functional Description

A new bored or mined tunnel would be constructed under Belltown to connect to a replacement Viaduct structure to the south and the existing SR 99 to the

north. There are several possible alignments for the tunnel. The new tunnel would be a two-level, deep tunnel with three lanes in each direction. The existing Battery Street Tunnel would be abandoned. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Provides additional capacity to the AWV Corridor by adding one-lane in each direction through the new tunnel
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation
- Improves traffic safety issues related to nonstandard lane and shoulder widths

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – The risk of constructing bored or mined tunnels would be high, due to the size of the tunnels required to accommodate 3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- This concept is dropped because conceptual engineering analysis of this option revealed that it would cost more to build a new Battery Street Tunnel than what could reasonably be funded in the foreseeable future. Therefore, the project purpose and screening criteria goals can be better met by the No Action option to continue utilizing the Battery Street Tunnel; option B1a, Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel; and/or option B1b Seismic Upgrade to the Existing Battery Street Tunnel.

B3b: BORED OR MINED TUNNELS UNDER BELLTOWN

General Functional Description

Similar description to design concept B4a, only two smaller diameter tunnels would be constructed under Belltown to connect to a replacement Viaduct structure to the south and the existing SR 99 to the north. Three lanes would be

provided in each direction. The existing Battery Street Tunnel would be abandoned. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Provides additional capacity to the AWW Corridor by adding one-lane in each direction through the new tunnel
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation
- Improves traffic safety issues related to nonstandard lane and shoulder widths

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – The risk of constructing bored or mined tunnels would be high, due to the size of the tunnels required to accommodate 3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- This concept is dropped because conceptual engineering analysis of this option revealed that it would cost more to build a new Battery Street Tunnel than what could reasonably be funded in the foreseeable future. Therefore, the project purpose and screening criteria goals can be better met by the No Action option to continue utilizing the Battery Street Tunnel; option B1a, Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel; and/or option B1b Seismic Upgrade to the Existing Battery Street Tunnel.

C. ROADWAY IMPROVEMENTS OUTSIDE OF THE AWW CORRIDOR

C1a: TWIN BORED TUNNELS AT WESTERN AVE.

General Functional Description

This concept proposes to replace the existing Viaduct along the downtown waterfront⁴ with twin bored tunnels under Western Avenue. Similar to concept A11, this concept includes constructing two lanes in each direction. The focus would be on through traffic. Ramps to downtown would not be provided, but access to the waterfront, downtown, and Ballard/Interbay would be possible through Alaskan Way surface street connections. This concept would likely require bypassing the Battery Street Tunnel and constructing a new tunnel at the north end. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown would not be provided, but access to the waterfront, downtown, and Ballard/Interbay would be possible through Alaskan Way surface street connections
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Requires significant changes to Battery Street Tunnel connection and/or a new tunnel to replace it at the north end
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition to construction risk, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

C1b: TWIN BORED TUNNEL ROUTES AT 1ST AVE. AND 2ND AVE.

General Functional Description

In this concept, the Viaduct along the downtown waterfront⁴ would be replaced with twin bored tunnels under 1st and 2nd Avenues. Two lanes would be provided in each tunnel and 2nd Avenue provides extra width potential for increased tunnel capacity. Ramps to downtown would not be provided but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. This concept would require bypassing the Battery Street Tunnel and constructing a new tunnel at the north end. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront

- Removal of Viaduct structure allows for a variety of urban design options
- Requires bypassing Battery Street tunnel and constructing a new tunnel at the north end
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition to construction risk, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

C1c: TWIN BORED TUNNELS AT 3RD AVE.

General Functional Description

This concept proposes to replace the existing Viaduct along the downtown waterfront⁴ with twin bored tunnels under 3rd Avenue, below the bus tunnel.

The tunnel would connect with SR 99 north and south of downtown. Ramps to downtown would not be provided but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. This concept would require bypassing the Battery Street Tunnel and constructing a new tunnel at the north end. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Requires bypassing Battery Street tunnel and constructing a new tunnel at the north end
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 - The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that

the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

C1d: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. – EAST PORTAL

General Functional Description

This concept proposes to replace the existing Viaduct along the downtown waterfront⁴ with twin bored tunnels under 4th and 5th Avenues. They would connect with SR 99 north and south of downtown. The southern terminus would be east of the E-3 bus way at about S. Massachusetts and the north terminus would be at SR 99, just south of Mercer Street. Ramps to downtown would not be provided but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections.

Key Features

- Ramps to downtown would not be provided but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Requires bypassing Battery Street tunnel and constructing a new tunnel at the north end
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

C1e: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. – SOUTH PORTAL

General Functional Description

This concept proposes to replace the existing Viaduct along the downtown waterfront⁴ with twin bored tunnels under 4th and 5th Avenues. They would connect with SR 99 north and south of downtown. The southern terminus would be east of the Seattle International Gateway (SIG) Yard at about S. Stacy Street and the north terminus would be at SR 99 at about Denny Way. Ramps to downtown would not be provided but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. This concept would require bypassing the Battery Street Tunnel and constructing a new tunnel at the north end. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown would not be provided but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront

- Removal of Viaduct structure allows for a variety of urban design options
- Requires bypassing Battery Street tunnel and constructing a new tunnel at the north end
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

C1f: TWIN BORED TUNNEL ROUTE AT I-5

General Functional Description

Under this concept, the Viaduct would be replaced with bored tunnels constructed under I-5 through Seattle. The multiple lanes at project completion would increase I-5 capacity. The focus would be on through traffic.

Intermediate connections would be difficult due to tunnel depth and existing I-5 ramps and other structures. This concept would serve as an improvement to I-5 more than as an alternative for the Alaskan Way Viaduct Corridor. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Increases I-5 capacity
- Would not serve the majority of travel needs in the AWV Corridor
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 2 - This concept would not maintain the current transportation functions of the AWV Corridor, nor would it meet the travel demand currently served by the AWV Corridor. This option would eliminate existing access for through traffic traveling between the Duwamish industrial area and Ballard/Interbay.
- Goal 10 - The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that

the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, intent of this design concept and the project purpose and screening criteria goals can be better met by other design options such as A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

C2: SIGNATURE BRIDGE ACROSS ELLIOTT BAY FROM WEST SEATTLE

General Functional Description

This concept would replace the existing Viaduct with a signature bridge across Elliott Bay from West Seattle to the Battery Street Tunnel area. It would provide three to four lanes in each direction, designed to meet demand. Ramps to downtown would not be provided, but waterfront, downtown, and Interbay access could be provided through Alaskan Way surface street connections. This option would only provide service to/from West Seattle, and would not serve communities to the north and south of Seattle. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Would not serve all of existing travel needs of Alaskan Way Viaduct Corridor, specifically north and south Seattle traffic
- Ramps to downtown would not be provided, but waterfront, downtown, and Interbay access would be provided through Alaskan Way surface street connections
- Removes visual impact along waterfront, but creates a new visual impact to Elliott Bay
- Removal of Viaduct structure allows for a variety of urban design options
- Impacts navigation in Elliott Bay
- Permitting issues are substantial for ESA, shorelines, and navigational impacts
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Difficult construction due to water depth

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 2 – This option would only provide service to/from West Seattle, and would not serve communities to the north and south of Seattle. Therefore, this option would not maintain the transportation functions within the AWW Corridor.
- Goal 3 – Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a bridge.
- Goal 5– The AWW Corridor would lose some linkages with SR 520, and the Mercer Corridor.
- Goal 8 - The existing waterfront view corridor would be substantially impacted if a new bridge across Elliott Bay were constructed. This would not be consistent with existing land use and shoreline plans.
- Goal 9 – A signature bridge across Elliott Bay would create additional overwater shading, which would reduce fish and wildlife habitat.
- In addition, the bridge concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

C3: ELLIOTT BAY SUBMERGED TUNNEL ALONG WATERFRONT AREA

General Functional Description

Under this concept, a submerged tunnel would replace the Viaduct along the downtown waterfront. Three lanes would be provided in each direction. The focus would be on through traffic. Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Impacts navigation in Elliott Bay
- Permitting issues are substantial and include ESA, shoreline issues, and navigation

- Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be provided through Alaskan Way surface street connections
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 3 – Marine transportation in the Port of Seattle and Washington State Ferry Terminal would be degraded by the addition of a submerged tunnel along the waterfront.
- Goal 5 – Ferry system access would be restricted.
- Goal 9 – Submerged tunnel construction and long-term operation would reduce overall fish and wildlife habitat.
- Goal 10 – Requires complicated, high-risk construction methods for deep water tunnel construction
- In addition, the submerged tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

C4: I-5 IMPROVEMENTS TO ACCOMMODATE A PORTION OF SR 99 DEMAND

General Functional Description

This concept proposes to replace the Viaduct by increasing capacity on I-5 to accommodate a portion of the SR 99 demand. Increased capacity on I-5 would be accomplished through widening. This concept would serve as an improvement

to I-5 more than as an alternative for the AWW Corridor. Existing transportation functions within the Corridor would not be maintained. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Would not serve majority of travel needs and maintain transportation functions served in the AWW Corridor
- Removes visual barrier for waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Very difficult to add capacity in I-5 corridor without substantial property impacts
- Likely high cost
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 2 – This option would not maintain the transportation functions within the AWW Corridor that provide for the movement of people, freight, and goods traveling to and from downtown, between the Duwamish industrial area and Ballard/Interbay, and through downtown.
- In addition, this concept would not meet the project purpose and need. It would not address the seismic deficiencies of the existing Seawall and Viaduct unless paired with separate Viaduct and Seawall options.

C5: ELLIOTT BAY FLOATING TUNNEL ALONG WATERFRONT AREA

General Functional Description

This concept proposes to replace the Viaduct with a submerged floating tube under Elliott Bay, along the waterfront. Three lanes would be provided in each direction. The focus would be on through traffic. Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. The facility would

be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Impacts navigation in Elliott Bay
- Permitting issues are substantial and include ESA, shoreline issues, and navigation
- Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections.
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Requires complex design for capacity, safety, and ventilation

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 3 – Marine transportation in the Port of Seattle and Washington State Ferry Terminal would be degraded by the addition of a submerged tunnel along the waterfront.
- Goal 9 – Floating tunnel construction and long-term operation would reduce fish and wildlife habitat.
- Goal 10 – Requires complicated, high-risk construction methods for deep water tunnel construction
- In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

C6: SIGNATURE BRIDGE FROM STADIUM AREA TO BELLTOWN VIA ELLIOTT BAY

General Functional Description

This concept would replace the Viaduct with a high-rise suspension bridge across Elliott Bay from the stadium area to Belltown. It would provide three to four lanes in each direction. Opportunities would exist to expand capacity in the future. Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections.
- Removes visual impact along waterfront, but creates a new visual impact to Elliott Bay
- Removal of Viaduct structure allows for a variety of urban design options
- Impacts navigation in Elliott Bay
- Permitting issues are substantial for ESA, shorelines, and navigational impacts
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Difficult construction due to water depth in excess of 200 feet

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 3 - Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a bridge.
- Goal 8 - The existing waterfront view corridor would be substantially impacted if a new bridge across Elliott Bay were constructed. This would not be consistent with existing land use and shoreline plans.

- Goal 9 – Construction and long-term operation of a bridge over Elliott Bay would create overwater shading, which would reduce fish and wildlife habitat.
- In addition, this concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

C7: EXISTING 4th AVENUE BNSF TUNNEL TRANSITIONING TO CUT-AND-COVER TUNNEL

General Functional Description

This concept proposes to replace the existing Viaduct along the downtown waterfront with a cut-and-cover tunnel that connects with the existing BNSF rail tunnel under 4th Avenue. The north portal of the BNSF tunnel at Blanchard Street would be connected to a point north of Broad Street by way of a cut-and-cover tunnel. Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Limited capacity in BNSF tunnel due to tunnel size
- Impacts BNSF use of tunnel and movement of goods and freight
- Requires substantial upgrades to the BNSF Tunnel
- Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections.
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Limited property impacts
- Reduces traffic noise
- Could improve traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 2 - This option would restrict the transport of BNSF freight and goods throughout the AWW Corridor. The existing BNSF tunnel is constrained, and it is likely that transportation functions currently provided by the AWW Corridor would not be maintained.
- Goal 3 - Operations of the BNSF Railroad would be degraded by this option, and tunnel capacity is constrained.
- In addition, this concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

**C8a: FLOATING BRIDGE FROM PORT OF SEATTLE
PROPERTY TO CONNECT AT BROAD STREET**

General Functional Description

This concept proposes to replace the existing Viaduct with a floating bridge from the Port of Seattle property on the south end of the Viaduct to connect to the existing SR 99 at Broad Street. This option would likely require the construction of a new Ramps from the floating bridge would not be provided but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections. This concept would require bypassing the Battery Street Tunnel and constructing a new tunnel at the north end. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Requires relocation of Port of Seattle, ferry, and cruise ship operations
- Impacts navigation in Elliott Bay
- Permitting issues are substantial and include ESA, shoreline issues, and navigation
- Ramps to downtown would not be provided, but waterfront, downtown, and Ballard/Interbay access would be possible through Alaskan Way surface street connections.
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along the waterfront, but creates new visual impacts to Elliot Bay
- Removal of Viaduct structure allows for a variety of urban design options
- Requires bypassing the Battery Street Tunnel and constructing a new tunnel at the north end
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall

- Requires difficult construction due to water depth in excess of 200 feet

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 3 – Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a floating bridge.
- Goal 5 – Ferry system access would be restricted.
- Goal 9 – Construction and long-term operation of a floating bridge along Elliott Bay would reduce fish and wildlife habitat.
- In addition, this concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

C8b: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT SENECA STREET

General Functional Description

This concept proposes to replace a section of the Viaduct with a floating bridge from the Port of Seattle property on the south end to connect to the existing Viaduct at Seneca Street. Ramps from the floating bridge would not be provided, but access to the waterfront, downtown, and Ballard/Interbay could be provided north or south of the bridge. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible.

Key Features

- Would only fix seismic deficiencies in the Viaduct up to Seneca, unless paired with another design concept north of Seneca
- Ramps from the floating bridge would not be provided, but waterfront, downtown, and Ballard/Interbay access could be provided north or south of the bridge.
- Requires relocation of Port of Seattle, ferry, and cruise ship operations
- Impacts navigation in Elliott Bay
- Permitting issues are substantial and include ESA, shoreline issues, and navigation
- Removal of Viaduct structure allows for a variety of urban design options
- Separates through and local traffic, with through traffic focus

- Removes visual barrier along the waterfront, but creates new visual impacts to Elliot Bay
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires difficult construction due to water depth in excess of 200 feet

Screening Results

This option has been dropped, and it will not be evaluated in the EIS because it does not meet the following goals:

- Goal 3 – Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a floating bridge.
- Goal 5 – Ferry system access would be restricted.
- Goal 9 – Construction and long-term operation of a floating bridge along Elliott Bay would reduce fish and wildlife habitat.
- In addition, this concept would not address the seismic deficiencies of the existing Seawall and the Viaduct north of Seneca unless it is paired with additional design options.

D. MULTIMODAL SOLUTIONS

D1: TRANSPORTATION SYSTEM/DEMAND MANAGEMENT TO MAXIMIZE EXISTING SYSTEM

General Functional Description

The goal of this concept is to use transportation system and demand management (TSM/TDM) to maximize the existing system either through changes to improve traffic flow or reduce demand on facilities. The components of this concept include maximizing transit and non-motorized modes and the use of existing transportation facilities. Modest improvements to several existing facilities would be combined with an emphasis on alternative modes. Possibilities include transit priority, pricing strategies for general traffic and freight to minimize vehicle demand, and improved pedestrian and bicycle connections.

Key Features

- Emphasizes pedestrian and bicycle opportunities
- Short time-frame for implementation
- Generally lower cost in comparison to capital improvements

Screening Results

This option will be carried forward for further evaluation in the EIS.

TSM/TDM measures are being carried forward as components of all alternatives being evaluated in the EIS. An additional description of the range of TSM/TDM measures are contained in the December 2002 document entitled *Draft Flexible Transportation Package: An Integrated Program of Demand and System Management Strategies*, written by Parsons, Brinckerhoff, Quade, and Douglas, Inc.

D2: HIGH CAPACITY TRANSIT ALONG EXISTING AWW CORRIDOR WITH NEW CONCEPT

General Functional Description

This concept proposes to combine a High Capacity Transit route, such as Light Rail Transit, Monorail, or Bus Rapid Transit, together with a Viaduct reconstruction or replacement option. Variations may include a High Capacity Transit route adjacent to, above, or below, a new or rebuilt Viaduct facility, within new tunnel structure, or above or part of the Alaskan Way surface street option.

Key Features

- Ties to ongoing King County Metro Bus Rapid Transit and the Seattle Popular Monorail Authority's planning efforts
- Could be used to accommodate future traffic demand and/or reduce capacity needs in the Corridor
- Could expand transit capacity through downtown
- Timing of decisions need to be coordinated
- Waterfront route may not be preferred transit corridor
- Adds time and cost to project

Screening Results

This option will be carried forward for further evaluation in the EIS.

Increased transit will be considered as part of the alternatives being evaluated in the EIS. An additional description of the range of transit measures that will be incorporated are contained in the December 2002 document entitled *Draft Flexible Transportation Package: An Integrated Program of Demand and System Management Strategies*, written by Parsons, Brinckerhoff, Quade, and Douglas, Inc.

E. RELATED IMPROVEMENTS (WOULD BE COMBINED WITH OTHER VIADUCT REPLACEMENT CONCEPTS)

E1a: ADD MISSING RAMPS AT S.SPOKANE ST./ALASKAN WAY INTERCHANGE

General Functional Description

This concept would add missing ramps at the S. Spokane Street/Alaskan Way interchange.

Key Features

- Improves freight access
- Removes trucks from city streets; more effectively uses AWW Corridor for freight
- Improves access from West Seattle

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.

E1b: IMPROVE ACCESS AT STADIUM AREA

General Functional Description

This concept would improve the access in the vicinity of the baseball stadium and the new football stadium. Connections between surface streets and the AWW would be provided.

Key Features

- Improves existing design deficiencies at existing ramps
- May help relieve traffic on city streets
- May help balance flows between SR 99 and I-5
- Reduces role of Viaduct as a bypass through downtown
- May cause traffic congestion concerns on Viaduct due to added volume
- Requires coordination with SR 519 improvements

Screening Results

This concept will be included⁵ in design plans being evaluated in the EIS.

Existing access to the Viaduct is currently limited at the Stadium Area to a NB on-ramp at Railroad Way S. Options to improve Stadium area access are related to design option E2f, Improve I-90/SR 519/SR 99 Connections, which is supported by screening criteria Goal 5⁶

E1c: ADD NEW ACCESS AT THE DOWNTOWN CORE

General Functional Description

This concept would add new access at the downtown core. Connections between surface streets and the AWV would be improved.

Key Features

- Improves existing design deficiencies at ramps
- May help relieve traffic on city streets
- May help balance flows between SR 99 and I-5
- Reduces role of Viaduct as a bypass through downtown
- May cause traffic congestion concerns on Viaduct and immediate adjacent streets due to added volume

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not directly related to the purpose of the project. Most of the design options would not preclude new access into downtown; however, design options that would preclude additional access into downtown (such as design option A5a, One-Level Cut-and-Cover Tunnel Under Existing Alaskan Way) will be disclosed in the EIS.

⁵ For the purposes of this screening process the term “included” means that the general concept has been incorporated in one or more specific design options being carried forward for further analysis in the EIS.

⁶ Goal 5 requires the project to maintain regional transportation linkages. Specifically, Goal 5 states that an alternative should integrate functional with planned transportation projects such as SR 519.

E1d: IMPROVE ACCESS AT BATTERY ST./WESTERN AVE./ELLIOTT AVE.**General Functional Description**

This concept would improve the access at Battery Street/Western Avenue/Elliott Avenue.

Key Features

- Improves design deficiencies at existing ramps
- Improves traffic safety
- May help relieve traffic on city streets
- May cause traffic congestion concerns on Viaduct and immediate adjacent streets due to added volume

Screening Results

This option will be carried forward for further evaluation in the EIS.

The existing ramps at Battery Street/Western Avenue/Elliott Avenue are nonstandard and have safety deficiencies. Options to improve these deficiencies are supported by screening criteria Goal 4⁷ and will be incorporated where feasible into design plans carried forward into the EIS. See also concepts E2e, Improve Ballard/Interbay Connections and E3e, Improve Broad Street Rail Crossing.

E1e: ADD S. SPOKANE STREET OFF-RAMP TO 6TH AVENUE S. FOR BUSES**General Functional Description**

This concept would add an off-ramp to 6th Avenue S. from S. Spokane Street for bus use.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

⁷ Goal 4 states that the project should improve traffic safety.

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

E1f: ADD S. SPOKANE STREET OFF-RAMP TO 4TH AVENUE S.**General Functional Description**

This concept would add an off-ramp from S. Spokane Street to 4th Avenue S.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

E1g: ADD EXTENSION TO THE S. SPOKANE STREET 4TH AVENUE ON-RAMP**General Functional Description**

This concept would add an extension to the S. Spokane Street 4th Avenue on-ramp.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

E1h: PROVIDE SOUTHBOUND ACCESS TO SR 99 FROM WEST SEATTLE BRIDGE**General Functional Description**

This concept would add SB access to SR 99 from the West Seattle Bridge.

Key Features

- Creates additional access to SR 99
- May cause traffic congestion concerns on Viaduct and immediate adjacent streets due to added volume
- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

E2a: ADD CONNECTION TO SOUTH LAKE UNION AREA**General Functional Description**

This concept would add connections to the South Lake Union area. Access to and from South Lake Union and SR 99 would be improved.

Key Features

- Improves access to/from the waterfront and South Lake Union area
- May cause traffic congestion concerns on Viaduct and immediate adjacent streets due to added volume
- May improve traffic circulation and improve existing traffic issues at Mercer Street and other streets
- Could allow for reconnection of street grid in South Lake Union area

Screening Results

This concept will be included⁸ in design plans being evaluated in the EIS.

⁸ For the purposes of this screening process the term “included” means that the general concept has been incorporated in one or more specific design options being carried forward for further analysis in the EIS.

The option to add or improve connections to the South Lake Union Area north of the Battery Street Tunnel will be included into specific design options being carried forward into the EIS. These specific design options include E2l, Lowered Aurora/SR 99; E2m, Widened Mercer; and E2n, Existing Mercer with Signals on SR 99 North of the Battery Street Tunnel.

E2b: EXTEND ALASKAN WAY VIADUCT CORRIDOR TO I-5 THRU MERCER ST. CORRIDOR

General Functional Description

The AWV Corridor would be extended to I-5 through the Mercer Street corridor at the south end of Lake Union.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

E2c: EXTEND SR 520 TO ALASKAN WAY VIADUCT CORRIDOR

General Functional Description

This concept proposes to extend SR 520 west to the AWV Corridor.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

**E2d: EXTEND SR 99 GRADE SEPARATION OVER 1ST
AVE. S. BRIDGE TO SR 509****General Functional Description**

This concept would extend the SR 99 grade separation over the 1st Avenue South Bridge to SR 509.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

E2e: IMPROVE BALLARD / INTERBAY CONNECTIONS**General Functional Description**

For this regional connection concept, connections between SR 99 and Ballard/ Interbay would be improved.

Key Features

- Improves design deficiencies at existing ramps
- Improves traffic safety
- May help relieve traffic on city streets
- May cause traffic congestion concerns on Viaduct and immediate adjacent streets due to added volume

Screening Results

This concept will be included⁹ in design plans being evaluated in the EIS.

The existing ramps providing the Ballard/ Interbay connection are located at Western Avenue and Elliott Avenue. These ramps are nonstandard and have safety deficiencies. Options to improve these deficiencies are supported by

⁹ For the purposes of this screening process the term “included” means that the general concept has been incorporated in one or more specific design options being carried forward for further analysis in the EIS.

screening criteria Goal 4¹⁰ and will be incorporated where feasible into design plans carried forward into the EIS. Specifically, this concept is incorporated into design option E1d, Improve the Access at Battery Street/Western Avenue.

E2f: IMPROVE I-90 / SR 519 / SR 99 CONNECTIONS

General Functional Description

This concept proposed to improve the connections between I-90, SR 519, and SR 99.

Key Features

- Further study required for I-90 connections
-
- For SR 519/SR99 Connections the following key features apply
- Improves existing design deficiencies at existing ramps and improve safety
- May help relieve traffic on city streets
- May help balance flows between SR 99 and I-5
- Reduces role of Viaduct as a bypass through downtown
- May cause traffic congestion concerns on Viaduct due to added volume
- Requires coordination with SR 519 improvements

Screening Results

This design option to improve I-90 access has been dropped, and it will not be evaluated in the EIS for the following reasons:

- The concept of improving the connections between SR 99 and I-90 and between I-90 and SR 519 is not precluded; however, it is not related to the purpose of the project.

The design option to improve SR 519/SR 99 connections will be carried forward for further evaluation in the EIS.

The concept of improving the connection between SR 99 and SR 519 is supported by Goal 5¹¹ of the screening criteria and is being incorporated into design options being carried forward into the EIS.

¹⁰ Goal 4 states that the project should improve traffic safety.

¹¹ Goal 5 requires the project to maintain regional transportation linkages. Specifically, Goal 5 states that an alternative should integrate functional with planned transportation projects such as SR 519.

E2g: IMPROVE I-5/ SR 99 CONNECTION AT S.SPOKANE STREET**General Functional Description**

The connection between I-5 and SR 99 would be improved at S. Spokane Street.

Key Features

- Further study required
-

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

E2h: IMPROVE WATERFRONT ACCESS BETWEEN THE WEST SEATTLE BRIDGE AND BATTERY STREET**General Functional Description**

Access to the waterfront would be improved at all points between the West Seattle Bridge and Battery Street.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option is not precluded, but is dropped because it is not directly related to the purpose of the project. However, the intent of all of the options being carried forward is to improve waterfront access, where feasible, to and from downtown and along the waterfront.

E2i: LOCATE TUNNEL PORTAL AT ROY STREET TO RECONNECT CROSSINGS AT THOMAS AND HARRISON**General Functional Description**

This concept proposes to locate a concept's tunnel portal at Roy Street, allowing for the reconnecting of Thomas Street and Harrison Street.

Key Features

- Requires construction of a new north end tunnel to replace the Battery Street Tunnel or it requires extending the existing Battery Street Tunnel to Roy Street
- Improves access and circulation north of the Battery Street Tunnel

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept requires the construction of a new tunnel to replace the Battery Street Tunnel, which is an option that has been dropped because the option to continue utilizing the Battery Street Tunnel accomplishes a similar goal as constructing a new tunnel with fewer risks and lower costs. Conceptual engineering analysis of this option revealed that it would cost more than what could reasonably be funded in the foreseeable future.

E2j: ADD OFF-RAMP TO AIRPORT WAY**General Functional Description**

This concept would add an off-ramp to Airport Way.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.

E2k: RE-UTILIZE BATTERY STREET TUNNEL AS A VEHICULAR CONNECTION TO ALASKAN WAY**General Functional Description**

This concept would re-use the Battery Street Tunnel as a vehicular connection to Alaskan Way, reducing traffic on Broad Street at Alaskan Way.

Key Features

- Requires construction of a new north end tunnel to replace the Battery Street Tunnel
- May reduce traffic on Broad Street
- Provides additional roadway capacity through Belltown

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option has been dropped because the current project proposes to use the existing Battery Street Tunnel as part of any alternative to be evaluated in the EIS. This design concept was originally developed as an alternative use to the existing Battery Street Tunnel if a new tunnel under Belltown were created as part of the project. Conceptual engineering analysis of this option to construct a new Battery Street Tunnel revealed that it would cost more than what could reasonably be funded in the foreseeable future; therefore, this design option has been dropped.

E2l: LOWERED AURORA/SR 99**General Functional Description**

This concept proposes to lower Aurora/SR 99 from the north portal of the Battery Street Tunnel to Ward Street. Mercer Street would cross over SR 99 as a one-way street with four lanes east bound. Roy Street would cross over SR 99 as a one-way street with three lanes west bound. Thomas, Harrison, and Republican Streets could be connected by crossing over SR 99 as two-way streets with two lanes in each direction. Broad Street would be closed from 5th Avenue to 8th Avenue. SR 99 would be two lanes in each direction from the Battery Street Tunnel to north of Roy Street where it would become three lanes in each direction. Transit only ramps would be provided to and from Denny Way. A north bound off ramp and south bound on ramp from Mercer Street would be provided, and would include an auxiliary lane in each direction to connect to the

Denny Way transit ramps. At Roy Street north bound on, and south bound off ramps would be provided

Key Features

- Improves corridor operations by eliminating turning movements
- Improves neighborhood circulation by re-connecting the street grid
- Improves operations at Denny Way intersection by reducing traffic to transit only
- Eliminates multiple access points from SR 99 to the South Lake Union area
- Improves safety by eliminating existing street connections, which require rapid acceleration/ deceleration on the mainline
- Improves connectivity between primary routes (SR 99, Mercer Street, Roy Street, and I-5)
- Removes barrier to neighborhood
- Hazardous soils present challenges for construction
- Considerable disruption to neighborhood and traffic during construction
- Lengthy construction period
- Accommodates traffic flow during AWV construction by utilizing Broad Street as a temporary detour for SB SR 99 traffic

Screening Results

This option will be carried forward for further evaluation in the EIS.

This concept would provide access along SR 99 north of the Battery Street Tunnel in all directions (rather than just to/from the west SB, and to/from the east NB). It would improve traffic operations of SR 99 north of the Battery Street Tunnel by eliminating side-street connections and consolidating access to a new interchange. It would also help to improve the connection between I-5 and SR 99.

E2m: WIDENED MERCER

General Functional Description

This concept proposes widening Mercer Street as it crosses under SR 99. SR 99 would remain two lanes each direction from the Battery Street Tunnel to Thomas Street where it becomes three lanes each direction. Mercer Street would become a two-way street with three lanes each direction and left turn lanes for a total width of seven lanes. Left turn off from SR 99 would be prohibited but right turns from and to SR 99 would be allowed at Harrison, Republican, and Roy Streets. Thomas Street would cross over SR 99 on a two-lane bridge providing

one lane in each direction. Broad Street would be closed from 5th Avenue to 8th Avenue.

Key Features

- Mercer Street becomes a two-way street
- Allows local street grid to be re-established
- Improves connectivity between primary routes (SR 99, Mercer Street, Roy Street)
- Accommodates traffic flow during AWV construction by utilizing Broad Street as a temporary detour for SB SR 99 traffic

Screening Results

This option will be carried forward for further evaluation in the EIS.

Along SR 99 north of the Battery Street Tunnel, this option would allow for reconfiguration of the adjacent street system into a regular grid, improving street connections and operations. This option may provide an advantage to traffic movement during AWV construction.

E2n: EXISTING MERCER WITH SIGNALS ON SR 99 NORTH OF THE BATTERY STREET TUNNEL

General Functional Description

This concept proposes to maintain the existing lanes on SR 99 and Mercer Street. SR 99 would remain three lanes each direction and Mercer Street would remain four lanes east bound. At-grade signalized intersections would be located at Harrison, Republican, and Roy streets. Left turns from SR 99 at these intersections would be prohibited. Thomas Street would intersect with SR 99, providing right turns to and from SR 99 only. Roy Street would become a three lane east bound street to compliment Mercer Street. Broad Street would be closed from 5th Avenue to 8th Avenue.

Key Features

- Mercer and Roy Streets become a one-way couplet.
- Adds three signalized intersections on SR 99
- Minimal construction duration
- Minimal disruption to local traffic
- Generally re-establishes local street grid
- Improves connectivity between primary routes (SR 99, Mercer Street, Roy Street)

Screening Results

This option will be carried forward for further evaluation in the EIS.

Along SR 99 north of the Battery Street Tunnel, this option would improve access between the street grid and SR 99 by allowing access to both NB and SB lanes from cross streets. In addition, this option would allow for reconfiguration of the adjacent street system into a regular street grid.

E3a: ADD SR 99 GRADE SEPARATION CROSSING BETWEEN S. ATLANTIC AND S. SPOKANE STREETS

General Functional Description

This concept for improving freight mobility proposes a grade-separated crossing of SR 99 for trucks between South Atlantic and South Spokane Streets. Additional data on freight demand are needed to justify investments.

Key Features

- Improves freight access
- Removes trucks from city streets; more effectively uses AWV corridor for freight

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.

E3b: ADD MISSING RAMPS AT S. SPOKANE ST./ ALASKAN WAY INTERCHANGE

General Functional Description

This concept would add missing ramps at the S. Spokane Street/Alaskan Way interchange. Additional data on freight demand are necessary to justify investments.

Key Features

- Improves freight access improvements
- Removes trucks from city streets; more effectively uses AWV Corridor for freight

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.

E3c: S.HANFORD ST. RAMPS TO/FROM SR 99 FOR GENERAL TRAFFIC / FREIGHT

General Functional Description

This concept proposes to add S. Hanford Street ramps for general traffic or freight access to/from NB SR 99. Additional data on freight demand are necessary to justify investments.

Key Features

- Improves freight access
- Removes trucks from city streets; more effectively uses AWW Corridor for freight

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.

E3d: IMPROVE EAST-WEST FREIGHT ACCESS BETWEEN S. SPOKANE ST. AND S. HOLGATE ST.

General Functional Description

Improved east-west freight access in the area between S. Spokane and S. Holgate Streets would occur under this concept. Additional data on freight demand would be necessary to justify investments.

Key Features

- Improves freight access
- Removes trucks from city streets; more effectively uses AWW corridor for freight

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.

E3e: IMPROVE BROAD STREET RAIL CROSSING

General Functional Description

This concept proposes improving the rail crossing at Broad Street.

Key Features

- Improves freight mobility
- Improves vehicular mobility
- Improves pedestrian and bicycle mobility

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This option has independent utility¹², and it will be constructed separately.

E3f: MOVE TRUCK CONTAINERS FROM WATERFRONT TO I-90

General Functional Description

This concept proposes to provide improved connections for movement of truck containers between the waterfront to I-90.

Key Features

- Further study required

¹² Independent utility is defined in FHWA November 5, 1993 guidance as being a usable and reasonable expenditure even if no additional transportation improvements in the area are made.

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.

E3g: INCORPORATE EXISTING RAILROAD TRACKS WITHIN THE CUT-AND-COVER TUNNEL

General Functional Description

This concept proposes to incorporate the existing railroad tracks within the new cut-and-cover tunnel. North of the railroad portal near Virginia Street, the rail line would be lowered to be combined with the cut-and-cover tunnel.

Key Features

Further study required.

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept is not directly related to the purpose of the project.

E4a: ADD FERRY TRAFFIC QUEUING AREA

General Functional Description

A queuing area for ferry traffic would be added within the existing AWW Corridor.

Key Features

- Could improve ferries operations
- Manages ferry traffic more effectively throughout the Corridor
- Accommodates anticipated future growth in ferries usage
- Complicates implementation of certain Viaduct replacement concepts

Screening Results

This option will be carried forward for further evaluation in the EIS.

If AWW design options limit possible locations for ferries queuing/holding, then ferry queuing/holding areas will be identified as mitigation in the EIS.

E4b: EXPAND PEDESTRIAN CONNECTIONS BETWEEN THE FERRY TERMINAL AND DOWNTOWN

General Functional Description

Pedestrian connections between the ferry terminals and the downtown core would be expanded.

Key Features

- Creates additional visual impacts along waterfront
- Provides additional connections for pedestrians, specifically those using the ferry system

Screening Results

This option will be carried forward for further evaluation in the EIS.

The concept of expanding pedestrian connections between the ferry terminal and downtown will be a component of all alternatives evaluated in the EIS in support of screening goals 5, 6, and 7.¹³

E4c: IMPROVE FERRY CONNECTIONS TO AWW CORRIDOR AND DOWNTOWN

General Functional Description

This concept would improve ferry connections to the AWW Corridor and downtown core.

Key Features

- Improves ferries operations
- Manages ferry traffic more effectively throughout the Corridor
- Would accommodate anticipated future growth in ferries usage

Screening Results

This option will be carried forward for further evaluation in the EIS.

¹³ Goal 5 states that alternatives should maintain regional transportation linkages (specifically linkages to ferries). Goal 6 states that alternatives should support pedestrian accessibility. Goal 7 states that alternatives should be compatible with local transit, which includes ferries.

The concept of improving ferry connections between the ferry terminal and downtown will be a component of alternatives evaluated in the EIS in support of screening goals 5, 6, and 7.¹⁴

E5a: IMPROVE PEDESTRIAN ENVIRONMENT ALONG WATERFRONT

General Functional Description

This concept proposes to improve the pedestrian environment along the waterfront.

Key Features

- Improves connections and access for pedestrians
- Improves overall pedestrian environment, creating more opportunities and an improved pedestrian experience
- Consistent with city's downtown neighborhood plans and vision
- May cause traffic conflicts with some design options, particularly the surface roadway options

Screening Results

This option will be carried forward for further evaluation in the EIS.

The concept of improving pedestrian connections is being coupled with the urban design component of all alternatives evaluated in the EIS.

E5b: IMPROVE PEDESTRIAN CONNECTIONS BETWEEN WATERFRONT AND DOWNTOWN

General Functional Description

Under this concept, pedestrian connections between the waterfront and downtown core would be improved.

Key Features

- Improves connections and access for pedestrians
- Improves overall pedestrian environment, creating more opportunities and an improved pedestrian experience
- May cause additional visual impacts if pedestrian connections include aerial overpasses
- Consistent with City's downtown neighborhood plans and vision
- May cause traffic conflicts with some design options, particularly the surface roadway options

Screening Results

This option will be carried forward for further evaluation in the EIS.

The concept of improving pedestrian connections is being coupled with the urban design component of all alternatives evaluated in the EIS.

E5c: RETAIL, RESIDENTIAL, AND PUBLIC SPACE WITH AERIAL STRUCTURE

General Functional Description

Under this concept, retail, residential and/or public space would be combined with an aerial structure within the SR 99 right-of-way.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept not precluded by any of the aerial structure design options. An urban design plan incorporating public space will be presented for each alternative considered in the EIS. The EIS will not specifically analyze a design concept incorporating retail and residential space.

E5d: BUILD WATERFRONT PEDESTRIAN PARK WITH BUSINESSES

General Functional Description

Under this concept, a waterfront pedestrian park would be built and integrated with downtown businesses.

Key Features

- Further study required

Screening Results

This option has been dropped, and it will not be evaluated in the EIS for the following reason:

- This concept not precluded by any of the aerial structure design options. An urban design plan incorporating public space will be presented for each alternative considered in the EIS. The EIS will not specifically analyze a design concept incorporating retail and residential space.

CONCEPTS RECOMMENDED TO BE DROPPED FROM FURTHER CONSIDERATION

The following concepts have been dropped based on the screening criteria and will not be evaluated further in the project EIS.

A: AWW Improvements from S. Holgate Street to the Battery Street Tunnel

- A1a: Retrofit Existing Double-Level Structure
- A1c: Retrofit Existing Structure - Limited to Passenger Vehicles and Transit
- A2a: Two-Level Aerial Replacement - West of Existing
- A2c: Enclosed Two-Level Aerial Replacement - West of Existing Location
- A3a¹⁴: One-Level Aerial with Six Lanes - Over Existing
- A3b: One-Level Aerial with Six Lanes - West of Existing
- A5b: Two-Level Cut-and-Cover Tunnel Concept under Alaskan Way
- A6: Combine One-Level, One-Way Aerial with One-Way Surface Arterial
- A7: One-Level, One-Way Tunnel and One-Level, One-Way Aerial
- A8: One-Level, One-Way Tunnel and One-Way Surface Arterial
- A11: Bored Tunnels under Alaskan Way

B: Battery Street Tunnel Improvements within the AWW Corridor

- B2: Two-Level Cut-and-Cover Tunnel through Belltown
- B3a: Bored or Mined Tunnel under Belltown
- B3b: Bored or Mined Tunnels under Belltown

C: Roadway Improvements Outside of the AWW Corridor

- C1a: Twin Bored Tunnels at Western Ave.
- C1b: Twin Bored Tunnel Routes at 1st/2nd Ave.
- C1c: Twin Bored Tunnels at 3rd Ave. (below bus tunnel)
- C1d: Twin Bored Tunnel Routes at 4th/5th Ave. - East Portal
- C1e: Twin Bored Tunnel Routes at 4th/5th Ave. - South Portal
- C1f: Twin Bored Tunnel Route at I-5
- C2: Signature Bridge Across Elliott Bay from West Seattle
- C3: Elliott Bay Submerged Tunnel along Waterfront
- C4: I-5 Improvements to Accommodate a Portion of SR 99 Demand

¹⁴ Dropped in downtown waterfront segment of AWW Corridor from King Street to the Battery Street Tunnel

- C5: Elliott Bay Floating Tunnel along Waterfront Area
- C6: Signature Bridge from Stadium Area to Belltown via Elliott Bay
- C7: Existing 4th Avenue BNSF Tunnel Transitioning to Cut-and-Cover Tunnel
- C8a: Floating Bridge from Port of Seattle Property to Connect at Broad Street
- C8b: Floating Bridge from Port of Seattle Property to Connect at Seneca Street

D: Multimodal Solutions

None of these options were recommended to be dropped

E: Related Improvements (Combine with other Concepts)

- E1a: Add Missing Ramps at the S. Spokane St./Alaskan Way Interchange
- E1c: Add New Access at the Downtown Core
- E1e: Add S. Spokane Street Off-Ramp to 6th Avenue S. for Buses
- E1f: Add S. Spokane Street Off-Ramp to 4th Avenue S.
- E1g: Add Extension to the S. Spokane Street 4th Avenue On-Ramp
- E1h: Provide Southbound Access to SR 99 from West Seattle Bridge
- E2b: Extend Alaskan Way Viaduct Corridor to I-5 thru Mercer St. Corridor
- E2c: Extend SR 520 to Alaskan Way Viaduct Corridor
- E2d: Extend SR 99 Grade Separation over 1st Ave. S. Bridge to SR 509
- E2f¹⁵: Improve I-90/SR 519/SR 99 Connections
- E2g: Improve I-5/SR 99 Connection at S. Spokane Street
- E2h: Improve Waterfront Access between the West Seattle Bridge and Battery Street
- E2i: Locate Tunnel Portal at Roy Street to Reconnect Crossings at Thomas and Harrison
- E2j: Add Off-Ramp to Airport Way
- E2k: Re-utilize Battery Street Tunnel as a Vehicular Connection to Alaskan Way
- E3a: Add SR 99 Grade Separation Crossing between S. Atlantic and S. Spokane Streets
- E3b: Add Missing Ramps at S. Spokane St./Alaskan Way Interchange
- E3c: S. Hanford St. Ramps to/from SR 99 for General Traffic/Freight
- E3d: Improve East-West Freight Access between S. Spokane Street and S. Holgate Street
- E3e: Improve Broad Street Rail Crossing
- E3f: Move Truck Containers from Waterfront to I-90
- E3g: Incorporate Existing Railroad Tracks within the Cut-and-Cover Tunnel
- E5c: Retail, Residential, and Public Space with Aerial Structure
- E5d: Build Waterfront Pedestrian Park with Businesses

¹⁵ Improve I-90 connections is dropped, improve SR 519/SR 99 connections is carried forward

CONCEPTS RECOMMENDED TO BE CARRIED FORWARD

The following concepts are recommended to be carried forward for further evaluation in the project EIS.

A: AWV Improvements from S. Holgate Street to the Battery Street Tunnel

- A1b: Retrofit Existing Single-Level Structure
- A1d: Rebuild Existing Structure
- A2b: Two-Level Aerial Replacement - Existing Location
- A3a¹⁶: One-Level Aerial with Six Lanes - Over Existing
- A4a: Multi-Lane Boulevard Surface Roadway
- A4b: Multi-Lane Boulevard Surface Roadway with Sections of Tunnel and/or Overpasses
- A5a: One-Level Cut-and-Cover Tunnel Under Alaskan Way
- A9: Combine One-Level, Two-Way Bypass Tunnel With Two-Way Surface Arterial
- A10: Combine Two-Way Bypass Aerial with Two-Way Surface Arterial

B: Battery Street Tunnel Improvements

- B1a: Fire, Life and Safety Upgrade to the Existing Battery Street Tunnel
- B1b: Seismic Upgrade to the Battery Street Tunnel

C: Roadway Improvements Outside of the AWV Corridor

None of these options are recommended to be carried forward

D: Multimodal Solutions

- D1: Transportation System/Demand Management to Maximize Existing System
- D2: High Capacity Transit along Existing AWV Corridor with New Concept

E: Related Improvements (Combine with Other Concepts)

- *E1b: Improve Access at Stadium Area
- E1d: Improve Access at Battery St./Western Ave./Elliott Ave.
- *E2a: Add Connection to the South Lake Union Area
- *E2e: Improve Ballard/Interbay Connections

¹⁶ This option is being carried forward only in the southern section of the AWV Corridor.

E2f¹⁷: Improve I-90/SR 519/SR 99 Connections

E2l: Lowered Aurora/SR 99

E2m: Widened Mercer

E2n: Existing Mercer with Signals on SR 99 north of the Battery Street Tunnel

E4a: Add Ferry Traffic Queuing Area

E4b: Expand Pedestrian Connections between the Ferry Terminal and
Downtown

E4c: Improve Ferry Connections to AWV Corridor and Downtown

E5a: Improve Pedestrian Environment along Waterfront

E5b: Improve Pedestrian Connections between Waterfront and Downtown

* These options have been “included”, which means that the general concepts have been incorporated in one or more specific design options being carried forward for further analysis in the EIS.

¹⁷ The I-90 Connections is dropped, improve SR 519/SR 99 connections is carried forward

Appendix A: Design Concepts Developed in Phase 1 and Phase 2

DESIGN CONCEPTS DEVELOPED IN PHASE 1 AND 2

ROADWAY IMPROVEMENTS WITHIN THE EXISTING AWV CORRIDOR

- A1a: RETROFIT CONCEPT
- A1b: RETROFIT CONCEPT LIMITED TO PASSENGER VEHICLES AND TRANSIT
- A2a: TWO-LEVEL AERIAL REPLACEMENT – WEST OF EXISTING
- A2b: TWO-LEVEL AERIAL REPLACEMENT – EXISTING LOCATION
- A3a: ONE-LEVEL AERIAL WITH SIX LANES – OVER EXISTING
- A3b: ONE-LEVEL AERIAL WITH SIX LANES – WEST OF EXISTINGA
- A4a: MULTI-LANE BOULEVARD SURFACE ROADWAY
- A4b: MULTI-LANE BOULEVARD SURFACE ROADWAY WITH SECTIONS OF TUNNEL
- A5a: ONE-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY
- A5b: TWO-LEVEL CUT-AND-COVER TUNNEL UNDER ALASKAN WAY
- A6: COMBINE ONE-LEVEL ONE WAY AERIAL AND ONE WAY SURFACE ARTERIAL
- A7: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE-LEVEL ONE WAY AERIAL
- A8: COMBINE ONE-LEVEL ONE WAY TUNNEL AND ONE WAY SURFACE ARTERIAL
- A9: BORED TUNNELS UNDER ALASKAN WAY

ROADWAY IMPROVEMENTS OUTSIDE OF THE AWV CORRIDOR

- B1a: TWIN BORED TUNNELS AT WESTERN AVE.
- B1b: TWIN BORED TUNNEL ROUTES AT 1ST AVE. AND 2ND AVE.
- B1c: TWIN BORED TUNNELS AT 3RD AVE.
- B1d: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. – EAST PORTAL
- B1e: TWIN BORED TUNNEL ROUTES AT 4TH AVE. AND 5TH AVE. – SOUTH PORTAL
- B1f: TWIN BORED TUNNEL ROUTE AT I-5
- B2: SIGNATURE BRIDGE ACROSS ELLIOTT BAY FROM WEST SEATTLE
- B3: ELLIOTT BAY SUBMERGED TUNNEL ALONG WATERFRONT AREA
- B4: I-5 IMPROVEMENTS TO ACCOMMODATE A PORTION OF SR-99 DEMAND

- B5: ELLIOTT BAY FLOATING TUNNEL ALONG WATERFRONT AREA
- B6: SIGNATURE BRIDGE FROM STADIUM AREA TO BELLTOWN VIA ELLIOTT BAY
- B7: EXISTING 4TH AVENUE BNSF TUNNEL TRANSITIONING TO CUT-AND-COVER TUNNEL
- B8a: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT BROAD STREET
- B8b: FLOATING BRIDGE FROM PORT OF SEATTLE PROPERTY TO CONNECT AT SENECA STREET

MULTIMODAL SOLUTIONS

- C1: TRANSPORTATION SYSTEM/DEMAND MANAGEMENT TO MAXIMIZE EXISTING SYSTEM
- C2: HCT ALONG EXISTING AWV CORRIDOR WITH NEW CONCEPT
- C3: HCT ALONG NEW AWV CORRIDOR WITH NEW CONCEPT

RELATED IMPROVEMENTS

- D1a: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE
- D1b: IMPROVE ACCESS AT STADIUM AREA
- D1c: ADD NEW ACCESS AT THE DOWNTOWN CORE
- D1d: IMPROVE ACCESS AT BATTERY ST. / WESTERN AVE. / ELLIOTT AVE.
- D1e: ADD SOUTH SPOKANE STREET OFF-RAMP TO 6TH AVENUE FOR BUSES
- D1f: ADD SOUTH SPOKANE STREET OFF-RAMP TO 4TH AVENUE SOUTH
- D1g: ADD EXTENSION TO THE SOUTH SPOKANE STREET 4TH AVENUE ON-RAMP
- D1h: PROVIDE SOUTHBOUND ACCESS TO SR 99 FROM WEST SEATTLE BRIDGE
- D2a: ADD CONNECTION TO SOUTH LAKE UNION AREA
- D2b: EXTEND ALASKAN WAY CORRIDOR TO I-5 THRU MERCER ST. CORRIDOR
- D2c: EXTEND SR 520 TO ALASKAN WAY CORRIDOR
- D2d: EXTEND SR 99 GRADE SEPARATION OVER 1ST AVE. S. BR. TO SR 509
- D2e: IMPROVE BALLARD / INTERBAY CONNECTIONS
- D2f: IMPROVE I-90/SR 519 / SR 99 CONNECTIONS
- D2g: IMPROVE I-5 / SR 99 CONNECTION AT SOUTH SPOKANE STREET

- D2h: IMPROVE WATERFRONT ACCESS BETWEEN THE WEST SEATTLE BRIDGE AND BATTERY STREET
- D2i: LOCATE TUNNEL PORTAL AT ROY STREET TO RECONNECT CROSSINGS AT THOMAS AND HARRISON
- D2j: ADD OFF-RAMP TO AIRPORT WAY
- D2k: RE-UTILIZE BATTERY STREET TUNNEL AS A VEHICULAR CONNECTION TO ALASKAN WAY
- D3a: SR 99 GRADE SEPARATION CROSSING BETWEEN ATLANTIC AND SOUTH SPOKANE STREETS
- D3b: ADD MISSING RAMPS AT SOUTH SPOKANE ST. / ALASKAN WAY INTERCHANGE
- D3c: SOUTH HANFORD ST. RAMPS TO/FROM SR 99 FOR GENERAL TRAFFIC / FREIGHT
- D3d: IMPROVE EAST-WEST FREIGHT ACCESS BETWEEN SOUTH SPOKANE ST. AND SOUTH HOLGATE ST.
- D3e: IMPROVE BROAD STREET RAIL CROSSING
- D3f: MOVE TRUCK CONTAINERS FROM WATERFRONT TO I-90
- D3g: INCORPORATE EXISTING RAILROAD TRACKS WITHIN THE CUT-AND-COVER TUNNEL
- D4a: ADD FERRY TRAFFIC QUEUING AREA ON EXISTING ALASKAN WAY S
- D4b: EXPAND PEDESTRIAN CONNECTION BETWEEN FERRY TERMINAL AND DOWNTOWN
- D4c: IMPROVE FERRY CONNECTION TO AWV CORRIDOR AND DOWNTOWN
- D5a: IMPROVE PEDESTRIAN ENVIRONMENT ALONG WATERFRONT
- D5b: IMPROVE PEDESTRIAN CONNECTION BETWEEN WATERFRONT AND DOWNTOWN
- D5c: RETAIL, RESIDENTIAL, AND PUBLIC SPACE WITH AERIAL STRUCTURE
- D5d: BUILD WATERFRONT PEDESTRIAN PARK WITH BUSINESS

Appendix B: Screening Evaluation Table

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 1 - An alternative must provide facilities that meet current seismic design standards ¹ .		
A. Meets Current Seismic Standards	An alternative meets the current WSDOT and AASHTO seismic design standards.	Note the characteristic(s) of an alternative that appear seismically vulnerable.
B. Improves Integrity of Seawall	An alternative must improve the structural integrity of the existing Alaskan Way Seawall.	Note alternatives where structural improvements to the existing seawall are not proposed or would be precluded. Note areas (if any) where proposed seawall improvements would meet less stringent seismic standards than improvements for the roadway facility.

¹ Goals 1 and 2 must be met for any design concept to be advanced. If it does not meet goals 1 and 2, it will be dropped from consideration without further evaluation.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 2 - An alternative must maintain the current transportation functions of the Alaskan Way Viaduct Corridor ¹ .		
A. Transportation Functions	An alternative must maintain transportation-related functions including movement of people, freight, and goods to and from the central downtown core; between manufacturing and industrial centers, and through traffic on SR 99.	<p>Note the transportation functions that cannot be provided by an alternative. Specifically the movement of people, freight, and goods.</p> <ul style="list-style-type: none"> • To and from downtown • Between the Duwamish industrial area and Ballard/Interbay • Through downtown

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 3 - An alternative should not further degrade the operation of other major transportation facilities.		
A. Major Transportation Facilities	An alternative should not further degrade the operation of other major transportation facilities. An alternative could include the possibility of additional transit service and the use of TDM/TSM measures to maintain mobility.	List the location(s) where an alternative would cause degradation in operations and describe the magnitude of that impact to existing major transportation facilities.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 4 - An alternative should improve traffic safety.		
A. Roadway Design Standards	An alternative should improve traffic safety by meeting WSDOT approved roadway design standards for lane widths, shoulder widths, and ramps.	List the location(s) where an alternative does not meet roadway design standards and briefly describe the safety implications of not meeting the standards.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 5 - An alternative should maintain regional transportation linkages.		
A. Regional Transportation Projects	<p>An alternative should integrate functionally with other transportation projects currently underway or planned.</p> <p>Planned projects may include SR 519, Spokane Street Viaduct Widening Project, and SR 509.</p>	List the transportation system project(s) that are precluded or restricted.
B. Regional Linkages	An alternative should maintain existing regional linkages to I-5, SR 520, and the Mercer Corridor.	List the transportation system linkages that are precluded or restricted.
C. Ferry System Access	An alternative must maintain vehicular and pedestrian access to the ferry system.	Note how vehicular and pedestrian access to the ferry system would be precluded or restricted by an alternative.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 6 - An alternative should support bicycle and pedestrian accessibility and mobility.		
A. Pedestrian Accessibility and Mobility	An alternative should allow pedestrian movement between the waterfront, downtown core, stadiums, and Pike Place Market area.	Note areas in listed locations where pedestrian movement would be substantially impeded or precluded.
B. Bicycle Accessibility and Mobility	An alternative should allow bicycle travel along the corridor with connections to bicycle routes.	Note areas along the corridor where bicycle travel would be substantially impeded or precluded.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 7 - An alternative should be compatible with local, express, and high-capacity transit.		
A. Transit Access	An alternative should support access for transit to and from the corridor with connections to multiple transit modes.	List areas where an alternative does not support transit access.
B. Transit Compatibility	An alternative should be compatible with plans for local, express, and high capacity transit.	List areas where an alternative would not be compatible with plans for local, express, and high capacity transit.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 8 - An alternative should support land use and shoreline plans and policies pertaining to development of the downtown Seattle waterfront.		
A. Land Use and Shoreline Plans	An alternative should support land use and shoreline plans and policies related to the downtown urban waterfront.	List and briefly describe areas that are not compatible with existing land use and shoreline plans and policies.
B. Waterfront Connections	An alternative should allow for expanded visual, physical, and aesthetic connections between downtown Seattle and the waterfront.	List areas where expanded visual, physical, and aesthetic connections would be precluded.
C. Public Access	An alternative should maintain or improve public access to and along the waterfront.	List and briefly describe area(s) where continued development of the waterfront for public access would be inhibited.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
GOAL 9 - An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall.		
A. Marine and Intertidal Habitat	An alternative should support improved habitat in the marine and intertidal environment.	Briefly describe how an alternative could inhibit or preclude habitat improvements.

ALASKAN WAY VIADUCT AND SEAWALL PROJECT

SCREENING CRITERIA EVALUATION TABLE

EVALUATION INDICATOR	EVALUATION CRITERIA	EVALUATION METHOD
----------------------	---------------------	-------------------

GOAL 10 - An alternative should rely on proven construction methods, minimize construction duration, and promote effective traffic management during construction.		
A. Construction Time	An alternative should minimize the construction timeframe.	List and briefly describe the area(s) where the length of construction time appears to have a severe impact.
B. Construction Methods	An alternative should rely on proven construction methods to avoid or minimize construction risks.	List and briefly describe the area(s) where adverse construction risks appear particularly severe.
C. Traffic Management	An alternative should promote effective traffic management within the corridor during construction.	List and briefly describe the area(s) where adverse traffic management impacts appear particularly severe.

Appendix C: Screening Results Table

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A. AWV IMPROVEMENTS FROM S. HOLGATE STREET TO THE BATTERY STREET TUNNEL			
A1a	Retrofit Existing Double-Level Structure	DROPPED	Justification: <ul style="list-style-type: none"> ➤ An April 2003 report entitled <i>Rebuild/Retrofit 500, 500-Year Design Earthquake</i>, written by Parsons, Brinckerhoff, Quade, & Douglas, Inc. compares the retrofit and rebuild design concepts for a current standard design level earthquake. The comparison clearly demonstrated that the rebuild design option for the double-level structure from S. Holgate Street to Pike Street is superior to retrofitting the existing double-level structure when seismic performance, aesthetics, cost, and risk are balanced. Therefore, the project purpose and screening criteria goals are better met with Rebuild option A1d, Rebuild Existing Structure.
A1b	Retrofit Existing Single-Level Structure	CARRIED FORWARD	

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A1c	Retrofit Existing Structure - Limited to Passenger Vehicles and Transit	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 2 – This option would create unbalanced access between freight, passenger, and vehicular traffic. It would limit linkages for freight traffic traveling to and from Downtown, through Downtown, and between the Duwamish industrial area and Ballard/Interbay area. ➤ An April 2003 report entitled <i>Rebuild/Retrofit 500, 500-Year Design Earthquake</i>, written by Parsons, Brinckerhoff, Quade, & Douglas, Inc. compares the retrofit and rebuild design concepts for a current standard design level earthquake. The comparison clearly demonstrated that the rebuild design option for the double-level structure from S. Holgate Street to Pike Street is superior to retrofitting the existing double-level structure when seismic performance, aesthetics, cost, and risk are balanced. Therefore, the project purpose and screening criteria goals are better met with Rebuild option A1d, Rebuild Existing Structure.
A1d	Rebuild Existing Structure	CARRIED FORWARD	

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A2a	Two-Level Aerial Replacement – West of Existing	DROPPED	Justification: <ul style="list-style-type: none"> ➤ Goal 8 – This option would move visual impacts of the Viaduct structure closer to the waterfront, which would not be compatible with existing land use and shoreline plans. ➤ The intent of this design concept and the project purpose and screening criteria goals are better met with Aerial options A1d, Rebuild Existing Structure or A2b, Two-Level Aerial Replacement – Existing Location. These options are being carried forward for further evaluation in the EIS.
A2b	Two-Level Aerial Replacement – Existing Location	CARRIED FORWARD	

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A2c	Enclosed Two-Level Aerial Replacement – West of Existing Location	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 8 – This option would move visual impacts of the Viaduct structure closer to the waterfront and the enclosed structure would approximately nine stories (90 feet) in height. This design option would not allow for improved visual, physical, and aesthetic connections between downtown and the waterfront, and would not be compatible with existing land use and shoreline plans. ➤ Goal 10 – Construction techniques for this structure are unknown and state-of-the-art, increasing overall project risk. In addition, it is unknown whether or not this option is technically feasible to properly engineer for fire, life, and safety risks. Long-term operations and maintenance of the enclosed structure is also a concern. ➤ The project purpose and screening criteria goals are better met with options A1d, Rebuild Existing Structure; A2b, Two-Level Aerial Replacement – Existing Location; A5a, One-Level Cut-and Cover Tunnel; or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These options are being carried forward for further evaluation in the EIS.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

A3a	One-Level Aerial with Six Lanes – Over Existing	CARRIED FORWARD IN SOUTH END ONLY	<p>Justification:</p> <p>This option is carried forward for only the south end of the project area from S. Holgate Street to King Street. In the downtown waterfront segment from King Street to the Battery Street Tunnel, this option has been dropped for the following reasons.</p> <ul style="list-style-type: none"> ➤ Goal 8 – In the downtown waterfront portion of the project area, the existing waterfront view corridor would be substantially impacted by this design option due to the width required for a one-level structure. This would not be consistent with existing land use and shoreline plans, and would not allow for improved visual, physical, and aesthetic connections between downtown and the waterfront. However, from S. Holgate Street to S. Royal Brougham Way, views are not as sensitive due to industrial land uses, therefore, in this segment of the project area, a single-level structure would be feasible. ➤ In the downtown waterfront area, the project purpose and screening criteria goals are better met by options A1d, Rebuild Existing Structure or A2b, Two-Level Aerial Replacement – Existing Location. However, this option meets the screening criteria goals for the southern portion of the project area, thus for the southern portion of the project area it will be carried forward in the EIS.
-----	---	-----------------------------------	--

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A3b	One-Level Aerial with Six Lanes – West of Existing	DROPPED	<p>Justification:</p> <p><i>South End of Project Area</i></p> <ul style="list-style-type: none"> ➤ From S. Holgate Street to approximately King Street, this option would require the purchase and relocation of railroad facilities and Port of Seattle Property. The acquisition and/or displacement of these activities would not be required by option A3a, One-Level Aerial with Six Lanes- Over Existing. Therefore, in the southern section of the project area the intent of this design concept and the project purpose and screening criteria goals are better met by option A3a. <p><i>Central Portion of Project Area</i></p> <ul style="list-style-type: none"> ➤ Goal 8 – From King Street to the Battery Street Tunnel the existing waterfront view corridor would be substantially impacted by this design option due to the width required for a one-level structure. This would not be consistent with existing land use and shoreline plans, and would not allow for improved visual, physical, and aesthetic connections between downtown and the waterfront. ➤ In the downtown waterfront area, the project purpose and screening criteria goals are better met by options A1d, Rebuild Existing Structure or A2b, Two-Level Aerial Replacement – Existing Location.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A4a	Multi-Lane Boulevard Surface Roadway	CARRIED FORWARD	
A4b	Multi-Lane Boulevard Surface Roadway with Sections of Tunnel and/or Overpasses	CARRIED FORWARD	
A5a	One-Level Cut-and-Cover Tunnel Under Alaskan Way	CARRIED FORWARD	
A5b	Two-Level Cut-and-Cover Tunnel Concept under Alaskan Way	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – This option carries more construction risk than option A5a, One-Level Cut-and-Cover Tunnel because deeper underground tunnel construction would be required. In addition, traffic management during construction would be more difficult with this option as compared with option A5a. ➤ The intent of this design concept and the project purpose and screening criteria goals can be better met by option A5a, One-Level Cut-and-Cover Tunnel.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A6	Combine One-Level, One-Way Aerial with One-Way Surface Arterial	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option would provide unbalanced access and travel times between northbound and southbound traffic. The direction of traffic traveling on the surface arterial would have increased travel times, but more downtown access through surface street connections. The direction of traffic traveling on the aerial structure would have fewer possible downtown access points, but travel times would be comparable to existing conditions. The intent of this design concept and the project purpose and screening criteria goals can be better met by other design options such as A2b, Two-Level Aerial Replacement – Existing Location and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial.
A7	Combine One-Level, One-Way Tunnel and One-Level, One-Way Aerial	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ The intent of this design concept and the project purpose and screening criteria goals can be better met by other design options such as A2b, Two-Level Aerial Replacement – Existing Location; A5a, One-Level Cut-and Cover Tunnel; and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A8	Combine One-Level, One-Way Tunnel and One-Way Surface Arterial	DROPPED	Justification: <ul style="list-style-type: none"> ➤ This option would provide unbalanced access and travel times between northbound and southbound traffic. The direction of traffic traveling on the surface arterial would likely have increased travel times, but more downtown access through surface street connections. The direction of traffic traveling in the tunnel would have fewer possible access points to the waterfront, downtown and Ballard/Interbay, but travel times would likely be comparable to existing conditions. The intent of this design concept and the project purpose and screening criteria goals can be better met by other design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial.
A9	Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial	CARRIED FORWARD	
A10	Combine a Two-Way Bypass Aerial with a Two-Way Surface Arterial	CARRIED FORWARD	

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
A11	Bored Tunnels under Alaskan Way	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ In addition to construction risk, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and-Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

B. BATTERY STREET TUNNEL IMPROVEMENTS WITHIN THE AWV CORRIDOR			
B1a	Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel	CARRIED FORWARD	
B1b	Seismic Upgrade to the Existing Battery Street Tunnel	CARRIED FORWARD	
B2	Two-Level Cut-and-Cover Tunnel through Belltown	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing a cut-and-cover tunnel through Belltown would be high because the width of the tunnel would come very close to existing footings of both historic and high-rise buildings. ➤ This concept is dropped because conceptual engineering analysis of this option revealed that it would cost more to build a new Battery Street Tunnel than what could reasonably be funded in the foreseeable future. Therefore, the project purpose and screening criteria goals can be better met by the No Action option to continue utilizing the Battery Street Tunnel; option B1a, Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel; and/or option B1b Seismic Upgrade to the Existing Battery Street Tunnel.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
B3a	Bored or Mined Tunnel Under Belltown	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored or mined tunnels would be high, due to the size of the tunnels required to accommodate 3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ This concept is dropped because conceptual engineering analysis of this option revealed that it would cost more to build a new Battery Street Tunnel than what could reasonably be funded in the foreseeable future. Therefore, the project purpose and screening criteria goals can be better met by the No Action option to continue utilizing the Battery Street Tunnel; option B1a, Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel; and/or option B1b Seismic Upgrade to the Existing Battery Street Tunnel.
B3b	Bored or Mined Tunnels Under Belltown	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored or mined tunnels would be high, due to the size of the tunnels required to accommodate 3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ This concept is dropped because conceptual engineering analysis of this option revealed that it would cost more to build a new Battery Street Tunnel than what could reasonably be funded in the foreseeable future. Therefore, the project purpose and screening criteria goals can be better met by the No Action option to continue utilizing the Battery Street Tunnel; option B1a, Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel; and/or option B1b Seismic Upgrade to the Existing Battery Street Tunnel.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

C. ROADWAY IMPROVEMENTS OUTSIDE OF THE AWV CORRIDOR			
C1a	Twin Bored Tunnels at Western Ave.	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ In addition to construction risk, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C1b	Twin Bored Tunnel Routes at 1 ST and 2 ND Ave.	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ In addition to construction risk, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C1c	Twin Bored Tunnels at 3 RD Ave (below bus tunnel)	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C1d	Twin Bored Tunnel Routes at 4 TH and 5 TH Ave. - East Portal	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C1e	Twin Bored Tunnel Routes at 4 TH and 5 TH Ave. - South Portal	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and the project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C1f	Twin Bored Tunnel Route at I-5	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 2 - This concept would not maintain the current transportation functions of the AWV Corridor, nor would it meet the travel demand currently served by the AWV Corridor. This option would eliminate existing access for through traffic traveling between the Duwamish industrial area and Ballard/Interbay. ➤ Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2-3 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States. ➤ In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, intent of this design concept and the project purpose and screening criteria goals can be better met by other design options such as A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C2	Signature Bridge Across Elliott Bay from West Seattle	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 2 – This option would only provide service to/from West Seattle, and would not serve communities to the north and south of Seattle. Therefore, this option would not maintain the transportation functions within the AWW Corridor. ➤ Goal 3 – Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a bridge. ➤ Goal 5– The AWW Corridor would lose some linkages with SR 520, and the Mercer Corridor. ➤ Goal 8 - The existing waterfront view corridor would be substantially impacted if a new bridge across Elliott Bay were constructed. This would not be consistent with existing land use and shoreline plans. ➤ Goal 9 – A signature bridge across Elliott Bay would create additional overwater shading, which would reduce fish and wildlife habitat. ➤ In addition, the submerged tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C3	Elliott Bay Submerged Tunnel along Waterfront Area	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 3 – Marine transportation in the Port of Seattle and Washington State Ferry Terminal would be degraded by the addition of a submerged tunnel along the waterfront. ➤ Goal 5 – Ferry system access would be restricted. ➤ Goal 9 – Submerged tunnel construction and long-term operation would reduce overall fish and wildlife habitat. ➤ Goal 10 – Requires complicated, high-risk construction methods for deep water tunnel construction ➤ In addition, the submerged tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C4	I-5 Improvements to Accommodate a Portion of SR 99 Demand	DROPPED	<p>Justification</p> <ul style="list-style-type: none"> ➤ Goal 2 – This option would not maintain the transportation functions within the AWW Corridor that provide for the movement of people, freight, and goods traveling to and from downtown, between the Duwamish industrial area and Ballard/Interbay, and through downtown. ➤ In addition, this concept would not meet the project purpose and need. It would not address the seismic deficiencies of the existing Seawall and Viaduct unless paired with separate Viaduct and Seawall options.
C5	Elliott Bay Floating Tunnel along Waterfront Area	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 3 – Marine transportation in the Port of Seattle and Washington State Ferry Terminal would be degraded by the addition of a submerged tunnel along the waterfront. ➤ Goal 9 – Floating tunnel construction and long-term operation would reduce fish and wildlife habitat. ➤ Goal 10 – Requires complicated, high-risk construction methods for deep water tunnel construction ➤ In addition, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C6	Signature Bridge from Stadium Area to Belltown via Elliott Bay	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 3 – Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a bridge. ➤ Goal 8 - The existing waterfront view corridor would be substantially impacted if a new bridge across Elliott Bay were constructed. This would not be consistent with existing land use and shoreline plans. ➤ Goal 9 – Construction and long-term operation of a bridge over Elliott Bay would create overwater shading, which would reduce fish and wildlife habitat. ➤ In addition, this concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.
C7	Existing 4 th Avenue BNSF Tunnel Transitioning to Cut-and-Cover Tunnel	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 2 – This option would restrict the transport of BNSF freight throughout the AWV Corridor. The existing BNSF tunnel is constrained, and it is likely that transportation functions currently provided by the AWV Corridor would not be maintained. ➤ Goal 3 - Operations of the BNSF Railroad would be degraded by this option, and tunnel capacity is constrained. ➤ In addition, this concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
C8a	Floating Bridge from Port of Seattle Property to Connect at Broad Street	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 3 - Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a floating bridge. ➤ Goal 5 – Ferry system access would be restricted. ➤ Goal 9 – Construction and long-term operation of a floating bridge along Elliott Bay would reduce fish and wildlife habitat. ➤ In addition, this concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option.
C8b	Floating Bridge from Port of Seattle Property to Connect at Seneca Street	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ Goal 3 - Marine transportation in the Port of Seattle and at the Washington State Ferry Terminal would be degraded by the addition of a floating bridge. ➤ Goal 5 – Ferry system access would be restricted. ➤ Goal 9 – Construction and long-term operation of a floating bridge along Elliott Bay would reduce fish and wildlife habitat. ➤ In addition, this concept would not address the seismic deficiencies of the existing Seawall and the Viaduct north of Seneca unless it is paired with additional design options.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

D. MULTIMODAL SOLUTIONS			
D1	Transportation System/Demand Management (TSM/TDM) to Maximize Existing System	CARRIED FORWARD	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ TSM/TDM measures are being carried forward as components of all alternatives being evaluated in the EIS. An additional description of the range of TSM/TDM measures are contained in the December 2002 document entitled <i>Draft Flexible Transportation Package: An Integrated Program of Demand and System Management Strategies</i>, written by Parsons, Brinckerhoff, Quade, and Douglas, Inc.
D2	High Capacity Transit along Existing AWV Corridor with New Concept	CARRIED FORWARD	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ Increased transit will be considered as part of the alternatives being evaluated in the EIS. An additional description of the range of transit measures that will be incorporated are contained in the December 2002 document entitled <i>Draft Flexible Transportation Package: An Integrated Program of Demand and System Management Strategies</i>, written by Parsons, Brinckerhoff, Quade, and Douglas, Inc.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

E. RELATED IMPROVEMENTS (WOULD BE COMBINED WITH OTHER CONCEPTS)			
E1	Access Improvement Concepts		
E1a	Add Missing Ramps at the S. Spokane St./Alaskan Way Interchange	DROPPED	Justification: <ul style="list-style-type: none"> ➤ This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.
E1b	Improve Access at Stadium Area	INCLUDED ¹	Discussion: <ul style="list-style-type: none"> ➤ Existing access to the Viaduct is currently limited at the Stadium Area to a northbound on-ramp at Railroad Way S. Options to improve Stadium area access are related to design option E2f, Improve I-90/SR 519/SR 99 Connections, which is supported by screening criteria Goal 5²
E1c	Add New Access at the Downtown Core	DROPPED	Justification: <ul style="list-style-type: none"> ➤ This option is not directly related to the purpose of the project. Most of the downtown; however, design options that would preclude additional design options would not preclude new access into access into downtown (such as design option A5a, One-Level Cut-and-Cover Tunnel Under Existing Alaskan Way) will be disclosed in the EIS.

¹ For the purposes of this screening process the term “included” means that the general concept has been incorporated in one or more specific design options being carried forward for further analysis in the EIS. The discussion section describes the specific design options where the concept has been incorporated.

² Goal 5 requires the project to maintain regional transportation linkages. Specifically, Goal 5 states that an alternative should integrate functional with planned transportation projects such as SR 519.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
E1d	Improve the Access at Battery St./Western Ave./ and Elliott Ave.	CARRIED FORWARD	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ The existing ramps at Battery Street/Western Avenue/and Elliott Avenue are nonstandard and have safety deficiencies. Options to improve these deficiencies are supported by screening criteria Goal 4³ and will be incorporated where feasible into design plans carried forward into the EIS. See also concept E2e, Improve Ballard/Interbay Connections and E3e, Improve Broad Street Rail Crossing.
E1e	Add S. Spokane Street Off-Ramp to 6 th Avenue S. for Buses	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.
E1f	Add S. Spokane Street Off-Ramp to 4 th Avenue S.	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.
E1g	Add Extension to the S. Spokane Street 4 th Avenue On-Ramp	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.
E1h	Provide Southbound Access to SR 99 from West Seattle Bridge	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

³ Goal 4 states that the project should improve traffic safety.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
E2	Regional Connection Concepts		
E2a	Add Connection to South Lake Union Area	INCLUDED ⁴	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ The option to add or improve connections to the South Lake Union Area north of the Battery Street Tunnel will be included into specific design options being carried forward into the EIS. These specific design options include E21, Lowered Aurora/SR 99; E2m, Widened Mercer; and E2n, Existing Mercer with Signals on SR 99 North of the Battery Street Tunnel.
E2b	Extend Alaskan Way Viaduct Corridor to I-5 thru Mercer St. Corridor	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.
E2c	Extend SR 520 to Alaskan Way Viaduct Corridor	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.
E2d	Extend SR 99 Grade Separation over 1 st Ave. S. Bridge to SR 509	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

⁴ For the purposes of this screening process the term “included” means that the general concept has been incorporated in one or more specific design options being carried forward for further analysis in the EIS. The discussion section describes the specific design options where the concept has been incorporated.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
E2e	Improve Ballard / Interbay Connections	INCLUDED ⁵	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ The existing ramps providing the Ballard/Interbay connection are located at Western Avenue and Elliott Avenue. These ramps are nonstandard and have safety deficiencies. Options to improve these deficiencies are supported by screening criteria Goal 4⁶ and will be incorporated where feasible into design plans carried forward into the EIS. Specifically, this concept is incorporated into design option E1d, Improve the Access at Battery Street/Western Avenue/ and Elliott Avenue.
E2f	Improve I-90 / SR 519 / SR 99 Connections	<p>I-90 Connections DROPPED</p> <p>SR 519 Connections CARRIED FORWARD</p>	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ The concept of improving the connections between SR 99 and I-90 and between I-90 and SR 519 is not precluded; however, it is not related to the purpose of the project. ➤ The concept of improving the connection between SR 99 and SR 519 is supported by Goal 5⁷ of the screening criteria and is being incorporated into design options being carried forward into the EIS.
E2g	Improve I-5 / SR 99 Connection at S. Spokane Street	DROPPED	<p>Justification:</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project.

⁵ For the purposes of this screening process the term “included” means that the general concept has been incorporated in one or more specific design options being carried forward for further analysis in the EIS. The Discussion section describes the specific design options where the concept has been incorporated.

⁶ Goal 4 states that the project should improve traffic safety.

⁷ Goal 5 requires the project to maintain regional transportation linkages. Specifically, Goal 5 states that an alternative should integrate functional with planned transportation projects such as SR 519.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
E2h	Improve Waterfront Access between the West Seattle Bridge and Battery Street	DROPPED	<p>Justification</p> <ul style="list-style-type: none"> ➤ This option is not precluded, but is dropped because it is not directly related to the purpose of the project. However, the intent of all of the options being carried forward is to improve waterfront access, where feasible, to and from downtown and along the waterfront.
E2i	Locate Tunnel Portal at Roy Street to Reconnect Crossings at Thomas and Harrison	DROPPED	<p>Justification</p> <ul style="list-style-type: none"> ➤ This concept requires the construction of a new tunnel to replace the Battery Street Tunnel, which is an option that has been dropped because the option to continue utilizing the Battery Street Tunnel accomplishes a similar goal as constructing a new tunnel with fewer risks and lower costs. Conceptual engineering analysis of this option revealed that it would cost more than what could reasonably be funded in the foreseeable future.
E2j	Add Off-Ramp to Airport Way	DROPPED	<p>Justification</p> <ul style="list-style-type: none"> ➤ This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.
E2k	Re-utilize Battery Street Tunnel as a Vehicular Connection to Alaskan Way (assumes new tunnel replaces the Battery Street Tunnel)	DROPPED	<p>Justification</p> <ul style="list-style-type: none"> ➤ This option has been dropped because the current project proposes to use the existing Battery Street Tunnel as part of any alternative to be evaluated in the EIS. This design concept was originally developed as an alternative use to the existing Battery Street Tunnel if a new tunnel under Belltown were created as part of the project. Conceptual engineering analysis of this option to construct a new Battery Street Tunnel revealed that it would cost more than what could reasonably be funded in the foreseeable future; therefore, this design option has been dropped.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
E2l	Lowered Aurora/SR 99	CARRIED FORWARD	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ This concept would provide access along SR 99 north of the Battery Street Tunnel in all directions (rather than just to/from the west southbound, and to/from the east northbound). It would improve traffic operations of SR 99 north of the Battery Street Tunnel by eliminating side-street connections and consolidating access to a new interchange. It would also help to improve the connection between I-5 and SR 99.
E2m	Widened Mercer	CARRIED FORWARD	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ Along SR 99 north of the Battery Street Tunnel, this option would allow for reconfiguration of the adjacent street system into a regular grid, improving street connections and operations. This option may provide an advantage to traffic movement during AWW construction.
E2n	Existing Mercer with Signals on SR 99 north of the Battery Street Tunnel	CARRIED FORWARD	<p>Discussion:</p> <ul style="list-style-type: none"> ➤ Along SR 99 north of the Battery Street Tunnel, this option would improve access between the street grid and SR 99 by allowing access to both northbound and southbound lanes from cross streets. In addition, this option would allow for reconfiguration of the adjacent street system into a regular street grid.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

E3	Freight Improvement Concepts		
E3a	Add SR 99 Grade Separation Crossing Between S. Atlantic and S. Spokane Streets	DROPPED	Justification ➤ This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.
E3b	Add Missing Ramps at S. Spokane St./Alaskan Way Interchange	DROPPED	Justification ➤ This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.
E3c	S. Hanford St. Ramps to/from SR 99 for General Traffic/Freight	DROPPED	Justification ➤ This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.
E3d	Improve East - West Freight Access between S. Spokane Street and S. Holgate Street	DROPPED	Justification ➤ This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.
E3e	Improve Broad Street Rail Crossing	DROPPED	Justification: ➤ This option has independent utility ⁸ , and it will be constructed separately.

⁸ Independent utility is defined in FHWA November 5, 1993 guidance as being a usable and reasonable expenditure even if no additional transportation improvements in the area are made

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		
E3f	Move Truck Containers from Waterfront to I-90	DROPPED	Justification: <ul style="list-style-type: none">➤ This concept is not precluded, but is dropped because it is not directly related to the purpose of the project.
E3g	Incorporate Existing Railroad Tracks within the Cut-and-Cover Tunnel	DROPPED	Justification: <ul style="list-style-type: none">➤ This concept is not directly related to the purpose of the project.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

E4 Ferry Access Improvement Concepts			
E4a	Add Ferry Traffic Queuing Area	CARRIED FORWARD	Discussion: ➤ If AWV design options limit possible locations for ferries queuing/holding, then ferry queuing/holding areas will be identified as mitigation in the EIS.
E4b	Expand Pedestrian Connections between the Ferry Terminal and Downtown	CARRIED FORWARD	Discussion: ➤ The concept of expanding pedestrian connections between the ferry terminal and downtown will be a component of all alternatives evaluated in the EIS in support of screening goals 5, 6, and 7 ⁹ .
E4c	Improve Ferry Connections to AWV Corridor and Downtown	CARRIED FORWARD	Discussion: ➤ The concept of improving ferry connections between the ferry terminal and downtown will be a component of alternatives evaluated in the EIS in support of screening goals 5, 6, and 7 ⁹ .

⁹ Goal 5 states that alternatives should maintain regional transportation linkages (specifically linkages to ferries). Goal 6 states that alternatives should support pedestrian accessibility. Goal 7 states that alternatives should be compatible with local transit, which includes ferries.

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROJECT

SCREENING RESULTS TABLE

CONCEPT		STATUS	COMMENTS
NO.	DESCRIPTION		

E5	Urban Design Concepts		
E5a	Improve Pedestrian Environment Along Waterfront	CARRIED FORWARD	Discussion: ➤ The concept of improving pedestrian connections is being coupled with the urban design component of all alternatives evaluated in the EIS.
E5b	Improve Pedestrian Connections between Waterfront and Downtown	CARRIED FORWARD	Discussion: ➤ The concept of improving pedestrian connections is being coupled with the urban design component of all alternatives evaluated in the EIS.
E5c	Retail, Residential, and Public Space with Aerial Structure	DROPPED	Justification: ➤ This concept not precluded by any of the aerial structure design options. An urban design plan incorporating public space will be presented for each alternative considered in the EIS. The EIS will not specifically analyze a design concept incorporating retail and residential space.
E5d	Build Waterfront Pedestrian Park with Businesses	DROPPED	Justification: ➤ This concept not precluded by any of the aerial structure design options. An urban design plan incorporating public space will be presented for each alternative considered in the EIS. The EIS will not specifically analyze a design concept incorporating retail and residential space.

Appendix D: Screening Results Summary Table

**Alaskan Way Viaduct and Seawall Replacement Project
Screening Results Summary Table**

	Concept	In EIS	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Goal 8	Goal 9	Goal 10	Other
A	AWV Improvements from S Holgate Street to the Battery Street Tunnel												
A1a	Retrofit Existing Double-Level Structure												●
A1b	Retrofit Existing Single-Level Structure	●											
A1c	Retrofit Existing Structure – Limited to Passenger Vehicles and Transit			●			●						●
A1d	Rebuild Existing Structure	●											
A2a	Two-Level Aerial Replacement – West of Existing									●			●
A2b	Two-Level Aerial Replacement – Existing Location	●											
A2c	Enclosed Two-Level Aerial Replacement – West of Existing Location									●		●	●
A3a	One-Level Aerial with Six Lanes – Over Existing (Central Waterfront)									●			●
	One-Level Aerial with Six Lanes – Over Existing (South End)	●											
A3b	One-Level Aerial with Six Lanes – West of Existing									●			●
A4a	Multi-Lane Boulevard Surface Roadway	●											
A4b	Multi-Lane Boulevard Surface Roadway with Sections of Tunnel and/or Overpasses	●											
A5a	One-Level Cut-and-Cover Tunnel Under Alaskan Way	●											
A5b	Two-Level Cut-and-Cover Tunnel Concept under Alaskan Way											●	●
A6	Combine One-Level, One-Way Aerial with One-Way Surface Arterial												●
A7	Combine One-Level, One-Way Tunnel and One-Level, One-Way Aerial												●
A8	Combine One-Level, One-Way Tunnel and One-Way Surface Arterial												●
A9	Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial	●											

**Alaskan Way Viaduct and Seawall Replacement Project
Screening Results Summary Table**

	Concept	In EIS	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Goal 8	Goal 9	Goal 10	Other
A10	Combine a Two-Way Bypass Aerial with a Two-Way Surface Arterial	●											
A11	Bored Tunnels under Alaskan Way											●	●
B Battery Street Tunnel Improvements Within the AWW Corridor													
B1a	Fire, Life, and Safety Upgrade to the Existing Battery Street Tunnel	●											
B1b	Seismic Upgrade to the Existing Battery Street Tunnel	●											
B2	Two-Level Cut-and-Cover Tunnel through Belltown											●	●
B3a	Bored or Mined Tunnel Under Belltown											●	●
B3b	Bored or Mined Tunnels Under Belltown											●	●
C Roadway Improvements Outside of the AWW Corridor													
C1a	Twin Bored Tunnels at Western Avenue											●	●
C1b	Twin Bored Tunnel Routes at 1st Ave. and 2nd Ave.											●	●
C1c	Twin Bored Tunnels at 3rd Avenue			●								●	●
C1d	Twin Bored Tunnel Routes at 4th and 5th Avenue – East Portal			●								●	●
C1e	Twin Bored Tunnel Routes at 4th and 5th Avenue – South Portal			●								●	●
C1f	Twin Bored Tunnel Route at I-5			●								●	●
C2	Signature Bridge Across Elliott Bay from West Seattle			●	●		●			●	●		
C3	Elliott Bay Submerged Tunnel along Waterfront Area				●		●				●	●	●
C4	I-5 Improvements to Accommodate a Portion of SR 99 Demand			●									●
C5	Elliott Bay Floating Tunnel along Waterfront Area				●						●	●	●
C6	Signature Bridge from Stadium Area to Belltown via Elliott Bay			●	●					●	●		●

**Alaskan Way Viaduct and Seawall Replacement Project
Screening Results Summary Table**

	Concept	In EIS	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Goal 8	Goal 9	Goal 10	Other
C7	Existing 4th Avenue BNSF Tunnel Transitioning to Cut-and-Cover Tunnel			●	●								●
C8a	Floating Bridge from Port of Seattle Property to Connect at Broad Street				●		●				●		●
C8b	Floating Bridge from Port of Seattle Property to Connect at Seneca Street				●		●				●		●
D	Multimodal Solutions												
D1	Transportation System/Demand Management (TSM/TDM) to Maximize Existing System	●											
D2	High Capacity Transit along Existing AWV Corridor with New Concept	●											
E	Related Improvements (would be combined with other concepts)												
E1	Access Improvement Concepts												
E1a	Add Missing Ramps at the S. Spokane Street/Alaskan Way Interchange												●
E1b	Improve Access at Stadium Area	●											
E1c	Add New Access at the Downtown Core												●
E1d	Improve Access at Battery Street/Western Avenue and Elliott Avenue	●											
E1e	Add S Spokane Street Off-Ramp to 6th Avenue S for Buses												●
E1f	Add S. Spokane Street Off-Ramp to 4th Avenue S												●
E1g	Add Extension to the S. Spokane Street 4th Avenue On-Ramp												●
E1h	Provide Southbound Access to SR 99 from West Seattle Bridge												●
E2	Regional Connection Concepts												
E2a	Add Connection to South Lake Union Area	●											
E2b	Extend Alaskan Way Viaduct Corridor to I-5 thru Mercer Street Corridor												●

**Alaskan Way Viaduct and Seawall Replacement Project
Screening Results Summary Table**

	Concept	In EIS	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Goal 8	Goal 9	Goal 10	Other
E2c	Extend SR 520 to Alaskan Way Viaduct Corridor												●
E2d	Extend SR 99 Grade Separation over 1st Avenue S Bridge to SR 509												●
E2e	Improve Ballard/Interbay Connections	●											
E2f	Improve I-90 Connections												●
	Improve SR 519/SR 99 Connections	●											
E2g	Improve I-5/SR 99 Connection at S. Spokane Street												●
E2h	Improve Waterfront Access between the West Seattle Bridge and Battery Street												●
E2i	Locate Tunnel Portal at Roy Street to Reconnect Crossings at Thomas and Harrison												●
E2j	Add Off-Ramp to Airport Way												●
E2k	Re-utilize Battery Street Tunnel as a Vehicular Connection to Alaskan Way												●
E2l	Lowered Aurora	●											
E2m	Widened Mercer Underpass	●											
E2n	Existing Mercer with Signals on SR 99 North of the Battery Street Tunnel	●											
E3	Freight Improvement Concepts												
E3a	Add SR 99 Grade Separation Crossing Between S. Atlantic and S. Spokane Streets												●
E3b	Add Missing Ramps at S. Spokane Street/Alaskan Way Interchange												●
E3c	S. Hanford Street Ramps to/from SR 99 for General Traffic/Freight												●
E3d	Improve East – West Freight Access between S. Spokane Street and S. Holgate Street												●

**Alaskan Way Viaduct and Seawall Replacement Project
Screening Results Summary Table**

	Concept	In EIS	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Goal 8	Goal 9	Goal 10	Other
E3e	Improve Broad Street Rail Crossing												●
E3f	Move Truck Containers from Waterfront to I-90												●
E3g	Incorporate Existing Railroad Tracks Within the Cut-and-Cover Tunnel												●
E4 Ferry Access Improvement Concepts													
E4a	Add Ferry Traffic Queuing Area	●											
E4b	Expand Pedestrian Connections between the Ferry Terminal and Downtown	●											
E4c	Improve Ferry Connections to AWV Corridor and Downtown	●											
E5 Urban Design Concepts													
E5a	Improve Pedestrian Environment Along Waterfront	●											
E5b	Improve Pedestrian Connections Between Waterfront and Downtown	●											
E5c	Retail, Residential, and Public Space with Aerial Structure												●
E5d	Build Waterfront Pedestrian Park with Businesses												●
	Total	26	0	9	7	0	5	0	0	6	6	14	51
Other - This column indicates options screened out for reasons other than the 10 screening criteria goals.													

Appendix W

Screening Documents

2003 Seawall

This Page Intentionally Left Blank

SR 99: ALASKAN WAY VIADUCT & SEAWALL REPLACEMENT PROJECT

Final Revised Screening of Seawall Concepts



Submitted to:
Washington State Department of Transportation
Urban Corridors Office
401 Second Avenue S, Suite 560
Seattle, WA 98104-3850

Submitted by:
Parsons Brinckerhoff Quade & Douglas, Inc.

Prepared by:
Parametrix, Inc.



June 2003

SR 99: Alaskan Way Viaduct & Seawall Replacement Project

Revised Screening of Seawall Concepts

Agreement No. Y-7888

Task 3.18

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:

Parsons Brinckerhoff Quade & Douglas, Inc.

999 Third Avenue, Ste 2200
Seattle, WA 98104

In association with:

BERGER/ABAM Engineers Inc.
BJT Associates
David Evans and Associates, Inc.
Entech Northwest
EnviroIssues, Inc.
Harvey Parker & Associates, Inc.
Jacobs Civil Inc.
Larson Anthropological Archaeological Services Limited
Mimi Sheridan, AICP
Parametrix, Inc.
Preston, Gates, Ellis, LLP
ROMA Design Group
RoseWater Engineering, Inc.
Shannon & Wilson, Inc.
Taylor Associates, Inc.
Tom Warne and Associates, LLC
William P. Ott

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
BACKGROUND.....	2
Alaskan Way Seawall Description	2
ALASKAN WAY SEAWALL SCREENING PROCESS.....	3
March 2002 Seawall Screening Process	3
Revised Screening Process.....	5
Seawall Screening Results	6
OVERVIEW OF SEAWALL CONCEPTS	7
SEAWALL REPLACEMENT OPTIONS.....	8
A1: Wharf with Fill Removed.....	8
A2: Wharf with Intertidal Beach.....	10
A3: Vertical Face Wall With Frame	12
A4: Drilled Shaft Wall With Soil Improvement.....	14
SEAWALL RETROFIT OPTIONS	15
B1: Face Wall Only	15
B2: Anchored Wall	16
B3: Buttress Fill.....	18
CONCEPTS RECOMMENDED TO BE CARRIED FORWARD	20

APPENDICES

APPENDIX A: FIGURES

APPENDIX B: CONCEPTUAL SEAWALL OPTIONS

Revised Screening of Seawall Concepts

EXECUTIVE SUMMARY

The Alaskan Way Viaduct and Alaskan Way Seawall are both at the end of their useful lives. Improvements to both are required to protect public safety and maintain the transportation corridor. Because these facilities are at risk of sudden and catastrophic failure in an earthquake, the Washington State Department of Transportation (WSDOT), City of Seattle (City), and Federal Highway Administration (FHWA) are proposing major improvements to the Alaskan Way Viaduct (AWV) Corridor and Alaskan Way Seawall.

WSDOT, the City, and FHWA have considered dozens of options designed to improve the Alaskan Way Viaduct Corridor and the Alaskan Way Seawall. The purpose of this memorandum is to present the design options that were considered specifically for the Alaskan Way Seawall and describe the screening process implemented to reduce the number of design options into a smaller group that will be evaluated in the project Environmental Impact Statement (EIS).

The Alaskan Way Seawall is located along Seattle's downtown central waterfront from South Washington Street on the south to Myrtle Edwards Park (near Pier 70) on the north. The Seawall supports the fill soils that the Alaskan Way surface street and the Alaskan Way Viaduct are built upon. In an earthquake, the Seawall provides the required lateral support to these soils.

The Alaskan Way Seawall is in a state of disrepair. Due to its poor condition, it is vulnerable to earthquakes and it is unable to resist both vertical and lateral loads associated with liquefaction of the loose fills on which it is constructed. In an earthquake, liquefaction of these soils is anticipated to result in large displacements of the wall and/or complete failure of the wall. This type of seawall failure could result in damage to adjacent waterfront piers, significant damage to utilities, and potential collapse of Viaduct sections.

This technical memorandum describes the options considered for the replacement of the Alaskan Way Seawall with structures that are capable of preventing the damage described above. The key features (advantages and disadvantages) of each option are described and screened using screening criteria developed for the Alaskan Way Viaduct and Seawall Replacement Project, and a recommendation is provided to carry forward or drop the design options considered. These options were identified by WSDOT, the City of Seattle, the Federal Highway Administration, and the consultant team.

Based on the screening analysis described in this memorandum, the following seawall design options will be carried forward for further analysis in the project EIS:

- A3: Vertical Face Wall with Frame (Figure 6 in Appendix A)
- A4: Drilled Shaft Wall with Soil Improvement (Figure 7 in Appendix A)

BACKGROUND

The Alaskan Way Viaduct and Alaskan Way Seawall are both at the end of their useful lives. Improvements to both are required to protect public safety and maintain the transportation corridor. Because these facilities are at risk of sudden and catastrophic failure in an earthquake, the Washington State Department of Transportation (WSDOT), City of Seattle (City), and Federal Highway Administration (FHWA) are proposing major improvements to the Alaskan Way Viaduct (AWV) Corridor and Alaskan Way Seawall.

WSDOT, the City, and FHWA have considered dozens of options designed to improve the Alaskan Way Viaduct Corridor and the Alaskan Way Seawall. The purpose of this memorandum is to present the design options that were considered specifically for the Alaskan Way Seawall and describe the screening process implemented to reduce the number of design options into a smaller group of alternatives that will be evaluated in the project Environmental Impact Statement (EIS).

Alaskan Way Seawall Description

The Alaskan Way Seawall is located along Seattle's downtown central waterfront from South Washington Street on the south to Myrtle Edwards Park (near Pier 70) on the north. The Seawall supports the fill soils that the Alaskan Way surface street and the Alaskan Way Viaduct are built upon. In an earthquake, the Seawall provides the required lateral support to these soils.

The Alaskan Way Seawall was constructed in 1916 and 1934. The majority of the Seawall constructed in 1934 is an anchored bulkhead system. The upper 20 feet of the Seawall is constructed with a pre-cast concrete panel. The concrete panel is supported by a steel bulkhead. The structural details and height of the bulkhead varies. In some places the bulkhead is buried in fill, in other locations it is exposed to the marine waters of Elliott Bay. The steel bulkhead and concrete wall are anchored to a timber relieving platform supported by piles that are battered to provide lateral resistance to earth pressures acting on the wall. The relieving platforms support approximately 13 feet of roadway fill and the Alaskan Way surface street. They rely on the weight of the fill to provide the lateral resistance required to stabilize the walls.

There are two types of 1934 seawalls, one in shallow water and one in deeper water. The tall wall has the widest relieving platform and an exposed steel bulkhead. It is located just below the central business district and supports the greatest depth of fill. The shorter wall, which features a narrower relieving platform and a buried steel bulkhead, makes up the greatest length of existing seawall and is primarily along the north end of the waterfront. In addition to the 1934 seawalls, there exists unreinforced, or lightly reinforced, concrete gravity walls supported on piles and concrete sidewalks supported on piles. This seawall type was constructed around 1916 in the vicinity of Colman Dock.

The Alaskan Way Seawall is in a state of disrepair and is nearing the end of its useful life. One vulnerability of the seawall is its poor condition. Both portions of the seawall bulkhead and portions of the timber relieving platform are deteriorated. Another vulnerability of the existing seawall is its inability to resist the lateral and vertical loads associated with liquefaction of the loose fills on which they are constructed. For the deep-water portions of the 1934 Seawall, liquefaction is anticipated to result in large displacements of the wall and/or complete failure of the wall. The resulting settlements could have catastrophic implications and could result in damage to adjacent waterfront piers, significant damage to utilities, and potential collapse of Viaduct sections. The influence of the movements could be felt as far to the east as Western Avenue and/or First Avenue, the approximate location of the original shoreline. Any structures located in this zone of movement would be at risk for major settlement-related damage.

ALASKAN WAY SEAWALL SCREENING PROCESS

The following text describes the Alaskan Way Seawall screening process. Alaskan Way Seawall design concepts were first screened in March 2002. Screening results from this effort are documented in a March 2002 document entitled *SR 99: Alaskan Way Viaduct and Seawall Project Screening of Seawall Concepts* written by BERGER/ABAM Engineers Inc. Details of the March 2002 screening process are summarized below.

March 2002 Seawall Screening Process

Screening Criteria Development

Screening criteria were developed to screen both the Alaskan Way Viaduct Corridor and Alaskan Way Seawall design options. Screening criteria were based upon the draft project Purpose and Need statement dated November 2, 2001. The project purpose as stated in the November 2, 2001 statement was “to maintain or improve mobility for people and goods along the existing SR 99 corridor and to improve safety, including the ability of the transportation facilities and the Seawall to resist earthquakes”. With this project purpose in mind, screening criteria were developed to include nine goals. These nine goals

were agreed upon by WSDOT the City, and FHWA. Details related to the screening process are documented in the *Screening of Initial Concepts Technical Memorandum*, dated January 2002 by Parsons, Brinckerhoff, Quade, and Douglas Inc and the *SR99: Alaskan Way Viaduct and Seawall Project Screening of Seawall Concepts*, dated March 2002 written by BERGER/ABAM Engineers.

Design Concept Development

Six seawall design options with a total of 52 design variations were considered in the March 2002 Seawall screening process (Appendix B). The six seawall design options were grouped into two primary categories: replacement options and retrofit options. Replacement options would replace the existing seawall entirely, proving structural capacity to carry both vertical and lateral loads due to earthquakes and the associated liquefaction. The retrofit options were designed to address specific deficient features of the existing walls. Generally, retrofit options maintain the existing configuration of the wall, but add lateral capacity to withstand increased earth pressures during and earthquake. The retrofit options assumed vertical capacity would be maintained by the existing relieving platform.

The seawall design options considered in the March 2002 screening included the following:

Replacement of Seawall

- A1. Wharf with Fill Removed
- A2. Wharf with Intertidal Beach
- A3. Vertical Faced Wall with Structural Frame

Retrofit of Seawall

- B1. Face Wall Only
- B2. Anchored Wall
- B3. Buttress Fill

Seawall Screening Results

The screening process resulted in a recommendation to carry three seawall options forward into the EIS. These options included A1: Wharf with Fill Removed; A3: Vertical Face Wall with Structural Frame; and B1: Face Wall Only.

Revised Screening Process

Purpose of Revised Screening Process

Conceptual engineering conducted after the March 2002 screening process resulted in additional information on design options and cost. This information indicated that the estimated cost of constructing several of the conceptual Viaduct and Seawall alternatives were high given potential funding sources. In addition, in November 2002, voters rejected Referendum 51, a tax plan that would have provided some funding for the Alaskan Way Viaduct and Seawall Project. Due to the lack of project funding, conceptual design options were re-examined to identify additional design options that might be more financially feasible to implement. To broaden the range of options that could be considered, the screening criteria were revised.

Because the screening criteria were changed all of the design concepts from the March 2002 screening process needed to be re-screened with the new criteria. The results of this screening process for Seawall design options are contained in this document. Information related to screening for the Viaduct design options are contained in a separate memorandum called *SR 99 Alaskan Way Viaduct and Seawall Replacement Project Revised Screening of Design Concepts*, dated June 2003 written by Parsons, Brinckerhoff, Quade, and Douglas.

Development of Screening Criteria

The screening criteria were developed to support the project purpose and are expressed as a series of ten goals. The revised screening criteria were approved by WSDOT, FHWA, City of Seattle, and participating agencies in the Resource Agency Leadership Forum¹, and are listed below.

- Goal 1: An alternative must provide facilities that meet current seismic design standards.
- Goal 2: An alternative must maintain the current transportation functions of the Alaskan Way Viaduct Corridor.
- Goal 3: An alternative should not further degrade the operation of other major transportation facilities.
- Goal 4: An alternative should improve traffic safety.
- Goal 5: An alternative should maintain regional transportation linkages.

¹ The Resource Agency Leadership Forum is comprised of regulatory agencies party to the Signatory Agency Committee (SAC) Agreement and local agencies having jurisdiction in the project area.

- Goal 6: An alternative should support bicycle and pedestrian accessibility and mobility.
- Goal 7: An alternative should be compatible with local, express, and high-capacity transit.
- Goal 8: An alternative should support land use and shoreline plans and policies pertaining to development of the downtown Seattle waterfront.
- Goal 9: An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall.
- Goal 10: An alternative should rely on proven construction methods, minimize construction duration, and promote effective traffic management during construction.

All design concepts were screened using the ten goals above. Goals 1 and 2 had to be met for an alternative to be advanced. Concepts that did not meet goals 1 and 2 were dropped. Options that met goals one and two were evaluated against the remaining goals. Where similar options were available, the concept that best met the screening criteria goals and project purpose and need were advanced for further consideration.

Design Concept Development

The six design concepts considered in the March 2002 screening process are evaluated as part of this revised screening process. In addition, one seawall design concept was added based on additional engineering design work completed between March 2002 and May 2003. This additional concept is to replace the existing seawall with a drilled shaft wall and block of soil improvement behind the wall.

Seawall Screening Results

All seven seawall design concepts have been screened using the criteria outlined above. The rest of this memorandum describes the design options, their key features, and screening results. The screening process has resulted in the recommendation to carry two seawall alternatives forward for further analysis in the EIS. These include options A3: Vertical Face Wall with Frame and A4: Drilled Shaft Wall with Soil Improvement.

OVERVIEW OF SEAWALL CONCEPTS

Seawall options utilizing several structure types and construction methods including deep foundation methods of slurry walls, drilled shafts, precast pre-stressed panel piles, soil improvements, and tiebacks were investigated as part of conceptual design. A total of 53 suboptions were considered (Appendix B). These 53 suboptions fell into seven primary structure types. These seven seawall concepts were screened in this document and include the following:

Seawall Replacement Options

- A1. Wharf with Fill Removed
- A2. Wharf with Intertidal Beach
- A3. Vertical Face Wall with Structural Frame
- A4. Drilled Shaft Wall with Soil Improvement

Seawall Retrofit Options

- B1. Face Wall Only
- B2. Anchored Wall
- B3. Buttress Fill

Seawall replacement options involve replacing the existing wall by providing structural capacity to carry all vertical, as well as lateral loads due to earthquakes and associated liquefaction. Seawall retrofit options are designed to address specific deficient features of the existing walls. Generally, these maintain the existing configuration of the wall, but add lateral capacity to withstand increased earth pressures during an earthquake. The retrofit options assume vertical capacity is maintained by the existing relieving platforms.

These seven seawall design options considered are described in detail and screened in the following text. Seawall options are shown in Figures 1 to 13 in Appendix A. The options depicted in Appendix A are shown as they would apply to the tallest section of the 1934 Seawall. Replacement and retrofit options for the shorter 1934 Seawall and 1916 Seawall are assumed to be similar. These concepts were developed without the detailed geotechnical knowledge required to fully assess their structural feasibility. In addition, the concepts were developed using estimates of the loads that are anticipated for three levels of earthquake ground motion:

1. An expected earthquake, which has a 50 percent probability of being exceeded in 75-years (108-year return period)
2. A moderate earthquake, which has a 10 percent probability of being exceeded in 50 years (about a 500-year return period)

3. A rare earthquake, which has a 3 percent probability of being exceeded in 75 years (about a 2,500-year return period)

The seawall is to remain “operational” for the expected earthquake and “life-safe” for the rare earthquake. The moderate event represents the City of Seattle’s current ground motion criteria for operational performance of important structures and facilities. The final seawall concepts are likely to be designed for the rare earthquake event. This is a significantly greater magnitude earthquake than is currently specified in current design codes and modifications to the dimensions and layout of these concepts may be required to meet the more stringent design criteria considered for this project.

SEAWALL REPLACEMENT OPTIONS

A1: Wharf with Fill Removed

General Functional Description

This concept proposes to replace the existing seawall and roadway with a wharf structure (Figures 1,2, and 3). Under this option, a bulkhead would be constructed up to 65 feet east of the current face of the existing seawall bulkhead. The wharf would span the distance from the new bulkhead west to directly behind the existing seawall bulkhead. Piles would be driven to support the wharf structure and the Alaskan Way surface street. The area of fill material between the existing seawall bulkhead and the new wharf bulkhead would be removed, which would result in a sloping bottom below the intertidal zone under what is now the Alaskan Way Surface street (Figures 1, 2, and 3).

The wharf consists of precast, pre-stressed concrete deck panels, supported on cast-in-place concrete pier caps supported by precast concrete piles. The piles would likely be 3-foot-diameter hollow sections. The expected pile and bent cap spacing is regular and would fit a spacing consistent with the bulkhead structure. The bulkhead would be constructed of a concrete retaining wall located behind the existing relieving platform. This would minimize disruptions during construction.

There are several ways to construct the bulkhead. One suboption, a cantilevered drilled shaft secant wall bulkhead, is shown on Figure 1 and in partial plan view on Figure 3. This option has a 10-foot-diameter drilled shaft spaced at five-thirds of the diameter of the shaft to set the primary reinforced shaft overlapping with a secondary unreinforced shaft. This design suggests a pile cap spacing of 16 feet 8 inches. The unreinforced shaft would act as lagging between the reinforced shafts.

A tieback suboption is shown on Figure 2. Under this suboption, the drilled shaft is smaller at 5-foot diameter because the tieback supports the top of the

shaft bulkhead. This effectively reduces the internal momentum in the shaft and allows the shaft to be shorter in depth. The shaft would need only to penetrate competent soil to provide lateral support; whereas the cantilevered drill shaft must penetrate deep to provide rotational (moment) support, as well as lateral support. The drawback is that a tieback must angle far back into competent soil where it can interfere with foundations of an aerial viaduct structure and possibly with existing building foundations.

A slurry wall bulkhead is shown both as a tieback and cantilever bulkhead on Figures 2 and 3. Again, the major difference is the tieback and depth into competent soil. The slurry wall is T-shape in plan with the T's cast side-by-side and the stem, or web at 20-foot, on-center spacing. The pile bent caps are also 20 feet on-center, which is more typical of pier and wharf construction with precast deck panels.

The Wharf option would require permanent relocation of most utilities. Existing utilities would be relocated based on the horizontal offset guidelines as defined in the *Final Utilities Design Criteria and Standards*, July 2002. The wharf option would significantly narrow the area inland of the Seawall that is available for relocating utilities and would not permit uniform application of the recommended offset distances. The proposed modifications to the utility alignments include reducing the recommended offset distances and installing some utilities in an exposed condition under the wharf. Reduction of the offset distances would require acceptance from each of the affected utilities, and for buried electrical lines would require an ampacity study to determine the impact of the reduced offsets on electrical carrying capacity. Relocation of utilities under the wharf may impact the life of the utilities subject to corrosion and would increase the risk of impacts damage to the utility lines.

The existing 115 kV power lines would be contained in the center of the wharf structure via a utilidor passing between pile cap beams, with the power continuing through cutouts in the beams. Vaults would be hung from the wharf structure to allow access to the power lines.

Key Features

- Replaces the existing relieving platform with new horizontal structural deck to support vertical loads.
- Requires removal of existing and potentially contaminated fills.
- Places the new seawall construction behind the existing relieving platform, minimizing risk of weakening the existing structure during construction
- May be able to support the Viaduct on the bulkhead.

- Uses proven construction methods and elements.
- Utilities will need to be relocated to confined locations and utility offset distances would not be met
- Value of possible habitat enhancements were determined to be minimal, at best

Seawall Screening Results

This option has been dropped because the project purpose and screening criteria can be better met with other seawall design options such as A3: Vertical Face Wall with Frame (Figure 6 in Appendix A), and A4: Drilled Shaft Wall with Soil Improvement (Figure 7 in Appendix A). The Wharf with Fill Removed option is technically less feasible than other options due to the required extensive utility relocations, the reduction in available space for utility relocations, and inability to meet utility offset distances. In addition, some utilities would be required to hang under the wharf structure and be exposed to the marine air. This corrosive environment would likely reduce the design life and increase maintenance costs of exposed utilities.

In addition, this concept was proposed because it was anticipated that it might provide improved marine habitat along the waterfront. However, in order to achieve this goal, the area under the wharf would need to receive natural light, have adequate water circulation, have natural substrate to provide improved habitat, and be located in the intertidal zone. This option would not provide natural light and it would not be located below the intertidal zone. Furthermore, the scour protection required to protect the slope would consist of riprap materials that are not conducive to the creation of the desired beach characteristics. If slope protection is not provided, constant maintenance of the slopes is likely to be required. Resource agency staff have generally agreed that the option offers limited habitat improvement. Additional information related to the wharf option is contained in the September 2002 technical memorandum titled, *Recommendation to Remove the Marginal Wharf from Seawall Options*, prepared by BERGER/ ABAM Engineers, Inc.

A2: Wharf with Intertidal Beach

General Functional Description

This option is similar to option A1: Wharf with Fill Removed, only subtidal areas would be back filled to achieve intertidal elevations. In this case, the sea side edge of the wharf is supported on 5-foot-diameter drilled shafts that are part of a partial height wall as shown in Figures 4 and 5 in Appendix A. The wall is required to retain existing and replacement fills, which could damage the existing adjacent piers. The top of the wall is set at Elevation -4.0. The wall retains an intertidal beach of gravelly sand with a slope of 6:1 to approximately

elevation +6.0. The gravelly sand is placed over a granular backfill whose depth is to be determined to protect the beach from any contamination in the remaining timber piles and exposed soils after the excavation.

The rear bulkhead for this wharf is, like Option A1, proposed to carry a substantial portion of the anticipated lateral loads. However, unlike Option A1, this bulkhead may not be a continuous wall, but may rely on arching of the retained soil to transfer load to the bulkhead structure. The feasibility of this would need to be investigated. The suboptions for constructing the bulkhead would be the same as described for Option A1 and include cantilevered drilled shafts and slurry walls, with and without tiebacks, as was shown on Figures 2 and 3. The option shown in Figures 4 and 5 has 10-foot-diameter drilled shafts without tiebacks. The shafts are spaced at 16 feet 8 inches to match the double space of the 5-foot-diameter primary shafts of the secant wall in the sea side wharf support.

Key Features

- Provides a seawall structure that can resist both vertical and lateral loads.
- Places a portion of the new seawall construction behind the existing relieving platform, minimizing risk of weakening the existing structure during construction.
- Requires removal of potentially contaminated fills.
- Requires backfill to attain desired intertidal elevations.
- Requires a partial height seawall at approximately the same location as the existing wall.
- The partial height wall will complicate the construction and will most likely require more time and expense to construct than other replacement options.
- The abrupt change in water depth at the partial height wall is expected to create substantial breaking wave activity. Scour protection may be required to prevent erosion of the intertidal beach at the top of the secant wall.
- May be able to support the Viaduct on the bulkhead.
- Uses proven construction methods and elements.
- Utilities will need to be relocated to confined locations and utility offset distances would not be met
- Value of possible habitat enhancements was determined to be minimal, at best.

Seawall Screening Results

This option has been dropped because the project purpose and screening criteria can be better met with other seawall design options such as A3: Vertical Face Wall with Frame (Figure 6 in Appendix A), and A4: Drilled Shaft Wall with Soil Improvement (Figure 7 in Appendix A). The Wharf with Intertidal Beach option is technically less feasible than other options due to the required extensive utility relocations, the reduction in available space for utility relocations, and inability to meet utility offset distances. In addition, some utilities would be required to hang under the wharf structure and be exposed to the marine air. This corrosive environment would likely reduce the design life and increase maintenance costs of exposed utilities.

In addition, this concept was proposed because it was anticipated that it might provide improved marine habitat along the waterfront. However, in order to achieve this goal, the area under the wharf would need to receive natural light, have adequate water circulation, and have natural substrate to provide improved habitat. This option would not provide natural light, and the scour protection required to protect the slope would consist of riprap materials that are not conducive to the creation of the desired beach characteristics. If slope protection is not provided, constant maintenance of the slopes is likely to be required. Resource agency staff have generally agreed that the option offers limited habitat improvement. Additional information related to the wharf option is contained in the September 2002 technical memorandum titled, *Recommendation to Remove the Marginal Wharf from Seawall Options*, prepared by BERGER/ABAM Engineers, Inc.

A3: Vertical Face Wall With Frame

General Functional Description

The Vertical Face Wall with Frame is a seawall structure that replaces the existing relieving platform with a concrete frame as shown in Figure 6 in Appendix A. The relieving platform is not entirely removed, but is covered with a concrete deck that frames into a 5-foot-diameter drilled shaft secant wall at the sea side support and a bulkhead at the land side of the relieving platform. A movement resisting frame is developed to provide lateral and vertical support. The concrete deck may be cast-in-place or precast, or a combination of both.

The land side bulkhead is shown on Figure 6 as a cantilevered, drilled shaft bulkhead. The shafts are estimated to be 10 feet in diameter and spaced at 16 feet 8 inches to match the double space of the 5-foot-diameter primary shafts of the secant wall in the sea side support. Drilled shafts with tiebacks or slurry wall, with or without tiebacks, as was shown on Figures 2 and 3 may also apply. Like the bulkhead for Option A2, this bulkhead may not be a continuous wall, but

may rely on arching of the retained soil to transfer load to the bulkhead structure. The feasibility of this would need to be investigated.

The sea side drilled shaft secant pile wall is constructed inside, or land side, of the existing wall face. Alternatively, a precast panel pile face wall may be used at the sea side wharf support, similar to that shown on Figure 10, in place of the 5-foot-diameter drilled shaft secant wall. A cast-in-place concrete deck would span over the existing fill to the bulkhead. The elevation of the concrete deck would be determined during project design, and it may be different than what is implied in Figure 6. The elevation of the deck will partially depend on what is needed to accommodate utilities. Lowering the deck would impose more dead load on it unless lightened by voids or framing in the soil ballast above.

Key Features

- Provides a seawall structure that can resist both vertical and lateral loads.
- Does not require removal of all of the existing and potentially contaminated fills, except at the sea side wharf face, and except as required to lower the deck sufficient to accommodate utilities.
- A substantial portion of the construction can be located behind the existing relieving platform, minimizing the disruption to businesses along the waterfront.
- The new seawall can be constructed behind the existing seawall, allowing the work to be isolated from the Elliott Bay. This would weaken the existing structure during construction. Temporary support for the existing wall would need to be devised. The alternative precast panel pile wall could be installed without weakening the existing structure. However, it would require a temporary sheet pile wall to isolate the excavation work from Elliott Bay. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall
- May be able to support the Viaduct on the bulkhead.
- Uses mostly proven construction methods and elements.
- Utility relocations are required.

Seawall Screening Results

This seawall option is recommended to be carried forward to the EIS.

A4: Drilled Shaft Wall With Soil Improvement

General Functional Description

This seawall design option involves strengthening the existing weak soils behind the existing Seawall and adding a drilled shaft secant pile wall to provide needed lateral and vertical support (see Figure 7 in Appendix A). The soil improvement also serves to prohibit liquefaction of the loose soils contained by the existing seawall. Soils would be strengthened with a concrete slurry by a process called jet grouting. Jet grouting is a process by which stabilizer and in-situ soils are mixed to create more competent soil. Most commonly, the stabilizer is cement grout. A hole is drilled from the existing ground surface down to the desired depth. A rod containing a jet through which grout is pumped at high pressures is inserted into the hole. The high-pressure grout penetrates the existing soils to the desired depth, enhancing the strength of the in-situ soils matrix by mixing soil with the grout. The jet is rotated while being drawn out of the hole, forming a column of improved soil. Numerous columns at close intervals are used to create a block of improved soil.

The drilled shaft secant pile wall would be constructed behind the existing Seawall to provide remaining required lateral resistance. In addition, the drilled shaft wall would serve as a barrier between improved soil and Elliot Bay, plus provide a structure to attach a new seawall façade or to re-attach the existing seawall façade (in places where complete replacement is not necessary).

Key Features

- Provides a seawall structure that can resist both vertical and lateral loads.
- Does not require removal of all of the existing and potentially contaminated fills.
- The new seawall can be constructed mostly behind the existing seawall, allowing the majority of the work to be isolated from Elliott Bay. This would weaken the existing structure during construction. Temporary support for the existing wall would need to be devised. Uses proven construction methods and elements.
- Utility relocations are possible but are not likely to be as extensive as for the other options.

Seawall Screening Results

This seawall option is recommended to be carried forward into the EIS.

SEAWALL RETROFIT OPTIONS

The figures in Appendix A for retrofit options are all shown for the tallest portion of the 1934 Seawall, which exists in the deep water areas. The retrofit options are also applicable to areas where the wall is not as tall.

The retrofit options are designed to primarily carry the lateral earth pressure loads. The retrofit options assume vertical capacity is maintained by the existing relieving platforms. Since the March 2002 Seawall Screening Process, the relieving platform has been investigated to determine its condition. This investigation revealed that the relieving platform has been severely damaged by marine borers and does not provide vertical capacity to meet current seismic design standards as documented in Shannon and Wilson's report entitled (SR99: *Alaskan Way Viaduct and Seawall Project, Volume 4 of 7, Geotechnical Analyses of Existing Alaskan Way Seawall, January 2003*). In order to meet current seismic design standards, seawall design options must be able to improve the ability of the Seawall to respond to both vertical and lateral loads. The retrofit options are designed to only carry the lateral earth pressure loads. Therefore, all of the retrofit options are no longer feasible solutions to meet mandatory Goal 1².

B1: Face Wall Only

General Functional Description

The Face Wall Only option introduces a new vertical wall at the sea side wharf face to laterally support the relieving platform and to prevent intrusion by marine borers. Typical details are shown in Figures 8 and 9 in Appendix A. The suboptions shown are driven precast panel piles with tieback on the outboard side of the existing seawall, a cantilever shaft on the inboard side, or a drilled shaft with tieback on the inboard side of the existing seawall. Plan sections of these walls are shown on Figure 10. The relieving platform may need to be reconstructed to repair existing damage. It may be reconstructed with concrete rather than timber. Utilities are relatively unchanged with this option except where the tieback may interfere close to the wall face over the relieving platform.

Key Features

- Relies on the existing relieving platform to be in good condition to carry vertical loads.
- Removal of existing and potentially contaminated fills is limited to the material excavated to construct the secant pile wall.

² Goal 1 is a mandatory screening criteria and specifies that an alternative provide facilities that meet current seismic design standards.

- A substantial portion of the construction can be located behind the existing relieving platform, minimizing the disruption to businesses along the waterfront.
- If the drilled shaft wall is used, the new seawall can be constructed behind the existing seawall, allowing the work to be isolated from Elliott Bay. This would weaken the existing structure during construction. Temporary support for the existing wall would need to be provided.
- The size of the drilled shaft can be reduced if tiebacks are used. However, the tiebacks will be difficult to install because the space available in front of the existing piers is limited.
- The alternative precast panel pile wall could be installed without weakening the existing structure. However, it would require a temporary sheet pile wall to isolate the excavation work from the sea. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall.
- The precast panel pile option with tieback is anticipated to need a section depth of about 6 feet, which is greater than the space available for placement outboard of the existing seawall face. This option will move the wall face out about 2 feet beyond the west margin of The Alaskan Way surface street and is likely to require removal of part of the existing piers.
- Uses mostly proven construction methods and elements.
- Utility relocations are possible but are not likely to be as extensive as for the replacement options.

Seawall Screening Results

This seawall option is recommended to be dropped from further consideration in the EIS.

In order to meet current seismic design standards, as required by mandatory screening criteria Goal 1, seawall design options must be able to improve the ability of the Seawall to respond to both vertical and lateral loads. The Face Wall Only option is designed to only carry the lateral earth pressure loads.

B2: Anchored Wall

General Functional Description

The Anchored Wall option is shown on Figure 11 in Appendix A. It is similar to the Option B2: Face Wall Only, except the angled ground anchor tieback is

replaced with a horizontal tieback to a large diameter drilled shaft bulkhead that acts as an anchor. Both structures would need to resist lateral loads. The relieving platform is still intact and assumed capable of carrying vertical loads.

The horizontal tieback is shown high to fit within the cast-in-place cap on the precast panel pile face wall and to keep the anchor and other construction work above the tidal zone. It may be located as low as the top of the relieving platform, if necessary, to accommodate the passage of utilities. Figure 10 shows the new wall being constructed with the precast panel pile, although a suboption using a drilled shaft located inboard of the existing seawall is possible.

The bulkhead anchor located behind the relieving platform is shown in Figure 11 as a 10-foot-diameter cantilever drilled shaft that would be closely spaced to facilitate arching of the soil between each shaft. Other bulkhead options may be used, similar to those shown on Figures 2 and 3. The bulkhead can be used to support the Viaduct. Utilities are relatively unchanged with this option if the tieback can be placed through the fill without interfering.

Key Features

- Relies on the existing relieving platform to be in good condition to carry vertical loads.
- Does not require removal of existing and potentially contaminated fills except for those excavated for construction of drilled shafts.
- A substantial portion of the construction can be located behind the existing relieving platform, minimizing the disruption to businesses along the waterfront.
- The new seawall can be constructed behind the existing seawall, allowing the work to be isolated from Elliott Bay. This would weaken the existing structure during construction. Temporary support for the existing wall would need to be devised.
- The alternative precast panel pile wall could be installed without weakening the existing structure. However, it would require a temporary sheet pile wall to isolate the excavation work from the sea. Installation of the sheet pile would require removal of the existing riprap, including removal of the riprap that has become embedded in the potentially contaminated deposits at the toe of the existing seawall.
- May be able to support the Viaduct on the bulkhead.
- Uses mostly proven construction methods and elements.

- Relatively minor impacts to utilities anticipated. Will take more time to construct than the Face Wall Only option but less than the Buttress Fill option.

Seawall Screening Results

The Anchored Wall is recommended to be dropped from further evaluation in the EIS.

In order to meet current seismic design standards, as required by mandatory screening criteria Goal 1, seawall design options must be able to improve the ability of the Seawall to respond to both vertical and lateral loads. The Anchored Wall option is designed to only carry the lateral earth pressure loads.

B3: Buttress Fill

General Functional Description

The Buttress Fill option uses soil fill against the existing relieving platform to provide the lateral restraint needed for the seismic earth pressures from the liquefiable soils. To prevent marine borer attack, the fill would need to be placed high enough to cover the joint between the existing steel bulkhead and the concrete face wall of the relieving platform near the west margin of the Alaskan Way surface street. Assuming that the joint should be covered by 5 feet of fill, the height of the fill would be approximately 36 feet as shown in Figure 12 of Appendix A for the deep water section of the 1934 Seawall.

Figure 12 shows the anticipated buttress fill required to achieve an intertidal beach. The ideal intertidal beach would have a slope of 6 horizontal to 1 vertical from the relieving platform down to Elevation -4.0 and a 3:1 slope continuing on to the seaward side from Elevation -4.0. As can be seen from Figure 11, the buttress fill may extend hundreds of feet from the relieving platform before it would intercept the existing ground line. It may be likely that the 3:1 slope of the fill will not intercept at some location along the waterfront making it impractical, or requiring a retaining structure underwater.

A suboption of this option is shown in Figure 13 as the Minimum Buttress Fill. The Minimum Buttress compromises the intertidal beach slightly by using steeper slopes. Even with steeper slopes, this fill would be extensive for the deep-water sections of the 1934 Seawall. Although not shown, the minimum buttress fill may be applicable to the shallow-water sections of the 1934 Seawall north of Pier 70 where there are no pier structures to interfere with its placement.

Key Features

- Relies on the existing relieving platform to be in good condition to carry vertical loads.

- Does not require removal of existing and potentially contaminated fills.
- Places new construction of the face wall to the outboard side of the existing relieving platform, minimizing risk of weakening the existing structure during construction.
- Can be accomplished with minimal disruptions to traffic on the Alaskan Way surface street.
- Little or no utility relocations required.
- May disrupt boat traffic during construction, particularly for the WSDOT ferry system if used at Colman dock.
- Placement of fill around and under the existing piers could cause substantial down-drag on the existing piles, possibly overloading them, and breaking the batter piles.
- Filling slips between piers may impact the operation of waterfront businesses and the fire boats.
- Native soils supporting the fill may be liquefiable, although they will be densified by the weight of the fill. Improvement methods would most likely involve the introduction of cementitious material, which could also be introduced into the seawater.
- Fill slopes would require riprap to protect against erosion.
- Placement of fill, and particularly the large riprap required to anchor it, will be difficult under the piers, which occupy a significant portion of the length of the waterfront.
- The Minimum Buttress Fill has the same deficiencies as the Buttress Fill, although to a lesser degree.
- The Minimum Buttress Fill may be applicable in limited areas north of Pier 70, where shallower, unobstructed water exists and where it is anticipated that design loads will be lower.

Seawall Screening Results

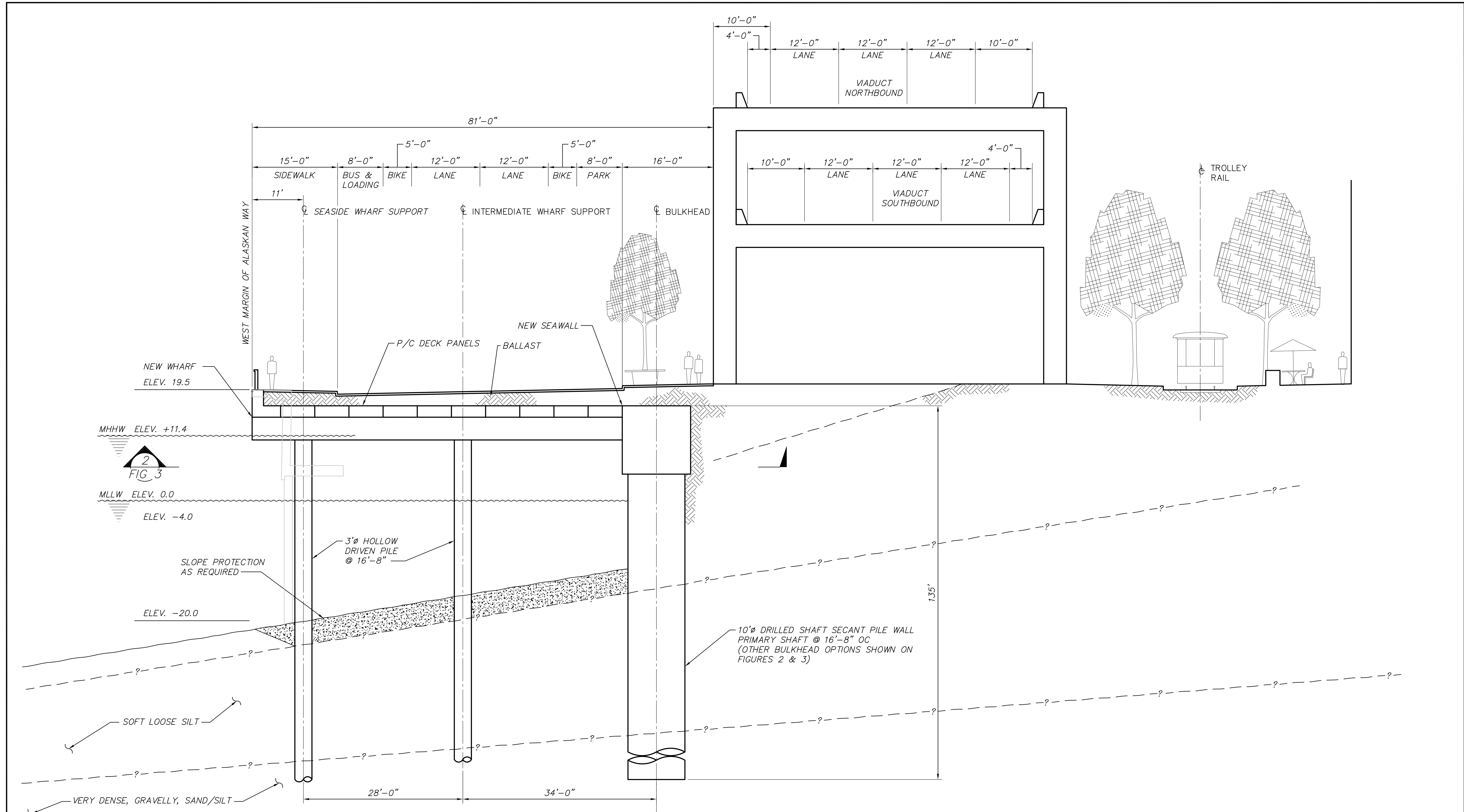
The Buttress Fill is recommended to be dropped from further evaluation in the EIS.

In order to meet current seismic design standards, as required by mandatory screening criteria Goal 1, seawall design options must be able to improve the ability of the Seawall to respond to both vertical and lateral loads. The Buttress Fill option is designed to only carry the lateral earth pressure loads.

CONCEPTS RECOMMENDED TO BE CARRIED FORWARD

- A3: Vertical Face Wall with Frame
- A4: Drilled Shaft Wall with Soil Improvement

APPENDIX A: FIGURES



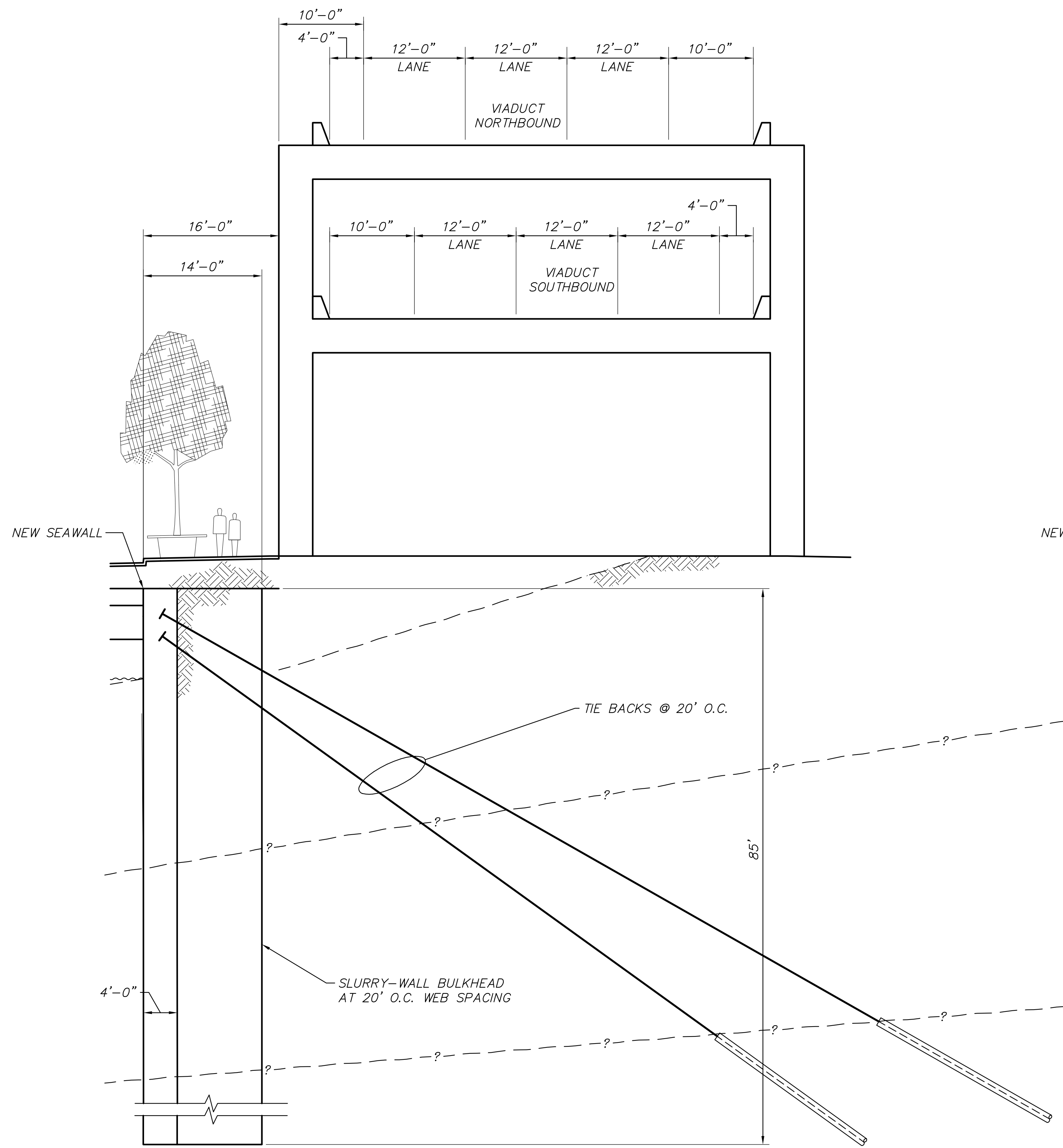
1
-
TYPICAL SECTION - W/CANTILEVER DRILLED SHAFT SECANT WALL BULKHEAD
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

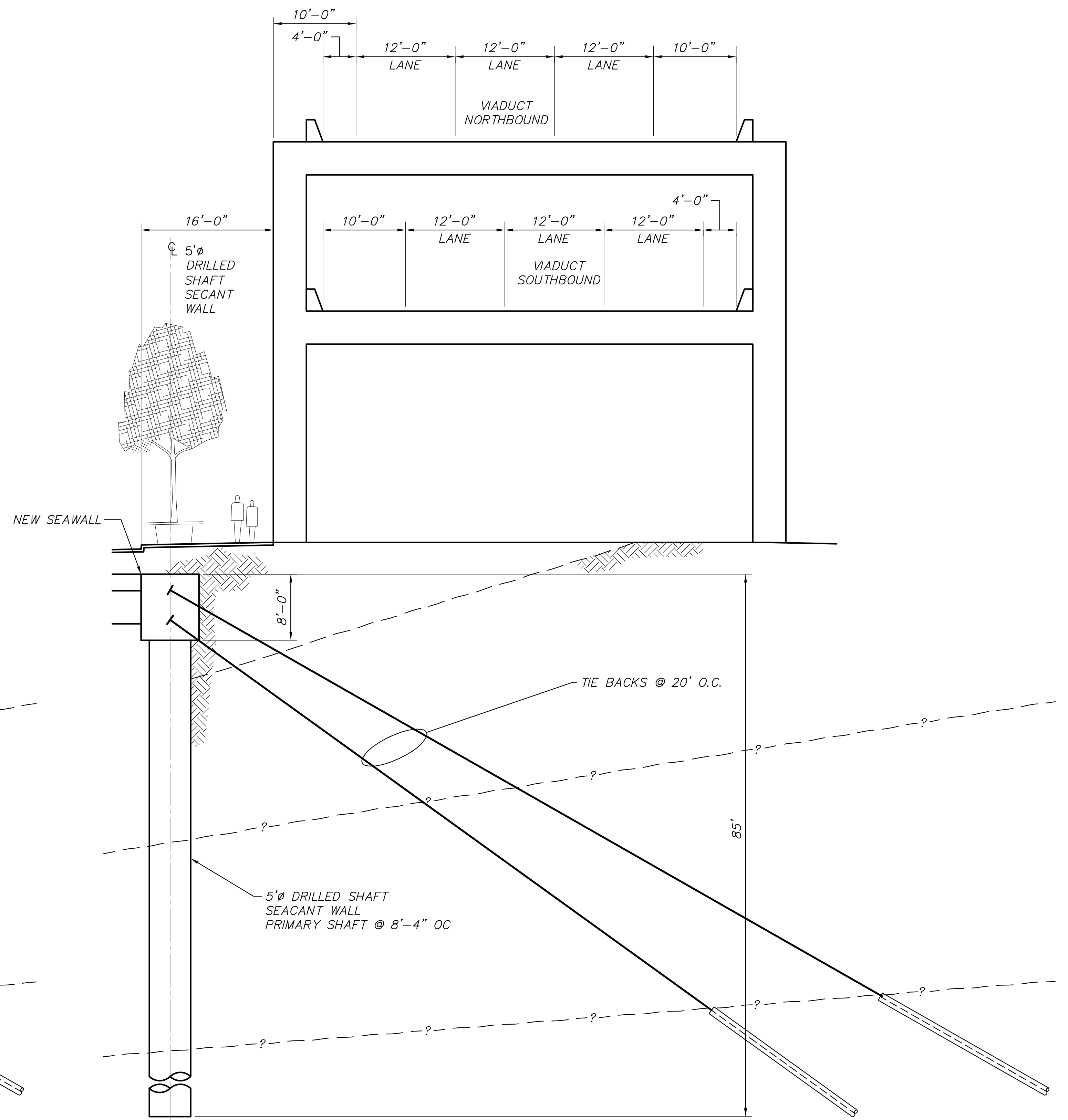
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				
-				



SEAWALL OPTION A1 WHARF WITH FILL REMOVED		FIG 1 SHEET OF SHEETS
TYPICAL SECTION		



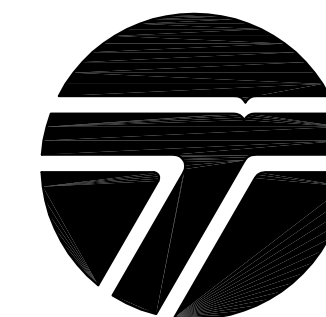
1 SLURRY-WALL BULKHEAD W/TIE BACKS
SCALE: N.T.S.



2 DRILLED SHAFT SECANT WALL BULKHEAD W/TIE BACKS
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
	DATE	REVISION	BY	APPR	

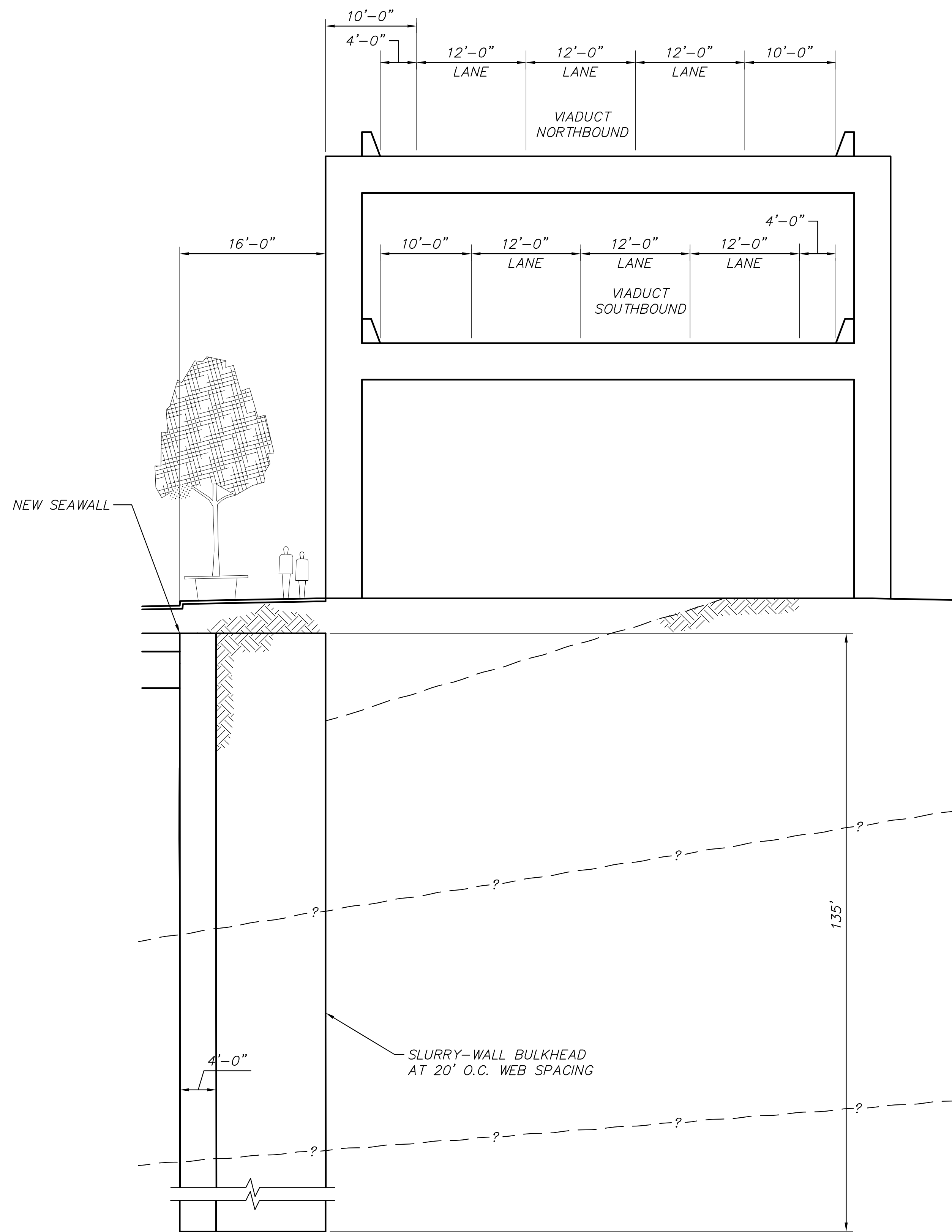
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH			
JOB NUMBER				
-				



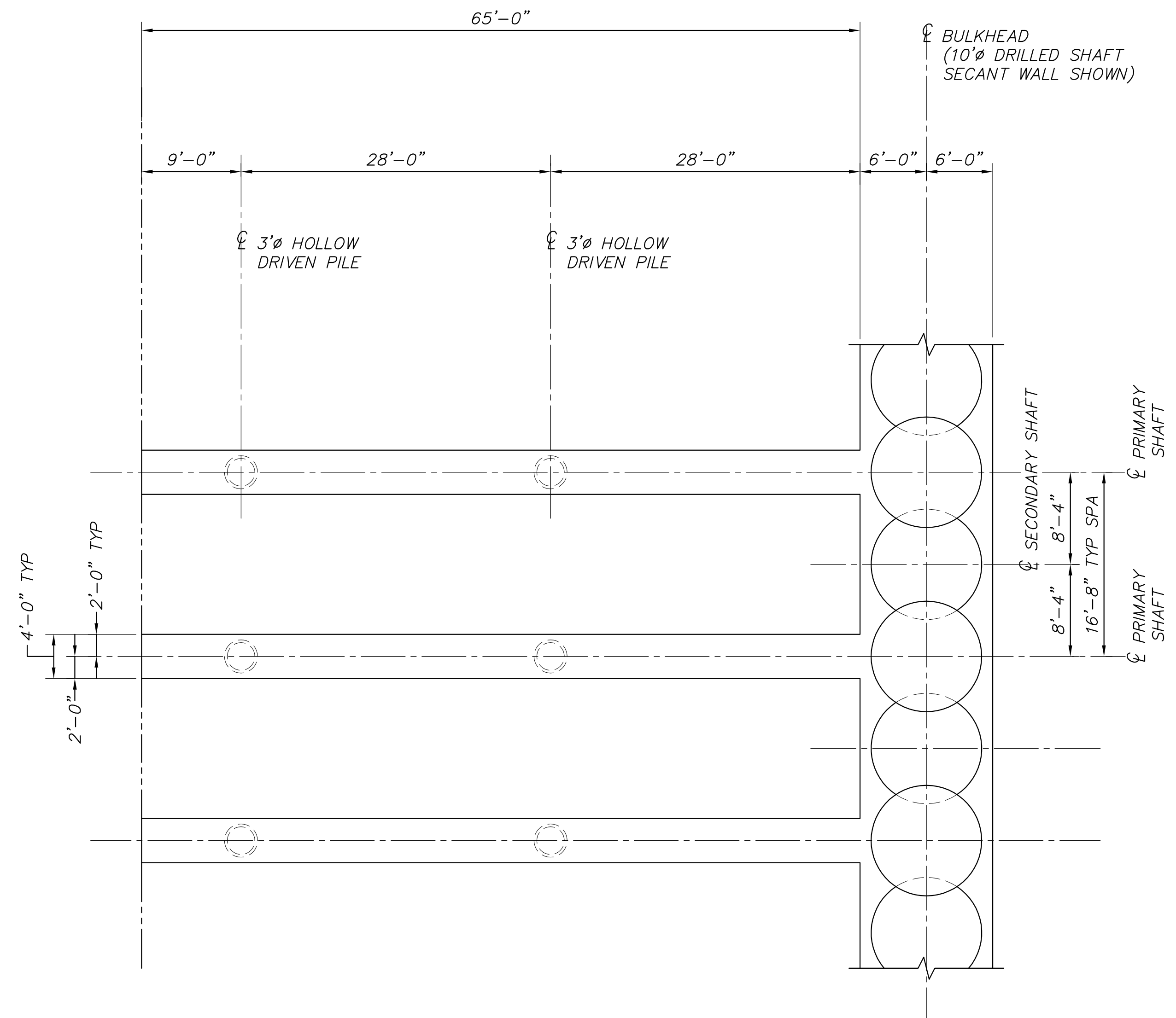
SEAWALL OPTION A1
WHARF WITH FILL REMOVED

BULKHEAD OPTIONS

FIG 2
SHEET
OF
SHEETS

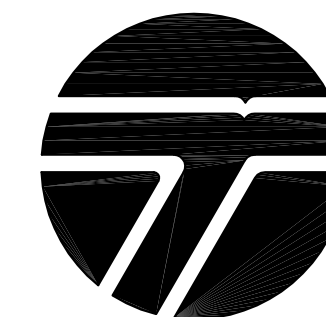


1 CANTILEVER SLURRY-WALL BULKHEAD
SCALE: N.T.S.



2 PARTIAL FRAMING PLAN
CANTILEVER DRILLED SHAFT
SECANT WALL BULKHEAD SHOWN
(OTHER BULKHEAD OPTIONS SIMILAR)
SCALE: N.T.S.

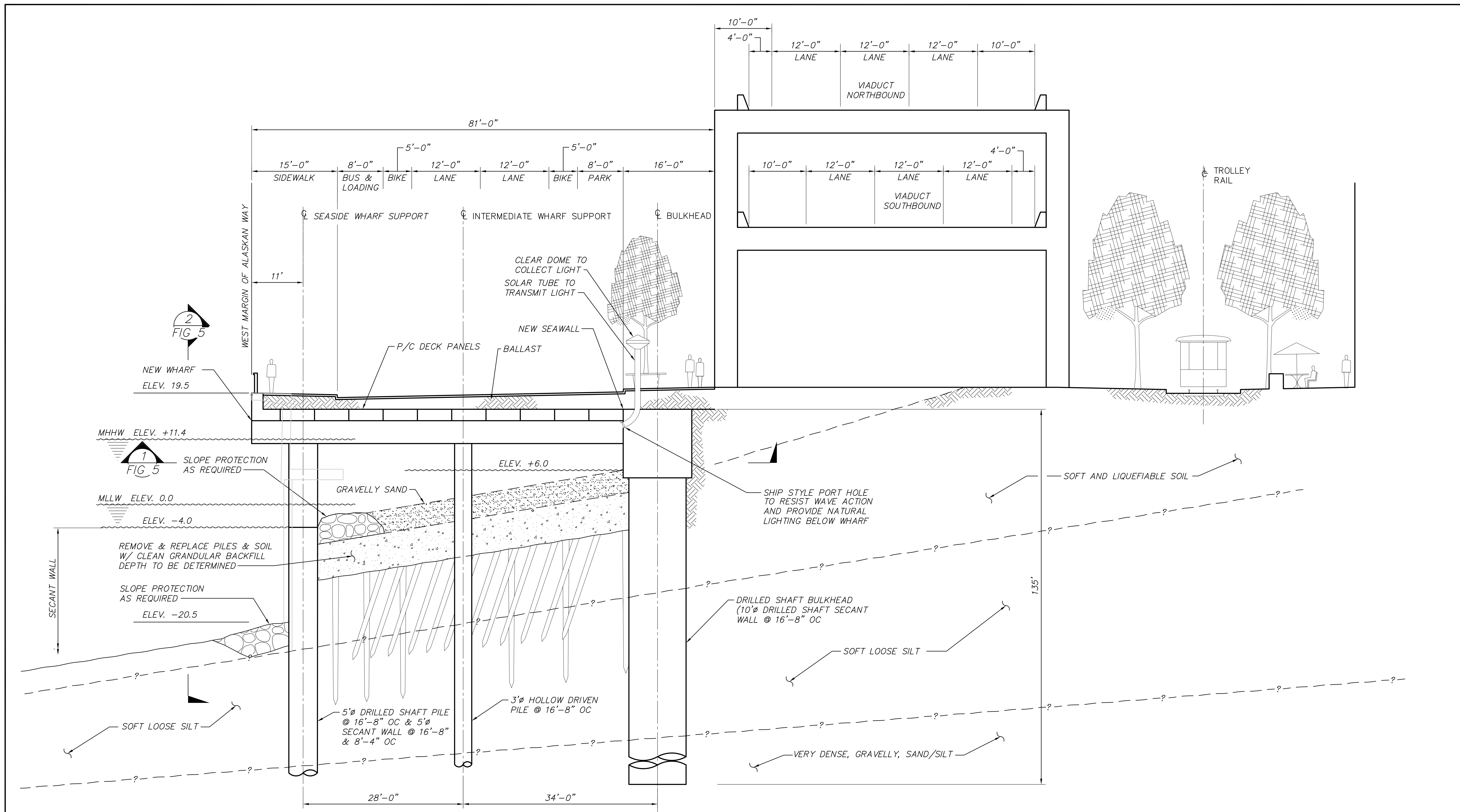
DRAWN	ERM					REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
DESIGNED	WEW					10	WASH			
CHECKED						JOB NUMBER				
PROJ ENGR	RLF									
REG ADM										
	DATE	REVISION	BY	APPR						



SEAWALL OPTION A1
WHARF WITH FILL REMOVED

BULKHEAD OPTIONS

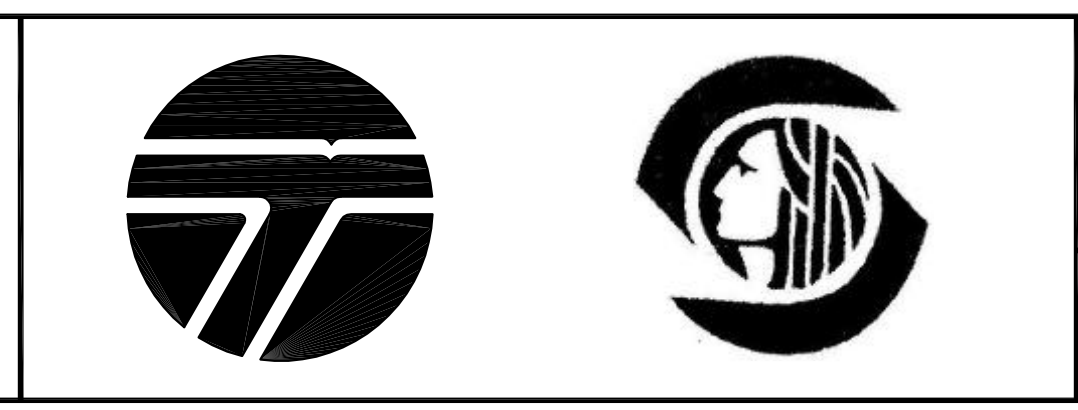
FIG 3
SHEET
OF
SHEETS



1
-
TYPICAL SECTION - WHARF W/PARTIAL FILL REMOVED
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

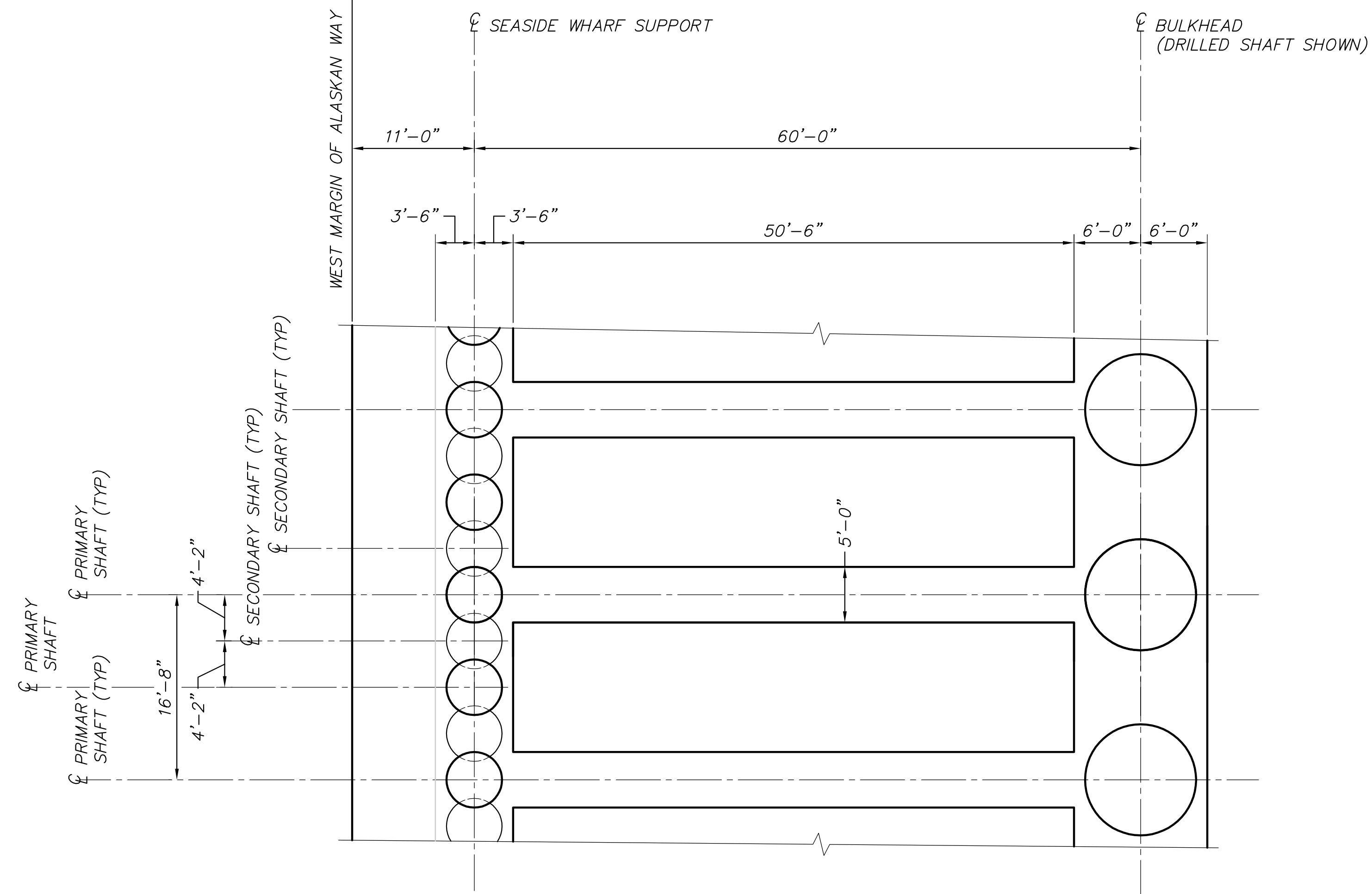
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				
-				



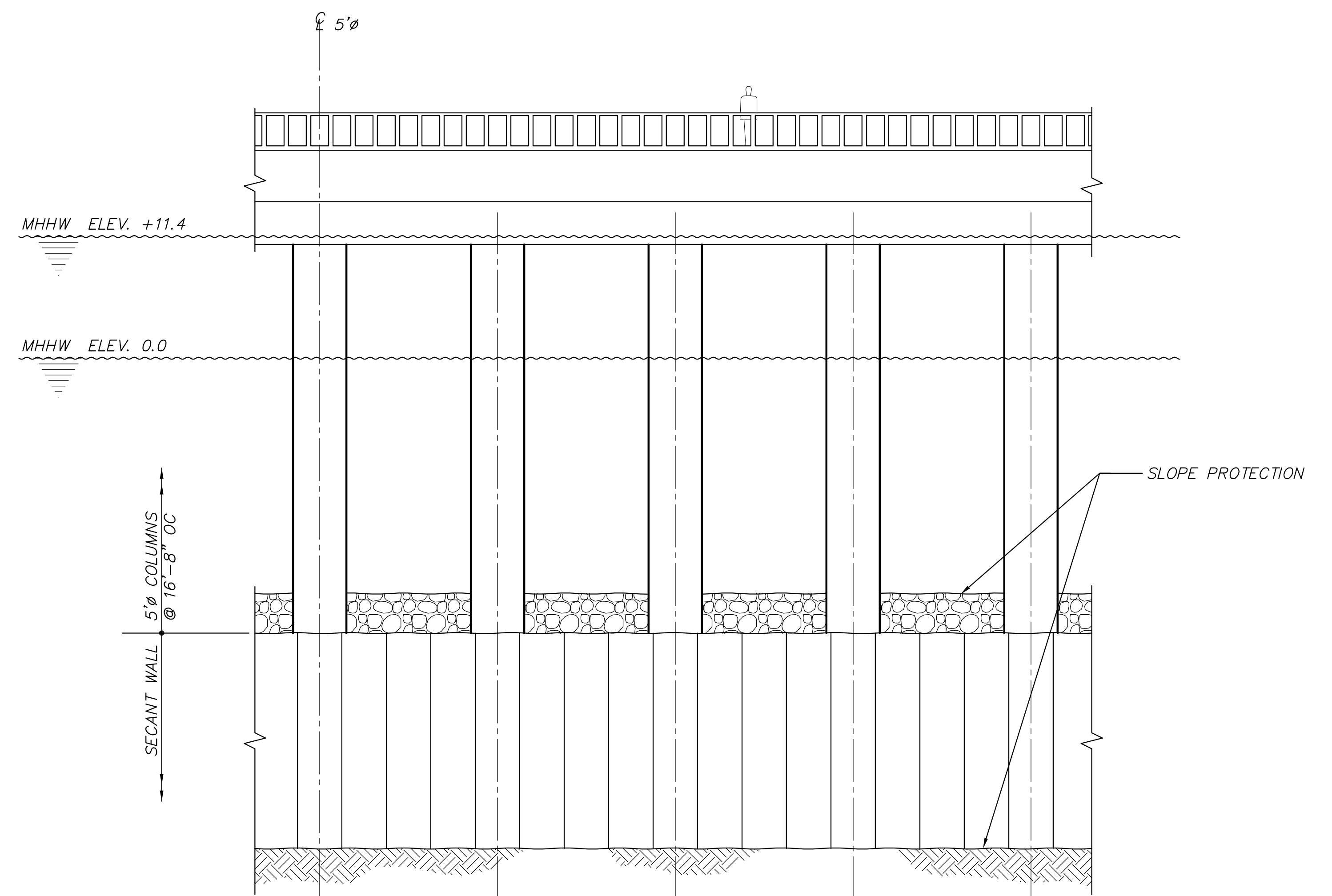
**SEAWALL OPTION A2
WHARF WITH INTERTIDAL BEACH**

TYPICAL SECTION

FIG 4
SHEET
OF
SHEETS



1 PARTIAL FRAMING PLAN
 FIG 4 SCALE: N.T.S.



2 ELEVATION
 FIG 4 SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
	DATE	REVISION	BY	APPR	

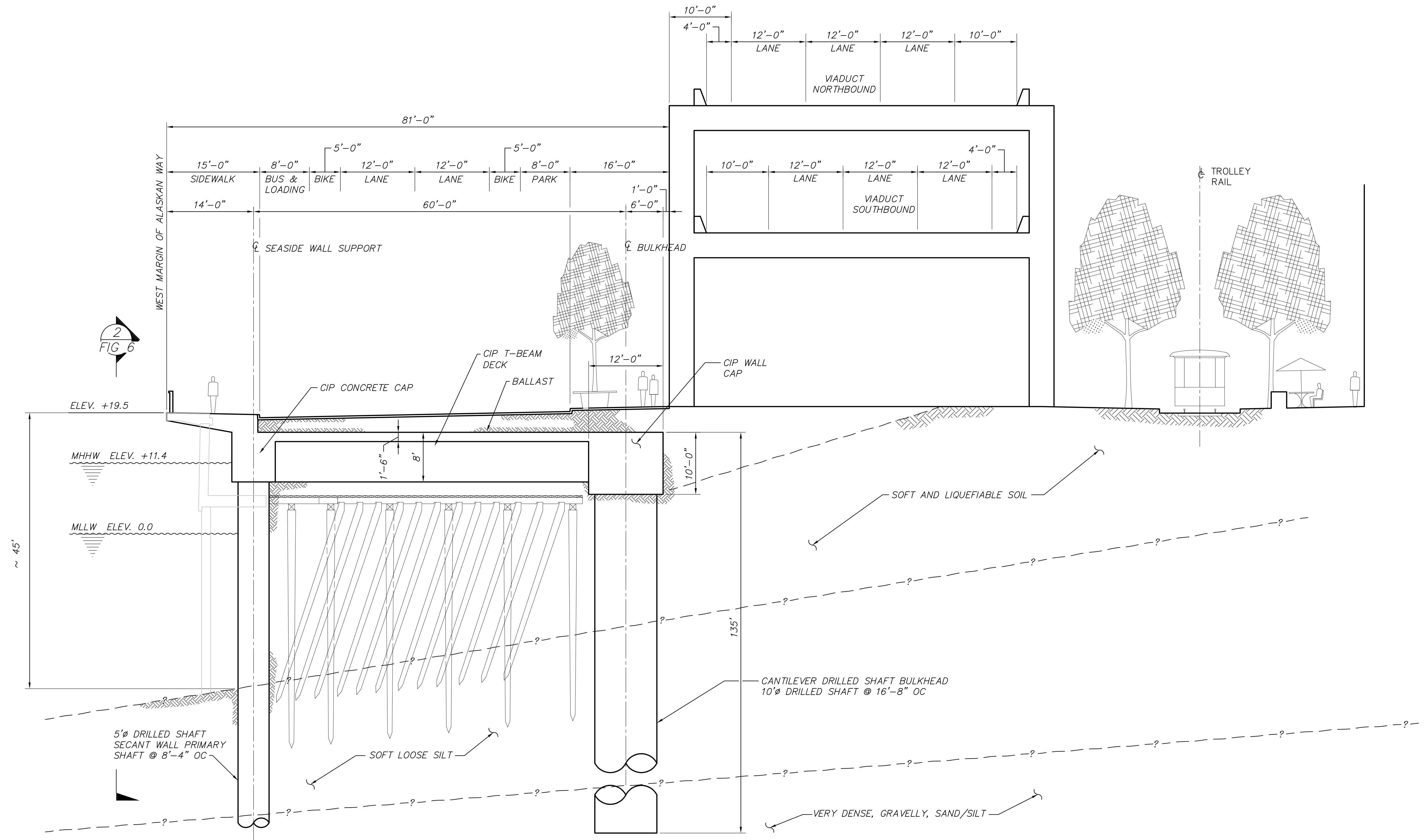
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER		-		



SEAWALL OPTION A2
 WHARF WITH INTERTIDAL BEACH

PLAN AND ELEVATION

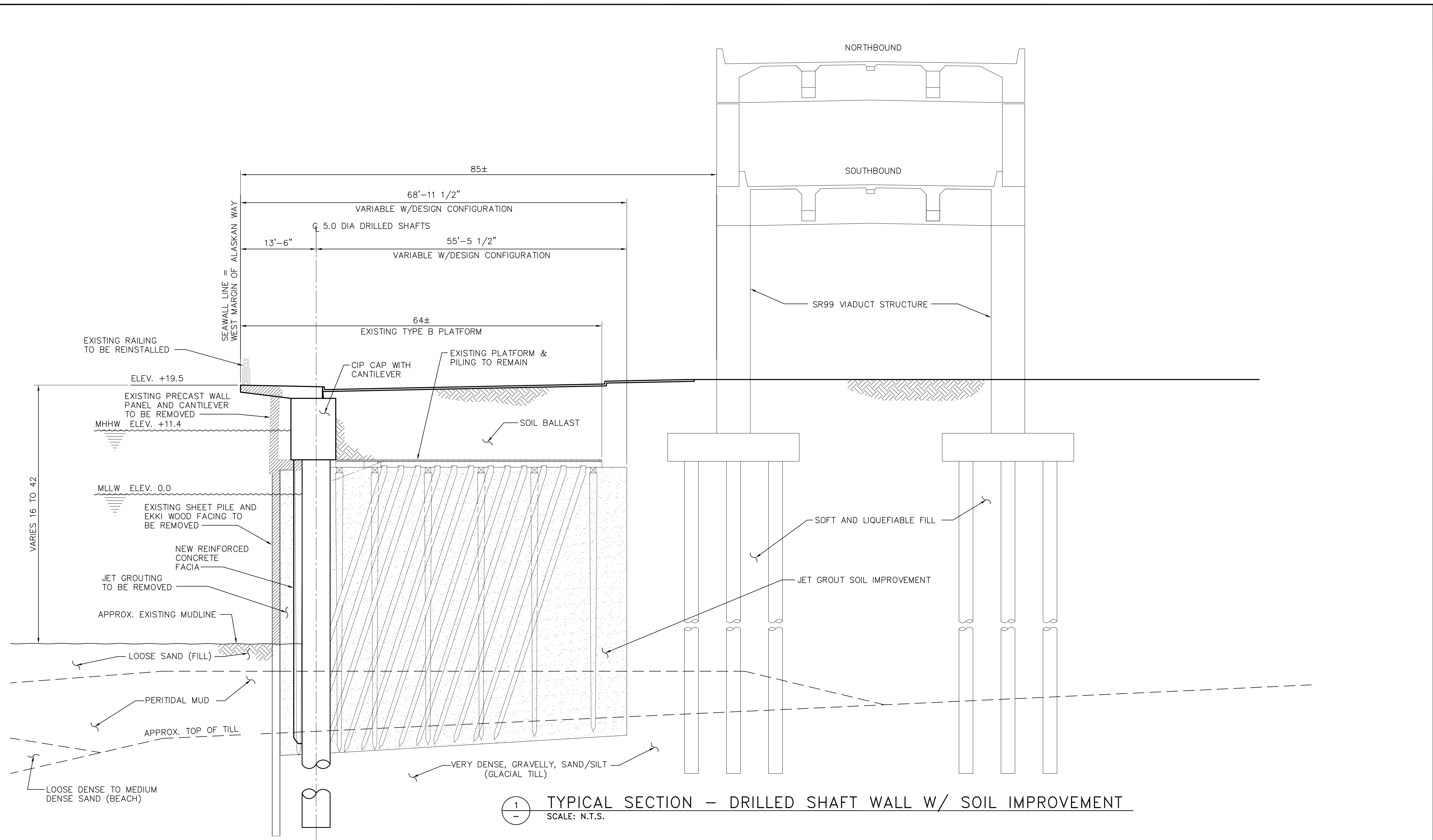
FIG 5
 SHEET
 OF
 SHEETS



2
FIG 6

1
-
TYPICAL SECTION - VERTICAL FACE W/ FRAME
SCALE: N.T.S.

DRAWN	ERM	REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS	 	SEAWALL OPTION A3 VERTICAL FACE WALL W/ FRAME	FIG 6 SHEET OF SHEETS
DESIGNED	WEW	10	WASH	-					
CHECKED		JOB NUMBER					TYPICAL SECTION		
PROJ ENGR	RLF								
REG ADM		DATE	REVISION	BY	APPR				



1
-
TYPICAL SECTION - DRILLED SHAFT WALL W/ SOIL IMPROVEMENT
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

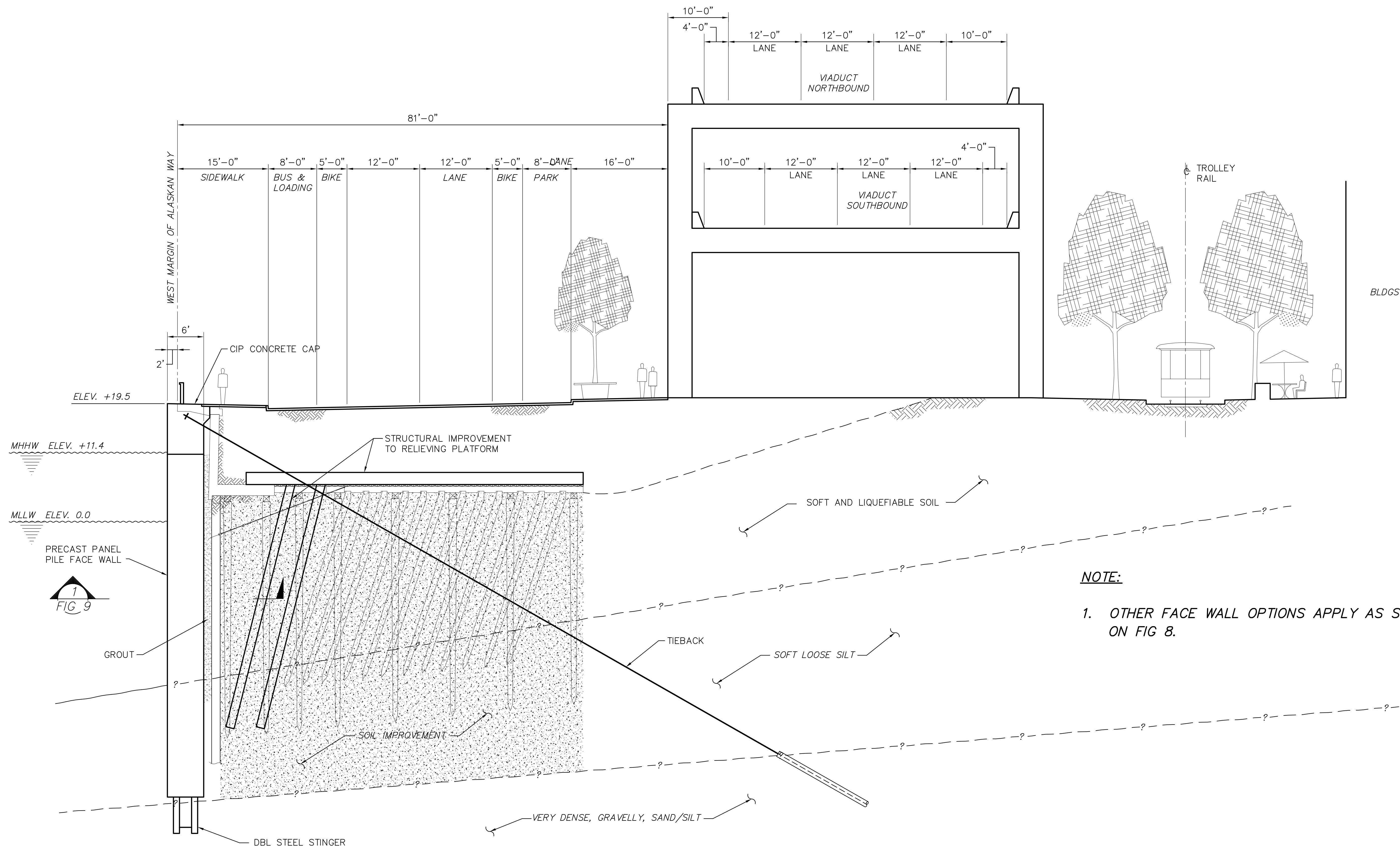
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				
-				



SEAWALL OPTION A4
DRILLED SHAFT WALL W/ IMPROVED SOIL



TYPICAL SECTION

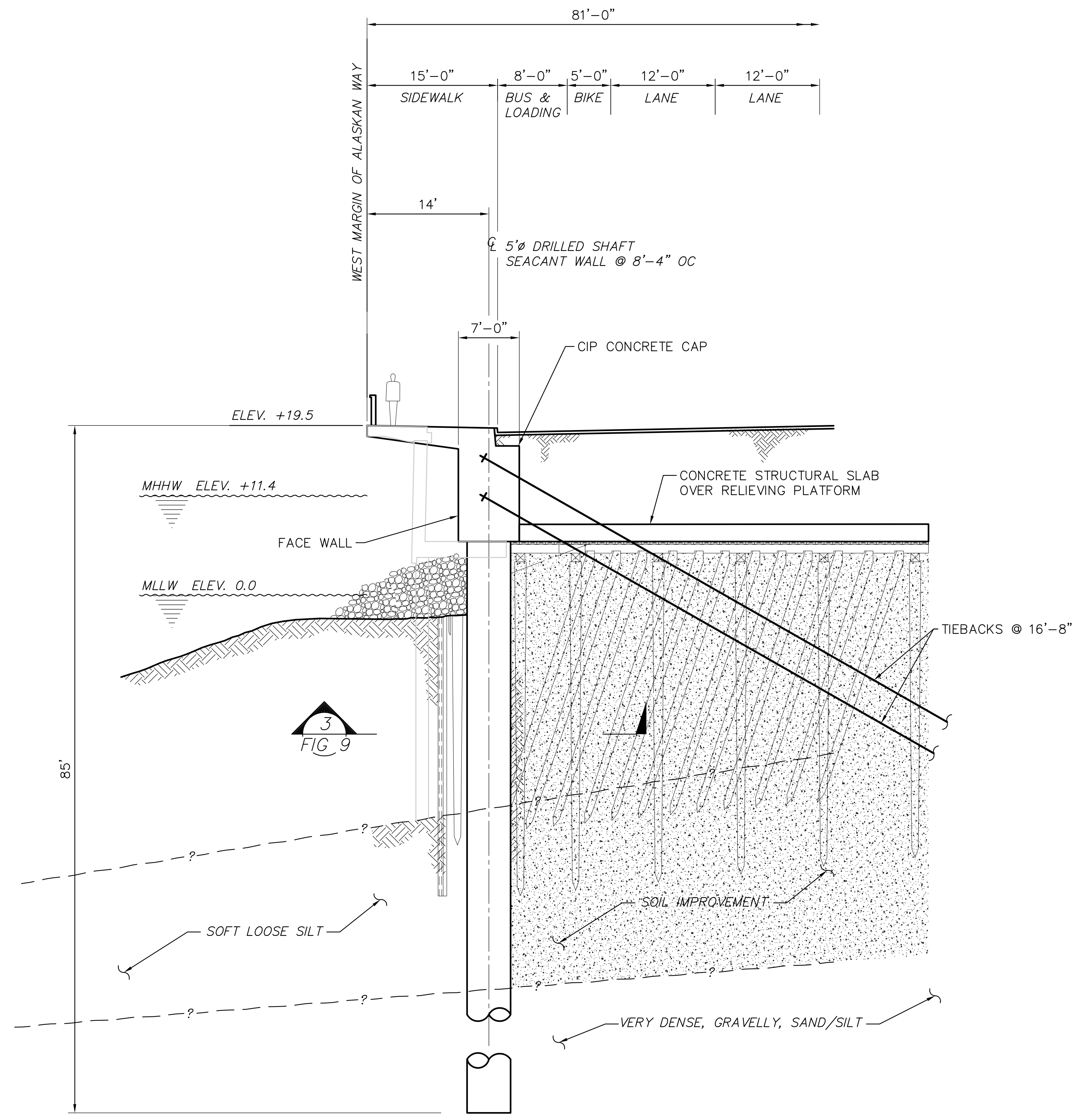
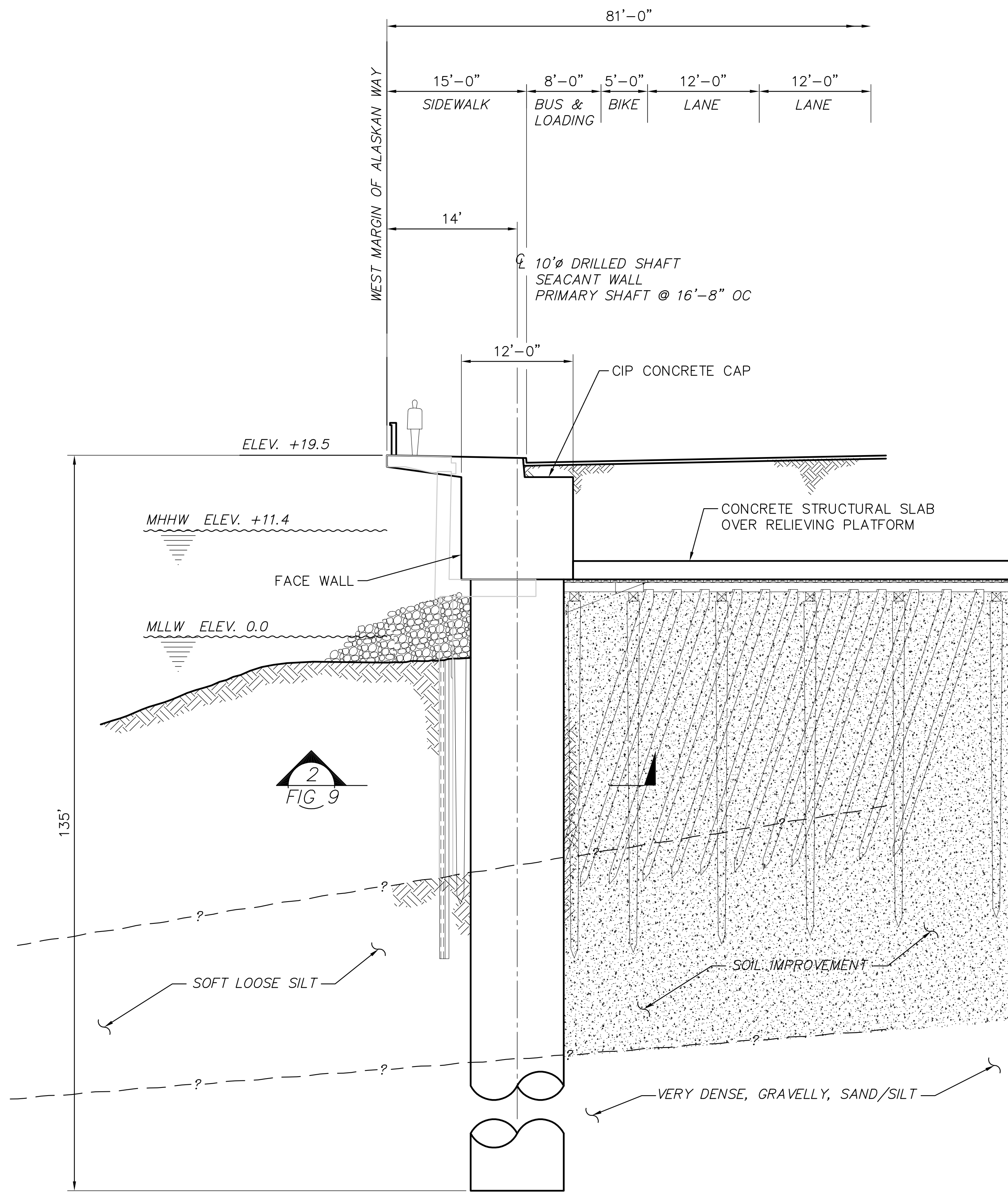
FIG 7
SHEET
OF
SHEETS



NOTE:
 1. OTHER FACE WALL OPTIONS APPLY AS SHOWN ON FIG 8.

1
 -
 TYPICAL SECTION - FACE WALL ONLY
 SCALE: N.T.S.

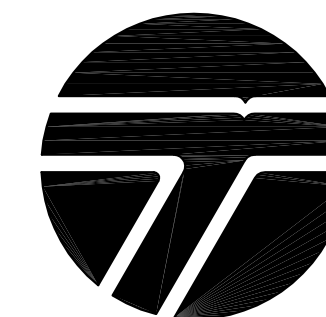
DRAWN	ERM	REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS	 	SEAWALL OPTION B1 FACE WALL ONLY	FIG 8 SHEET OF SHEETS
DESIGNED	WEW	10	WASH	-					
CHECKED		JOB NUMBER					TYPICAL SECTION		
PROJ ENGR	RLF								
REG ADM		DATE	REVISION	BY	APPR				



1
-
FACE WALL ONLY - W/ CANTILEVER DRILLED SHAFT
SCALE: N.T.S.

1
-
FACE WALL ONLY - DRILLED SHAFT W/ TIEBACKS
SCALE: N.T.S.

DRAWN	ERM					REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
DESIGNED	WEW					10	WASH	-		
CHECKED						JOB NUMBER				
PROJ ENGR	RLF									
REG ADM										
	DATE	REVISION	BY	APPR						

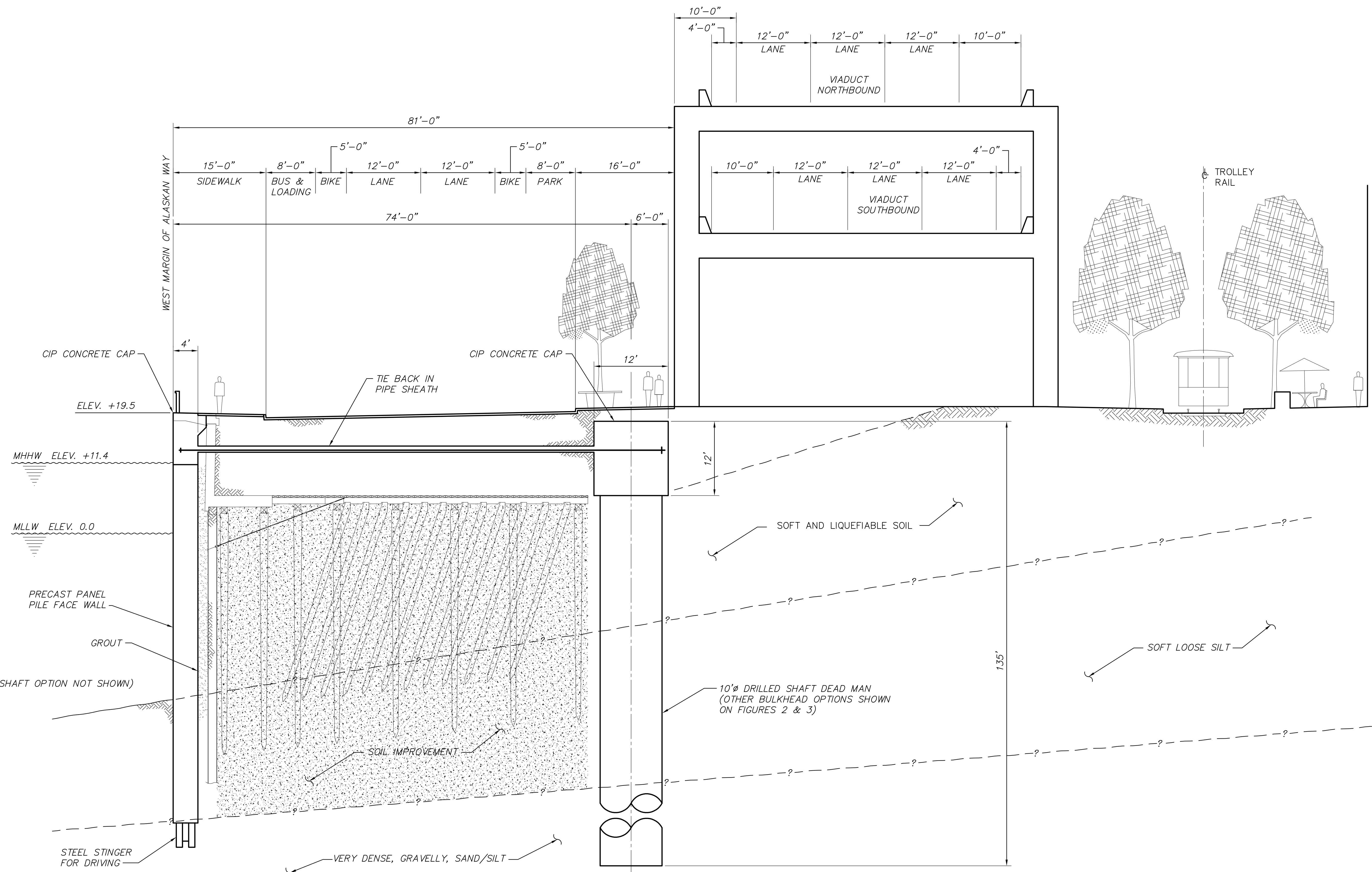


SEAWALL OPTION B1
FACE WALL ONLY

FACE WALL ONLY - OPTIONS

FIG 9

SHEET
OF
SHEETS



1
-
TYPICAL SECTION - ANCHORED WALL
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

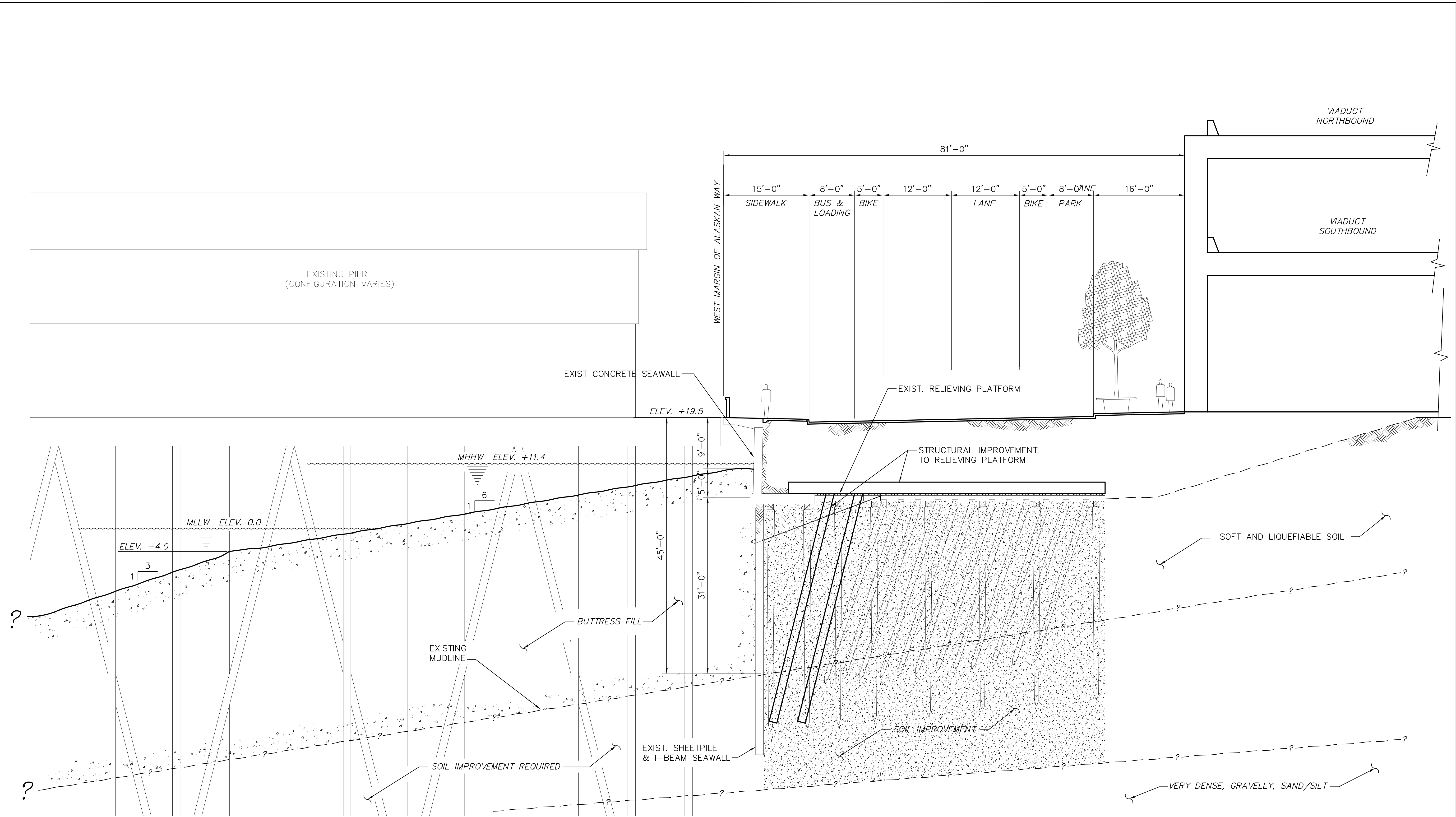
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				
-				



SEAWALL OPTION B2
ANCHORED WALL

TYPICAL SECTION

FIG 11
SHEET
OF
SHEETS



1
-
TYPICAL SECTION - BUTTRESS FILL
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

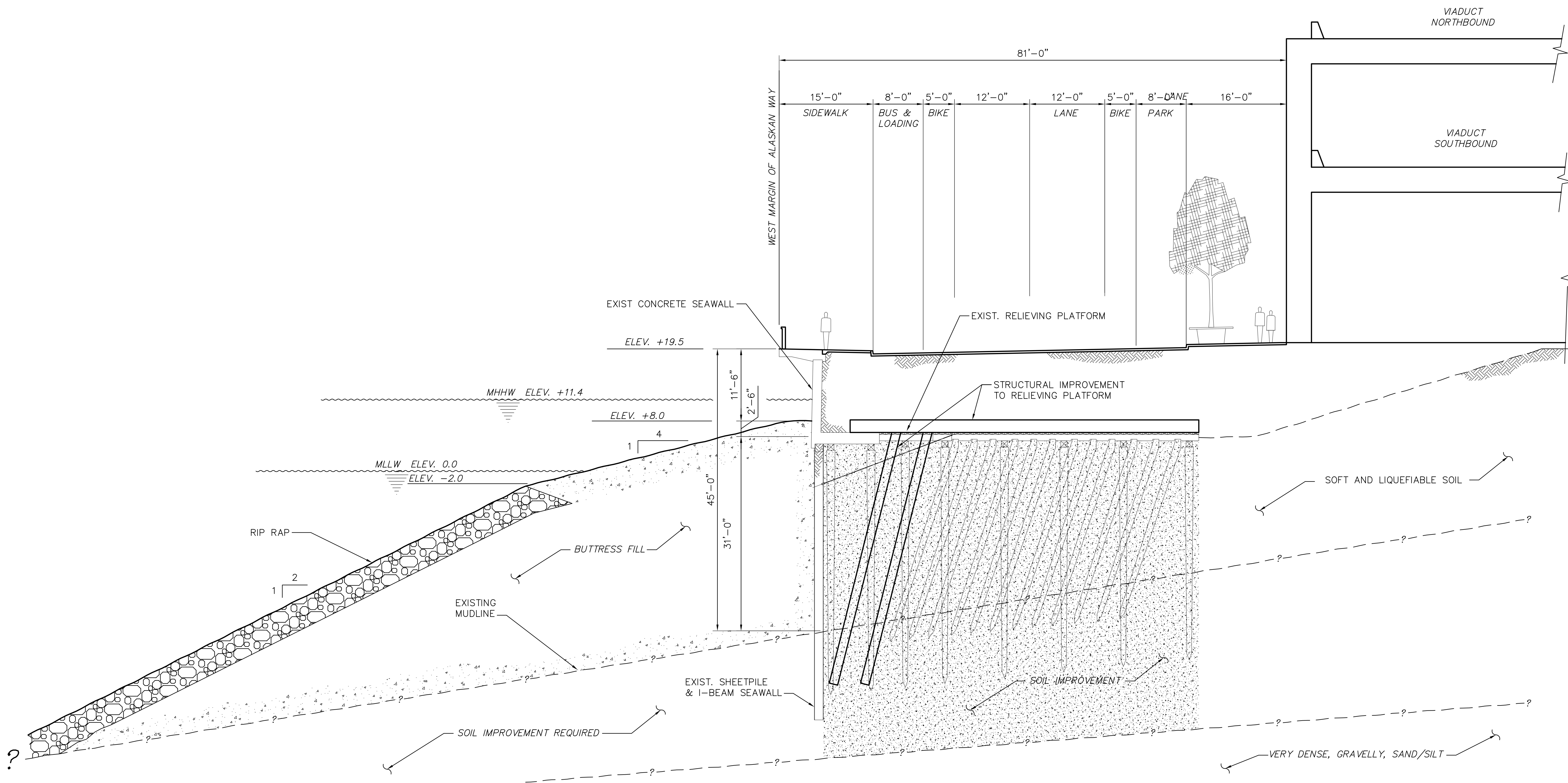
REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				



**SEAWALL OPTION B3
BUTTRESS FILL**

TYPICAL SECTION

FIG 12
SHEET
OF
SHEETS



1
-
TYPICAL SECTION - BUTTRESS FILL
SCALE: N.T.S.

DRAWN	ERM				
DESIGNED	WEW				
CHECKED					
PROJ ENGR	RLF				
REG ADM					
DATE	REVISION	BY	APPR		

REGION NO.	STATE	FED AID PROJ NO.	SHEET NO.	TOTAL SHEETS
10	WASH	-		
JOB NUMBER				



SEAWALL OPTION B3
MINIMUM BUTTRESS FILL

TYPICAL SECTION

FIG 13
SHEET
OF
SHEETS

APPENDIX B: CONCEPTUAL SEAWALL OPTIONS

Alaskan Way Seawall Replacement Options

Base Replacement Option	Sub-Option	Seaside Seawall/Face Wall Construction		Landside Bulkhead Construction	
		Outboard of Exist. Wharf Wall	Inboard of Exist. Wharf Wall	Bulkhead w/ Tieback	Bulkhead No Tieback
A1: Wharf w/ Fill Removed					
	a1		Pile	Shaft	
	a2		Pile		Shaft
	a3		Pile	Slurry Wall	
	a4		Pile		Slurry Wall
	b1		Shaft	Shaft	
	b2		Shaft		Shaft
	b3		Shaft	Slurry Wall	
	b4		Shaft		Slurry Wall
	c1	Pile		Shaft	
	c2	Pile			Shaft
	c3	Pile		Slurry Wall	
	c4	Pile			Slurry Wall
	d1	Shaft		Shaft	
	d2	Shaft			Shaft
	d3	Shaft		Slurry Wall	
	d4	Shaft			Slurry Wall
A2: Wharf w/ Intertidal Beach					
	a1		Shaft	Shaft	
	a2		Shaft		Shaft
	a3		Shaft	Slurry Wall	
	a4		Shaft		Slurry Wall
	b1	Shaft		Shaft	
	b2	Shaft			Shaft
	b3	Shaft		Slurry Wall	
	b4	Shaft			Slurry Wall
A3: Vertical Face Wall w/ Structural Frame					
	a1		Shaft	Shaft	
	a2		Shaft		Shaft
	a3		Shaft	Slurry Wall	
	a4		Shaft		Slurry Wall
	b1	Driven PC Pile		Shaft	
	b2	Driven PC Pile			Shaft
	b3	Driven PC Pile		Slurry Wall	
	b4	Driven PC Pile			Slurry Wall
	c1	Shaft		Shaft	
	c2	Shaft			Shaft
	c3	Shaft		Slurry Wall	
	c4	Shaft			Slurry Wall
A4: Drilled Shaft Wall w/ Soil Improvement					
	a1		Shaft	Soil Impovement	

Sub-Options eliminated early from further consideration

Alaskan Way Seawall Retrofit Options

Base Retrofit Option	Sub-Option	Seaside Seawall/Face Wall Construction		Landside Bulkhead Construction	
		Outboard of Exist. Wharf Wall	Inboard of Exist. Wharf Wall	Bulkhead w/ Tieback	Bulkhead No Tieback
B1: Face Wall Only					
	a	Driven Pile w/ Tieback			
	b1		Shaft w/ Tieback		
	b2		Cantilever Shaft		
B2: Anchored Wall					
	a1		Shaft	Shaft	
	a2		Shaft	Slurry Wall	Shaft
	a3		Shaft		Slurry Wall
	a4		Shaft		
	b1	Driven Piles		Shaft	
	b2	Driven Piles			Shaft
	b3	Driven Piles		Slurry Wall	Slurry Wall
	b4	Driven Piles			
	c1	Shaft		Shaft	
	c2	Shaft			Shaft
	c3	Shaft		Slurry Wall	
	c4	Shaft			Slurry Wall
B3: Buttress Fill					
	a1	Embankment Fill			

Sub-Options eliminated early from further consideration

Appendix W

Screening Documents

2005-2006 SDEIS Screening

This Page Intentionally Left Blank

Alaskan Way Viaduct and Seawall Replacement Project

2005 North End Screening Criteria

Introduction

The three lead agencies¹ have revised the project's purpose and need statement to address the need for access and safety improvements to the SR 99 corridor from the north portal of the Battery Street Tunnel north to Roy Street. Changes to the project's purpose and need statement only apply to areas north of the Battery Street Tunnel; therefore, the lead agencies propose to adopt screening criteria that only apply to areas north of the Battery Street Tunnel. For all areas south of the Battery Street Tunnel, the lead agencies will continue to apply screening criteria developed in 2003.

In this section of the project corridor, SR 99 currently has three lanes in each direction with a center jersey barrier. Some surface street connections are interrupted by SR 99 in this section. The primary purpose of the north end screening process is to narrow the range of design concepts that will be considered in the project corridor north of the Battery Street Tunnel.

Purpose and Need Statement and 2005 North End Screening Criteria

The 2005 amended project purpose is:

“To provide a transportation facility and seawall with improved earthquake resistance. The project will maintain or improve mobility, accessibility, and traffic safety for people and goods along the Alaskan Way Viaduct Corridor as well as improve access to and from SR 99 from the Battery Street Tunnel north to Roy Street.”

The screening criteria from 2003 have been revised and reorganized to match the revised purpose and need statement. Based on these changes, the following screening criteria will be used to screen design concepts for areas north of the Battery Street Tunnel.

The amended purpose and need statement calls for maintaining or improving:

1. traffic safety
2. mobility, and
3. accessibility

Purpose:

Goals 1 and 2 are both based on the Purpose statement.

¹ The three lead agencies for the project include the Federal Highway Administration (FHWA), the Washington State Department of Transportation (WSDOT), and the City of Seattle (City).

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

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

Goal 3: An alternative must improve traffic safety.

Need:

The goals listed below will be used to screen improvements based on the revised project needs.

Goal 4: An alternative should support bicycle and pedestrian accessibility and mobility.

Goal 5: Between Battery Street Tunnel and Roy Street, an alternative should improve access to and from SR 99 and improve local connections.

Goal 6: An alternative should eliminate or reduce design deficiencies found on the existing corridor.

Goals and Objectives:

The goals listed below will be used to screen improvements north of the Battery Street Tunnel based on the project's goals and objectives. They will be applied during the screening process after criteria based on the project's purpose and need have been satisfied. These criteria provide a means to narrow the range of alternatives.

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

Goal 8: An alternative should not further degrade the operation of other major transportation facilities.

Goal 9: An alternative should maintain transportation links to I-5.

Cross-reference to 2003 screening criteria

The table below shows how the 2005 amended screening criteria for areas north of the Battery Street Tunnel relate to 2003 screening criteria.

2005 revised screening criteria	2003 Goal
Goal 1: An alternative must provide facilities that meet current seismic design standards.	1
Goal 2: An alternative must maintain the current transportation functions of the Alaskan Way Viaduct Corridor.	2

2005 revised screening criteria	2003 Goal
Goal 3: An alternative must improve traffic safety.	4
Goal 4: An alternative should support bicycle and pedestrian accessibility and mobility.	6
Goal 5: Between Battery Street Tunnel and Roy Street, an alternative should improve access to and from SR 99 and improve local connections.	Not included
Goal 6: An alternative should eliminate or reduce design deficiencies found on the existing corridor.	Not included
Goal 7: An alternative should be compatible with local, express, and high-capacity transit.	7
Goal 8: An alternative should not further degrade the operation of other major transportation facilities.	3
Goal 9: An alternative should maintain transportation links to I-5.	5

2003 Screening Criteria Not Related to North End Improvements:

An alternative should support land use and shoreline plans and policies pertaining to development of the downtown Seattle waterfront.	8
An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall.	9
An alternative should rely on proven construction methods, minimize construction duration, and promote effective traffic management during construction.	10

This Page Intentionally Left Blank

Appendix W

Screening Documents

2006 Elevated Screening

This Page Intentionally Left Blank



The Alaskan Way Viaduct
& Seawall Replacement Project

Elevated Structure Alternative: Screening of Design Concepts

DRAFT Alternatives Screening Memorandum

Submitted to:

Washington State Department of Transportation

Urban Corridors Office

401 Second Avenue S, Suite 560

Seattle, WA 98104-3850

Submitted by:

Parsons Brinckerhoff Quade & Douglas, Inc.

Prepared by:

Parametrix, Inc.

October 2006

This Page Intentionally Left Blank

SR 99 | Alaskan Way Viaduct & Seawall Replacement Project

Elevated Structure Alternative Screening of Design Concepts Alternatives Screening Memorandum Update

Agreement No. Y-7888

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

Parsons Brinckerhoff Quade & Douglas, Inc.

999 Third Avenue, Suite 2200

Seattle, WA 98104

In association with:

Jacobs Civil Inc.

Parametrix, Inc.

William P. Ott

This Page Intentionally Left Blank

Table of Contents

1.0	INTRODUCTION AND PURPOSE: ELEVATED STRUCTURES SCREENING PROCESS.....	1
1.1	Screening Criteria Development.....	2
1.2	Screening Goals for Elevated Structures.....	4
2.0	DESIGN CONCEPT DEVELOPMENT.....	5
2.1	Concept Development Process.....	6
2.2	Functional Design Considerations	2
2.3	Development Workshops.....	6
2.4	Evaluation of Concepts with Key Design Features and Screening Summary	6
2.4.1	Option 1-Pre-Cast Girders.....	6
2.4.2	Option 2-Steel Box Girders	8
2.4.3	Option 3-Cable Stayed 1.....	9
2.4.4	Option 4-Cable Stayed 2.....	10
2.4.5	Option 5-Cable Stayed 3.....	12
2.4.6	Option 6-Steel Truss	13
2.4.7	Option 7-Concrete Segmental Box.....	14
2.4.8	Option 8-Extrados.....	15
2.4.9	Concept 9 (Representative Chopp) – PCB with Lid	16
2.5	Screening Summary: Elevated Concept(s) to be Carried Forward.....	18

Appendix A – Screening Goals Matrix

List of Tables

Insert List of Tables Here using “Table Headings” and automatic insert or manually typing in.

Table 1 Title.....	Error! Bookmark not defined.
Table 2 Title.....	Error! Bookmark not defined.

List of Figures

Insert List of Figures here using “figure titles” and automatic insert function or manually typing in.

Figure 1 Title.....	Error! Bookmark not defined.
Figure 2 Title.....	Error! Bookmark not defined.

Elevated Structure Alternative: Screening of Design Concepts

Elevated Structure Alternative Screening Memorandum Update

1.0 Introduction and Purpose - Elevated Structures Screening Process

The 2003 Final Screening Criteria were revised in May 2005 following the revision of the project's Purpose and Need statement (2005) by the three lead agencies: WSDOT, the City, and FHWA. These three agencies have considered dozens of alternatives designed to improve the Alaskan Way Viaduct corridor. The purpose of this alternatives screening memorandum update is to present the design options that have been added for consideration for the Elevated Structure alternative. This memorandum also describes the screening process used to select the alternative that will be evaluated in the project's Final Environmental Impact Statement (Final EIS).

Background

The Elevated Structure Alternative analyzed in the Supplemental Draft EIS was an amalgam of components of the Aerial Alternative and the Rebuild Alternatives evaluated in the Draft EIS. This Elevated Structure alternative evolved from a lengthy design process that in part resulted from listening to public comment on the Draft EIS.

After the Draft EIS was published in March 2001, many of the comments received requested that the project partners evaluate the effects and tradeoffs of more than the one construction plan analyzed in the Draft EIS. In response to this request and other subsequent public comments, the project team has developed three construction plans that are evaluated in the Supplemental Draft EIS. These construction plans represent the tradeoffs between total construction durations and the periods of time SR 99 can remain open during the construction period. That is, the longer the SR 99 corridor remains open, the longer the total construction period will be. With periodic closures of SR 99, the overall construction duration will be shorter.

Taking into consideration many of the public comments relating to potential construction effects and funding issues, the partnering agencies requested that the project team develop additional design concepts for the Elevated Structure Alternative, including construction approaches that might minimize traffic closure periods. Eight concepts were developed for evaluation with one additional concept

proposed for consideration by State Representative Frank Chopp for a total of nine design concepts presented for evaluation.

1.1 Screening Criteria Development

Design Goals

The following design goals, based on functional design considerations, were used in the development of the design concepts.

These initial design goals were:

- to evaluate different structure types and span lengths for an aerial structure;
- to incorporate solid context-sensitive urban design and architectural values in the design;
- to consider different structures or structural framing that might reduce noise or facilitate noise mitigation strategies
- to evaluate designs that might allow traffic flow to remain ‘as open as possible’ during construction
- to study designs that might allow for reduced construction durations
- to explore concepts that would enhance Seattle’s urban design context

The screening criteria were developed specifically to evaluate new elevated structure designs consistent with these design goals. The screening criteria also maintain consistency and compatibility with the previous screening evaluations of other alternatives, while ensuring the consideration of factors unique to elevated structure designs. The following screening criteria were used to narrow the range of elevated structures being considered:

1. Main bridge design performance
 - a. Battery Street Tunnel and Fire/Life Safety design
 - b. Ramp connections
 - c. Maintenance-long-term maintenance requirements and costs
 - d. Homeland Security considerations (AASHTO)
2. Construction activities and total construction duration
 - a. SR 99 Open or Closed Construction Plans

- b. Surface street traffic, including pedestrian/bicycle facilities, business access impacts, ferry operations, port and container terminal freight access
- c. Utilities relocation impacts
- 3. Constructability
 - a. Level of specialty work required
 - b. Risk to Contractor
 - c. Risk to Public Safety
 - d. Staging
 - e. Work Zone Access
 - f. Contracting Flexibility
- 4. Cost/risk assessment
 - a. Contractor constraints
 - b. Total project costs with varying construction plans
- 5. Maintenance of SR 99 traffic during construction planning
 - a. Closure Type A - 2 Lanes each direction (peak hours) with 2-month closure
 - b. Closure Type B - 2 Lanes each direction- 2 Lanes each direction (peak hours) with 6-month closure
 - c. Closure Type C - 1 Lane each direction (peak hours) with 6-month closure
 - d. Closure Type D - Complete closure
 - e. Detour infrastructure and feasibility
- 6. Final accessibility
 - a. Ramp traffic
 - b. Surface streets
 - c. Pedestrian
 - d. Bicycle
 - e. Transit/Waterfront Streetcar
 - f. Parking
 - g. Rail
- 7. Urban design considerations
 - a. Public Open Space opportunities
 - b. Waterfront plans
 - c. Bridge Aesthetics
 - d. Architectural Enhancement
 - e. Contextual compatibility
- 8. Environmental effects
 - a. Historic and Archeological resources and Sec. 4(f) & 106 requirements
 - b. Storm Water/Drainage
 - c. Final Traffic Noise-Businesses
 - d. Final Traffic Noise-Promenade/Pedestrians
 - e. View Corridor impacts
 - f. Views from Shoreline of downtown
 - g. Views from public parks

- h. Shading effects-shore
- i. Shading effects-Waterfront
- j. Shading effects-Public ROW
- k. Agency permits

1.2 Screening Goals for Elevated Structures

In 2003, in order to determine the range of design concepts to be included in the Draft EIS, the following screening goals were established to support the project's revised Purpose and Need statement. These screening goals (criteria) were approved by the WSDOT, FHWA, the City of Seattle, and agencies participating in the Resource Agency Leadership Forum. These goals are listed below.

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

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

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

Goal 4: An alternative should improve traffic safety.

Goal 5: An alternative should maintain regional transportation linkages.

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

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

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

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

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

Screening of elevated structure design concepts used criteria based on and consistent with these previously established goals.

2.0 Design Concept Development

The WSDOT and the City of Seattle requested that the project team review possible new design concepts for the Elevated Structure. Due to the evolving design and the continuing public process, more was known about public and resource agency interests regarding an elevated structure. As more was known at this point in the project about design constraints and opportunities, it was felt that design options for the Elevated Structure could be reviewed and updated, along with evaluating new approaches both in design and construction planning, for opportunities to accommodate some of these public and partnering agency interests.

Ultimately, 9 concepts were evaluated. These included 3 double-deck bridge concepts, 3 cable-stayed bridge types, 1 single-deck segmental concrete type, 1 extrados (cable/segmental concrete) type, and 1 double-level structure, with lidded park included. These bridge categories led to 9 structure design options, which in part or as a whole meet important project functional design considerations and/or meet some or all of the developed multi-disciplinary screening criteria.

The 9 options are:

1. Pre-stressed Concrete Girders
2. Steel Box Girders
3. Cable Stayed (single tower) w/ concrete segmental approaches
4. Cable Stayed (double towers) w/ concrete segmental approaches
5. Cable Stayed (double towers)/steel truss w/ steel box approaches
6. Steel Truss w/ steel box approaches
7. Concrete Segmental Box Girders
8. Extrados Cable Stayed/Concrete Segmental
9. Pre-stressed Concrete Girders with Lidded Park

While each bridge option provides unique features and challenges, approach structures at the ends where the replacement structure will tie-in to the existing and remaining components, will likely be single level and separated segmental box girders (similar to option 7), supported on single column bents founded on large diameter shafts.

Each option will be described below in Section 2.2.

2.1 Concept Development Process and Evaluation Workshops

A series of elevated structure workshops were held, with project leads representing key team disciplines, such as the environmental group, bridge structure experts, the civil engineering leads, Project Management (PMAC team), partnering agency staff, utilities team, transportation, and urban design.

The workshops and their focus are detailed as follows:

Workshop No. 1 (May 16, 2006) focused on developing construction approaches with various traffic closure options and preliminary design concepts. Eight options, representing several categories of bridge types, were introduced for evaluation.

Workshop No. 2 (June 20, 2006) focused on the development of the evaluation criteria, with input from all of the discipline leads. Upon finalizing the criteria all team leads and support staff were involved with the evaluation of the 8 options introduced and discussed during Workshop No. 1.

Workshop No. 3 (July 11, 2006) focused on the screening process. During this initial round of screening, Option 4 - Cable-Stayed (double towers) with Concrete Segmental Approaches and Option 5 - Cable-Stayed (double towers) Steel Truss with Steel Box Approaches were recommended for elimination. The process continued with a review of the technical summaries of the six options remaining (Options 1, 2, 3, 6, 7, and 8). Option 9 was also introduced and recommended for evaluation by State Rep. Chopp at this time. Retaining Option 9 was recommended to allow sufficient time for review and examination of this option. The elimination of Options 4 and 5 was confirmed. As discussions continued, Option 2 (Steel Box Girders), Option 3 (Cable-stayed Bridge with single tower - Concrete Segmental Approaches), and Option 6 (Double-decked Steel Truss with Steel Box Approaches) were eliminated from further review for similar reasons of incompatibility with the screening criteria (detailed below under 2.2.1, 2.2.3 and 2.2.6).

Workshop No. 4 (October 5, 2006) convened to review and compare the remaining bridge options (1, 7, 8, and 9) under the two construction traffic closure approaches, Types A and D. Type A was defined as “two lanes open in each direction (peak hours) with a 2-month closure”, and Traffic Closure Type D was defined as a complete closure (between 42 and 45 months).

2.2 Evaluation of Concepts with Key Design Features and Screening Summary

2.2.1 Option 1-Pre-stressed Cast Concrete Girders

General Description

This option is very similar to the Elevated Alternative design plan proposed in the June 30, 2005 plan set and analyzed in the Supplemental Draft EIS issued in July 2006.

Key Features:

- Replace SR 99 with a new double-level aerial structure through the central section that would be 11.5 to 35 feet wider than today's viaduct with an approximate roadway width of 50 feet.
- The new structure would be only about 3 ft higher than the existing viaduct. The height to the upper deck for this option would be approximately 60 feet. Columns would be approximately XX feet apart.
- The new structure would meet current roadway design standards for lane and shoulder widths while minimizing the effects on views in downtown Seattle.
- The new structure would provide three lanes in each direction on two levels.
- This option would provide midtown ramp access with the replacement of the existing ramps at Seneca and Columbia Streets
- The SR 99 roadway would continue over Elliott and Western Avenues between Pine Street and the Battery Street Tunnel.
- Alaskan Way's surface street would be replaced with four lanes--two lanes each way with double waterfront streetcar tracks.

Key Characteristics

- Maintains connections to the waterfront, downtown, and Ballard/Interbay in the built condition.
- Widened lanes and shoulders would meet current safety standards.
- Can be built while maintaining at least two lanes of traffic on SR 99, except for 3 months of closure.
- This elevated structure has view impacts and urban design effects (such as lost land use opportunities) on downtown Seattle and the waterfront.
- Minimal ROW impacts in the central section up to the Battery Street Tunnel.

Screening Results

This option was retained for further consideration and development as it is most similar to the existing viaduct structure and meets several of the screening criteria:

- Meets current road design safety standards, including sight distance.
- This design concept represents substantial improvements in safety, updated design standards, including seismic safety events, etc.
- Minimal right-of-way (ROW) impacts in the central section up to the BST.
- Meets current design standards without necessitating deviation approval.
- Less costly than other options.
- Provides for simpler and more aesthetically appealing structure consistent with the urban design context.

2.2.2 Option 2-Steel Box Girders

Key Features

- This concept features a double-decked steel box structure (with similar framing as the existing viaduct.)

The horizontal and vertical alignment is also similar to the existing viaduct (with 300-foot span lengths). The approximate height from ground level to the upper roadway deck would be 60 feet, and the roadway width would be about 50 feet.

Key Characteristics

- Widened lanes and shoulders meet current safety standards.
- Meets current sight distance standards in curves.
- Street level uses would still experience negative noise effects from the steel box girder construction.
- Could accommodate more public open use area
- Provides for simpler and more appealing form (visual quality)
- Could meet criteria for context-sensitive design.
- Higher risk and greater difficulty to construct while maintaining some traffic flow

- Greater utility relocation impacts.

Screening Results:

This option was eliminated from further consideration primarily because of the following considerations.

- The steel box girder construction would carry greater noise impacts at the street level and at higher elevations. Steel structures tend to reflect roadway noise more efficiently than concrete structures which have some noise-absorptive qualities.
- This option would be more costly than many of the others with steel prices running generally higher than concrete prices globally.
- This option would carry greater life cycle maintenance requirements and therefore higher long-term maintenance costs.
- The construction of this design option carries higher risk and would be more difficult to build under traffic conditions.

2.2.3 Option 3-Cable-Stayed (single tower) with Concrete Segmental Approaches

Key Features

This single tower cable-stay bridge concept would be built as a cable-stayed structure with one roadway deck. It would be built with its horizontal alignment likely to be oriented to the west of the existing alignment. Its vertical profile would be substantially higher than the existing viaduct alignment with a roadway height of approximately 100 feet. The tower height would be approximately 270 feet.

Key Characteristics

- Would provide for an iconic, sculptural effect along the waterfront.
- Structure would be easier to build under open traffic flow conditions, and with safer construction staging over surface level traffic.
- Benefits utilities relocations efforts under early construction stages.
- Does not provide midtown ramp connections.
- Would include an undesirably steep 5% grade for about 2000 feet to accommodate connections at both ends of the bridge.

- Would require higher maintenance levels (due to steel components).
- Potentially carries greater shading effects on waterfront and promenade area.
- With greater height of roadway structure and tower, this design option would create substantial negative impacts on downtown view corridors (views both from the waterfront toward downtown and toward Elliott Bay from downtown)
- Would result in less space for public use open areas along the waterfront.

Screening Results

This concept was dropped from further consideration due to the following:

- Inconsistent with Goal 8: this design is incompatible with City Shoreline Management and land use regulations and would likely be very difficult to permit.
- The steep grade approaching the elevated structure (on both ends) presents a safety concern with regard to differential speeds.
- Cost is higher than other structure options, including high initial construction costs as well as higher long-term maintenance costs due to steel construction.
- Large tower foundations that would be necessary would substantially impact underground utility relocations.
- Substantial visual quality impacts due to width of structure and foundations.

For these reasons, as well as context-sensitive design issues, this design option was eliminated from further review.

2.2.4 Option 4-Cable-Stayed Bridge with Two Towers.

Key Features

This option would be built as a single-deck bridge supported by two main towers. These towers would consist of two reinforced concrete legs. The horizontal alignment would likely be oriented to the west of the existing viaduct. The roadway deck height would be approximately 70 to 120 feet high with an approximate tower height of 530 feet. Towers would be approximately XX feet apart.

Key Characteristics

- The wider bridge deck would have more shading effects along the waterfront.
- Carries less construction risk—safer for public and traffic on surface streets in the area. Less impact on buried utilities, and might reduce the extent of overall utility relocations necessary.
- More costly structure type to build.
- Substantial tower size out of context with rest of waterfront structures.
- Greater visual impacts. Wider structure blocks view of the waterfront from the downtown and blocks views of the downtown from the waterfront. The long structure intersects established view corridors. The tower height is almost twice the height of Option 3 and almost 4 times as high as Option 8.
- Not compatible with most traffic detour options during construction.
- Restricts the ability to expand or create new public open space.
- Does not provide midtown ramp connections.
- Incompatible with the City's Shoreline Management Plan

Screening Results

This concept was dropped from further consideration due to its inconsistency with Goal 8 and Goal 10 and other design considerations as follows:

- Goal 8: Incompatible with City Shoreline Management and Seattle land use regulations and would likely be very difficult to permit.
- The steep grade approaching the elevated structure (on both ends) presents a safety concern with regard to differential speeds.
- Cost is higher than other structure options, including higher initial construction material costs and long-term maintenance costs due to steel structures.
- Goal 10: The larger tower foundations that would be necessary would preclude underground utility relocations, which could further compound construction space constraints and constructability issues.
- Substantial visual quality impacts due to width of structure and foundations.

For these reasons, as well as context-sensitive design issues, this design option was eliminated from further review.

2.2.5 Option 5-Cable-Stayed Bridge

Key Features

This structure would be built as a 3-span, double-decked, cable-stayed bridge. The horizontal alignment would likely be oriented to the west of the existing viaduct, and the vertical alignment would create a much higher elevation profile (about 90 to 120 feet) than the existing viaduct. The height of the tower would be about 530 feet. The bridge width would be approximately 120 feet. Towers would be spaced approximately XX feet apart.

Key Characteristics

- Greater visual impacts. The wider roadway structure would block views of the waterfront from the downtown and blocks views of the downtown from the waterfront. The long structure intersects established view corridors. Presents a much taller and wider profile than the existing viaduct.
- Carries less construction risk—safer for public and traffic on surface streets in the area. Less impact on buried utilities, and might reduce the extent of overall utility relocations necessary.
- The wider bridge deck would have more shading effects along the waterfront.
- More costly structure type and materials.
- Tower size out of context with rest of waterfront structures.
- Not compatible with most traffic detour options during construction.
- Restricts the ability to expand or create new public open space.
- Does not provide midtown ramp connections.
- The double deck would have a deep profile.
- Likely to have severe noise impacts due to 2 roadway decks, steel girder construction and expansion joints.

Screening Results

This design concept was screened out and will not be evaluated further primarily for the following reasons:

- Would restrict the ability to expand or create new public open space.
- Goal 8: Incompatible with City Shoreline Management and Seattle land use regulations and would likely be very difficult to permit.
- The steep grade approaching the elevated structure (on both ends) presents a safety concern with regard to differential speeds.
- Cost is higher than other structure options. This would include higher initial construction costs as well as higher long-term maintenance costs due to the steel construction.
- Substantial visual quality impacts due to width of structure and foundations. Significantly higher and wider structure than the existing viaduct
- The larger tower foundations that would be necessary would severely affect underground utility relocations.

2.2.6 Option 6-Steel Truss Double-decked Superstructure

Key Features

Structure would look similar both in frame and appearance as the existing viaduct, potentially with similar horizontal and vertical alignments. The height of the structure would be slightly higher at 65 feet, and the width would be somewhat wider at 50 feet.

Key Characteristics

- Would meet current sight distance design standards and would not necessitate any deviation approval.
- Design would be consistent with existing urban context.
- Would require greater maintenance due to steel components.

Screening Results

This option was screened out due to the following considerations:

- The steel box girder construction would carry greater noise impacts at the street level and at higher elevations. Steel structures tend to reflect roadway noise more efficiently than concrete structures which have some noise-absorptive qualities.

- This option would be more costly than many of the others with steel prices running generally higher than concrete prices globally.
 - This option would carry greater life cycle maintenance requirements and therefore higher long-term maintenance costs.
 - The construction of this design option carries higher risk and would be more difficult to build under traffic conditions.
- Visual impacts and view blockage from the substantial amount of truss work.

2.2.7 Option 7-Concrete Segmental Box Girders

Key Features

This option would be built with two single-level roadways on offset elevations. The roadways would be built within an elevation envelope similar to the existing viaduct. The lower roadway would be approximately 30 feet high, and the upper roadway deck would be about 60 feet from ground level. The width for each of the roadway decks would be about 50 feet. Each roadway would be built on separate reinforced concrete column substructures.

Key Characteristics

- Easiest of the options to build with some traffic flow maintained. The construction of the roadway alignments could be phased to build the first structure on the west side of the existing viaduct carry traffic, with the second structure to replace the existing viaduct after shifting the traffic over. Allows the most flexibility to accommodate traffic during construction.
- Allows for construction staging over “live” surface traffic with less risk than several of the other options considered.
- The structure offers greater design flexibility with the vertical profile.
- This design concept offers the most flexibility for column placement (which allows more urban design choices with the replacement of the Alaskan Way surface street.).
- Overall, this type of structure allows greater flexibility for design features, such as the vertical profile. This flexibility can allow for relatively inexpensive and less risky construction efforts. Has greater potential for the structure to conform to the urban context.

- Creates negative shading effects due to wide decks.
- Restricts the amount of space available for public use open area.

Screening Results

2.2.8 Although this option compared favorably with Option 1 earlier in the screening process, it was later dropped from further consideration because of relatively higher costs. The balance of the screening evaluation showed Option 1 is preferable, but should difficulties arise Option 7 could be reconsidered.

2.2.9 Option 8-Single-Deck Extrados Cable-Stayed, Concrete Segmental Bridge

Key Features

This option would consist of an Extrados concrete segmental superstructure, a variation of the cable-stayed bridges. Like the cable-stayed bridge options, it would be supported on reinforced concrete towers. Features would include a 7-span single-level bridge deck, with its horizontal alignment likely to be oriented west of the existing viaduct alignment. The vertical profile of the bridge would be at a higher elevation (approximately 100 feet)--substantially taller than the existing viaduct. The roadway deck width would be approximately 110 feet total.

Key Characteristics

Although somewhat less risky and easier to build under traffic flow conditions, it would have to be built over the existing roadway to maintain traffic flow.

- There would be benefits to utilities relocation efforts through the opportunity to keep the utilities on the viaduct in the early construction stages.
- Design includes an undesirable 5% grade for about 2000 feet to allow for the connections at both ends.
- While it could be considered a more iconic structure, it would be more compatible with its urban design context, with a lower profile than several of the other design options. Provides a substantial amount of space for public promenade—the single columns are spaced far apart.

- The higher elevation reduces the noise effects at the surface street (promenade) level compared to the other design options.
- Provides midtown ramp connections.

Screening Results

This option was screened out due to the following considerations:

- Incompatible with the City’s Shoreline Management Plan and shoreline regulations (inconsistent with Goal 8) and likely very difficult to permit.
- It does not meet Goal 10. This concept carries greater construction risk for construction over traffic (than Options 7 or 9) and it would be more difficult to “promote effective traffic management during construction”.
- Greater visual impacts than most of the other options, including negative shading impacts on the public ROW, the promenade and shoreline.

2.2.10 Concept 9 – Pre-stressed Concrete Girders with Lidded Park/Promenade

Key Features

This would be a double-decked structure approximately double the width of Option 1. While the height of this structure is comparable to the existing viaduct, the width would be about 110 feet at the upper deck of the double-deck structure. The top deck would provide for a park and promenade, while the lower deck would carry 2-way vehicular traffic on side-by-side roadways. Columns would be spaced approximately XX feet apart.

Key Characteristics

- The horizontal and vertical alignments would be similar to the existing viaduct, but the structure would be approximately double the width of today’s viaduct.
- The structure would be easier to build under traffic flow conditions.
- Less construction risk.
- Provides new public open space with views of Elliott Bay and the Olympic Mountains
- There are no construction design standards for construction of a park on the upper deck.

- Does not meet current horizontal sight distance requirements at Colman Curve and would require a design deviation approval.
- Does not provide midtown ramp connections.
- Would cause extensive coverage and shading effects on most of the public ROW below the structure.
- Access to the park/promenade on the upper deck would be difficult, except in the vicinity of the Pike Place Market—would generally be less accessible and usable than at-grade open space.
- Fire/Life Safety concerns relating to emergency access to the park.
- The height and bulk of the structure would create substantial physical separation between downtown and the waterfront.
- Would create substantial visual quality impacts with significantly reduced views, both of the water and mountains from downtown, and of the downtown cityscape for the waterfront piers and promenade.
- Column locations would potentially cause traffic sight distance issues for surface street traffic.
- More extensive foundations required, requiring deeper excavation for deeper foundations.
- Provides the potential for business development on the east side of the structure.
- Security concerns with park/promenade area on upper deck after dark when public activity decreases.
- Would require the revision of the project's Purpose and Need statement.

Screening Results

This option was eliminated due to the following factors:

- The project's Purpose and Need statement does not currently include the establishment of a park facility, which is the unique feature of this option. Revising the Purpose and Need statement could result in schedule delays of up to two years, including the need to consider the re-design, re-evaluation, and re-screening of project alternatives.
- Does not provide midtown ramp connections.

- Would not conform to the City's Shoreline Management regulations and would likely be very difficult to permit.
- Noise impacts ranked to be worse than other options.

2.3 Screening Summary: Elevated Concepts Recommended to be Dropped from Further Consideration

The following design concepts have been dropped based on the screening criteria and will not be evaluated further in the Final EIS.

2. Steel Box Girders
3. Cable Stayed (single tower) w/ concrete segmental approaches
4. Cable Stayed (double towers) w/ concrete segmental approaches
5. Cable Stayed (double towers)/steel truss w/ steel box approaches
6. Steel Truss w/ steel box approaches
7. Extrados Cable Stayed/Concrete Segmental
8. Pre-stressed Concrete Girders with Lidded Park
9. Concrete Segmental Box Girders

2.4 Screening Summary: Elevated Structure Design Concept Recommended to be Carried Forward

Following several interdisciplinary workshops, the 9 options that had been considered were screened down to four: Options 1, 7, 8 and 9. At the October 17, 2006 screening meeting, it was decided that Options 8 and 9 would be dropped from further review because of lack of conformity with design goal considerations, the 2003 screening criteria, and the Project's Purpose and Need Statement. Although Option 7 compared favorably to Option 1, the general consensus was that Option 1 was preferable. Should difficulties with Option 1 arise in the future Option 7 could be reconsidered.

The Option 1 design concept was recommended to be carried forward for evaluation in the Final EIS for several reasons. It is consistent with the design goals developed for consideration in the review of the Elevated Concept design options. It is also consistent with the 2003 screening criteria for the screening of both the AWW Corridor and the Seawall. These criteria were listed above on p. 4.

Key features of Option 1 that led to the recommendation to carry this option forward are:

- The stacked aerial structure is most consistent with the urban design context. Its design is most similar to the elevated structure concept similar to that analyzed in the Supplemental Draft EIS.

- Less costly both in construction and long-term maintenance than other options considered
- Can be constructed with the Type A construction approach—“as open as possible”
- This design concept represents substantial improvements in safety, updated design standards, including seismic and improved sight distance in the Colman Curve area.

Draft

This Page Intentionally Left Blank

Appendix A

Screening Goals Matrix

Draft

This Page Intentionally Left Blank

AWV Screening Goals for elevated structures

2006 Goal	2005 revised screening criteria	2003 Goal
A	Goal 1: An alternative must provide facilities that meet current seismic design standards.	1
B	Goal 2: An alternative must maintain the current transportation functions of the Alaskan Way Viaduct Corridor.	2
C	Goal 3: An alternative must improve traffic safety.	4
D	Goal 4: An alternative should support bicycle and pedestrian accessibility and mobility.	6
NA	Goal 5: Between Battery Street Tunnel and Roy Street, an alternative should improve access to and from SR 99 and improve local connections.	Not included
E	Goal 6: An alternative should eliminate or reduce design deficiencies found on the existing corridor.	Not included
F	Goal 7: An alternative should minimize the overall footprint of SR 99 (including ramps) to fit in with the adjacent urban neighborhoods.	Not included
G	Goal 8: An alternative should be compatible with local, express, and high-capacity transit.	7
H	Goal 9: An alternative should not further degrade the operation of other major transportation facilities.	3
NA	Goal 10: An alternative should maintain transportation links to I-5.	5

2003 Screening Criteria Not Related to North End Improvements:

I	An alternative should support land use and shoreline plans and policies pertaining to development of the downtown Seattle waterfront.	8
J	An alternative should support improved habitat for fish and wildlife along the Alaskan Way Seawall.	9
K	An alternative should rely on proven construction methods, minimize construction duration, and promote effective traffic management during construction.	10

This Page Intentionally Left Blank

Appendix W

Screening Documents

2007 Screening Update

This Page Intentionally Left Blank

AWV Revised Screening of Design Concepts, June 2007

2007 Update

In the **AWV Final Revised Screening of Design Concepts, June 2003**, 76 design concepts were identified for rebuilding, replacing, or improving the Alaskan Way Viaduct and its corridor. Under the primary category of AWW Improvements from S. Holgate Street to the Battery Street Tunnel, the design concepts that were examined related to:

- retrofitting or rebuilding the existing Alaskan Way Viaduct
- replacing the Viaduct with an aerial structure
- replacing the Viaduct with a tunnel
- replacing the Viaduct with a surface boulevard, or
- replacing the Viaduct with a combination of aerial, tunnel, and surface concepts.

Of these concepts, **C-1a, C-1b, C-1c, C-1d and C-1e** were all **Twin Bored Tunnels** through the downtown waterfront. These concepts all proposed two lanes in each direction with lane and shoulder widths meeting current design standards (where feasible).

C-1 Key Features

- Ramps to downtown would not be provided, but access to the waterfront, downtown, and Ballard/Interbay would be possible through Alaskan Way surface street connections
- Separates through and local traffic, with through traffic focus
- Removes visual barrier along waterfront
- Removal of Viaduct structure allows for a variety of urban design options
- Requires significant changes to Battery Street Tunnel connection and/or a new tunnel to replace it at the north end
- Limited property impacts
- Reduces traffic noise
- Improves traffic safety issues related to nonstandard lane and shoulder widths
- Would not address seawall deficiencies unless paired with a design option to improve the seawall
- Requires complex, state-of-the-art construction with high costs and high risks
- Relatively long construction period compared with other concepts
- Hazardous soils and groundwater issues present challenges for tunnel construction
- Requires complex design for capacity, safety, and ventilation
-

2003 Screening Results

These bored tunnel options were dropped and were not evaluated in the EIS, primarily because they did not meet the following:

- Goal 10 – The risk of constructing bored tunnels would be high, due to the size of the tunnels required to accommodate 2 lanes in each direction with shoulders. The width of such tunnels would likely exceed the size of any bored tunnels constructed in the United States.
- In addition to construction risk, the bored tunnel concept would not address the seismic deficiencies of the existing Seawall unless it is paired with a separate Seawall option. Conceptual engineering of this option has shown that the cost to build both a new Seawall and the bored tunnels is greater than what could reasonable be funded in the foreseeable future. Therefore, the intent of this design concept and project purpose and screening criteria goals can be better met by design options A5a, One-Level Cut-and Cover Tunnel and/or A9, Combine One-Level, Two-Way Bypass Tunnel with Two-Way Surface Arterial. These design options address the seismic deficiencies of both the Viaduct and Seawall with fewer risks and lower costs than a bored tunnel concept.

2007 Screening Results

In 2003, the five bored tunnel concepts were dropped from further consideration as they would require a more complex design for safety and ventilation, along with relatively long construction periods. They also required complex, state-of-the-art construction with the associated high costs and high construction risks. Four years later, the technology has evolved to allow a considerably shorter construction period with lower costs along with reduced construction risk, relative to other alternatives that have been studied.

The current 2007 concept would replace SR 99 with two deep, 40-foot diameter bored tunnels, each containing a two-lane roadway with safety systems and current design standards, i.e. 8-foot lanes and standard shoulders provided, from approximately S. Royal Brougham Way in the south to about Denny Way in the north. The tunnels would extend for approximately 5100 feet in length.

Key Features

- Would address current seismic safety issues with existing viaduct
- Could address seawall deficiencies for central waterfront seawall; can be built with central waterfront seawall as separate component. (Central waterfront seawall could be included – no north waterfront or south section seawall rebuild would be constructed).
- With seawall as separate component, there would be fewer utility relocation impacts, and greater flexibility with utility relocation sequencing.
- Tunnels would include safety systems, including ventilation
- Existing viaduct could continue to carry traffic throughout the construction period, with a relatively minor closure of approximately 6 months in the final phase.
- Would have fewer severe construction effects, particularly on waterfront businesses.

- Through travel and local downtown traffic would be separated; through traffic would be better accommodated;
- Travel to downtown would be somewhat more constrained with no mid-town ramps. However, access could be provided for waterfront, downtown and Ballard/Interbay travel on Alaskan Way and various surface street connections.
- Armory Way roadway connector (over BNSF rail tracks) could provide connection to/from Alaskan Way to downtown and north of downtown surface streets
 - -In the south section, 4 on/off movements would be preserved (2 SB off/on and 2 NB off/on) in the Stadium Area
 - -In the north section, several options are possible in the Denny Way area
- Removal of Viaduct structure allows for a variety of urban design options for the central waterfront along Alaskan Way.
- Removes visual barrier to and from waterfront

The twin bored tunnels concept meets Goal 1 by providing a facility that meets current seismic design standards; Goal 3 does not further degrade the operations of other major transportation facilities; Goal 4 by improving traffic safety; Goal 5 by maintaining regional traffic linkages; Goal 7 by allowing for more space on the waterfront (after demolition of the current viaduct structure) for bicycle and pedestrian facilities; Goal 8 by supporting land use and shoreline plans and policies pertaining to Seattle downtown waterfront development.

This concept meets Goal 10 in 2007 as the boring technology has advanced and construction methods are now proven, and could allow for reduced construction periods, and effective traffic management during construction.

This option adequately meets Goal 2 (“alternative must maintain current transportation function of the AWW corridor”), and can therefore be advanced.

Cost Estimates

<i>Construction Elements</i>	<i>Twin Bored 40-foot Tunnels with Central Waterfront Seawall</i>	<i>Twin Bored 40-foot Tunnels with No Central Waterfront Seawall Replacement</i>
South section tie-in to ramps or surface street connections	\$800 m	\$800 m
Central Waterfront Urban Design Features ¹	\$250 m	\$100 m
Central Waterfront Seawall	\$400 m	
North section tie-in to existing Battery St. Tunnel	\$300 m	\$300 m
Total	\$3.3 b	\$ 2.8 b

Cost estimates compiled in March 2007.

¹ Includes demolition of existing viaduct structure.

Appendix W

Screening Documents

2010 Screening

This Page Intentionally Left Blank

QUALITY PROCESS LOG

Deliverable ID:		
Prepared By: Stephanie Miller		
Process	Scheduled Start	Scheduled Finish
1. Draft Outline Review		
2. Discipline QC Review of Rough Draft		
Quality Assurance Check		
3. Technical Edit of Drafts (as needed) Rough Draft		
Interdisciplinary Review Draft		
Final Draft		
4. Interdisciplinary QC Review	3-17-10	3-18-10
Quality Assurance Check		
5. Lead Agency Review	3-25-10	4-7-10
Quality Assurance Check		

(1) Draft Outline Review	Submittal Title			
	QC Reviewers			
	Comments			
	Actual Start		Actual Finish	
	QA Check			

(2) Discipline QC Review of Draft	Submittal Title	Revised Screening of Design Concepts 2010 Updated		
	QC Reviewers	David Mattern (11)		
	Comments	Incorporated		
	Actual Start	3-17-10	Actual Finish	3-18-10
	QA Check	Stephanie Miller		

(3) Technical Edits of Deliverable Drafts	Rough	Actual Start		Actual Finish	
	IDCR	Actual Start		Actual Finish	
	Final	Actual Start		Actual Finish	

(4) Interdisciplinary Review of Draft	Submittal Title			
	QC Reviewers	(incl 46)		
	Comments			
	Actual Start		Actual Finish	
	QA Check			

(5) Lead Agency Review of Deliverable	Submittal Title	Revised Screening of Design Concepts 2010 Updated		
	QC Reviewers	(incl 46), 11		
	Comments			
	GEC Approval			
	Actual Start	3-25-10	Actual Finish	4-7-10
	QA Check			

(6) Approval of Final Deliverable	Final Submittal	4-23-10	
	Proof (PS&E only)		
	Ad Copy (PS&E only)		

Assigned QC Reviewers

(Task / Discipline Leads confirm assignments...enter No's above)

	Interest	Name		Interest	Name
1	Construction	NA	24	Urban Design	
2			25		
3			26		
4			27		
5			28		
6	Engineering	NA	29	Utilities	
7			30		
8			31		
9			32		
10			33		
11	Environmental	Kimberly Farley	34	Special Other	
12		David Mattern	35	Tech Edit	Lorena Dinger
13		Bill Malley	36		
14			37		
15			38		
16	Real Estate / ROW		39	Lead Agencies	
17			40		
18			41		
19	Transportation		42		
20			43		
21			44		
22			45		
23			46	GEC Manager	

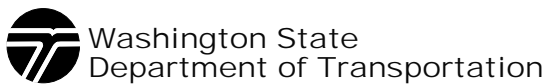
Revised Screening of Design Concepts 2010 Update



Submitted to:
Washington State Department of Transportation
Urban Corridors Office
401 Second Avenue S, Suite 560
Seattle, WA 98104-3850

Submitted by:
Parsons Brinckerhoff Quade & Douglas, Inc.

Prepared by:
Parametrix, Inc.



The Alaskan Way Viaduct Replacement Project

Revised Screening of Design Concepts

Agreement No. Y-9715

Task BZ.01

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:

Parsons Brinckerhoff

999 Third Avenue, Ste 2200
Seattle, WA 98104

In association with:

Coughlin Porter Lundeen, Inc.
Entech Northwest, Inc.
EnviroIssues, Inc.
HDR Engineering, Inc.
Jacobs Engineering Group, Inc.
KPF, Inc.
Magnusson Klemencic Associates, Inc.
Mimi Sheridan, AICP
Parametrix, Inc.
Power Engineers, Inc.
RoseWater GHD
Shannon & Wilson, Inc.
So-Deep, Inc.
Telvent Farradyne, Inc.
William P. Ott Construction Consultants

TABLE OF CONTENTS

PURPOSE AND BACKGROUND	1
History of Screening Analyses	1
Purpose and Need Statement Updated	4
Screening Criteria Updated	6
Design Concepts Considered	7
Screening Process.....	9
SCREENING ANALYSIS	10
Elevated Structures	10
Surface Arterials	17
Tunnels.....	20
SCREENING RESULTS SUMMARY	27
REFERENCES	31

APPENDICES

Appendix A: Purpose and Need Statement

LIST OF EXHIBITS

1 Updated Screening Criteria and Evaluation Measures	6
2 Screening Results Summary Table	27

Revised Screening of Design Concepts 2010 Update

PURPOSE AND BACKGROUND

The Federal Highway Administration (FHWA), the Washington State Department of Transportation (WSDOT), and the City of Seattle are proposing to replace the Alaskan Way Viaduct because it is deteriorating and likely to fail in an earthquake. The Alaskan Way Viaduct is part of State Route (SR) 99 located in downtown Seattle, King County, Washington. As defined for this project, SR 99 needs to be replaced or substantially modified from approximately S. Royal Brougham Way to Roy Street. Alternatives to replace this portion of SR 99 within its existing corridor have been considered in a 2004 Draft Environmental Impact Statement (EIS) and a 2006 Supplemental Draft EIS. Subsequently WSDOT, the City of Seattle, and King County evaluated a range of solutions that also included improvements to the transportation system outside of the existing SR 99 corridor. This public evaluation process, called the Partnership Process, resulted in three additional design concepts that were eventually narrowed to a single design concept. The Partnership Process received broad stakeholder and public input.

The purpose of this screening memorandum is to satisfy National Environmental Policy Act (NEPA) requirements for alternatives analysis by conducting the following additional work:

- Rescreen alternatives evaluated in the 2004 Draft EIS and 2006 Supplemental Draft EIS based on an updated project purpose and need statement and updated screening criteria.
- Consider additional design concepts developed as part of the Partnership Process.

History of Screening Analyses

Design concepts for replacing the Alaskan Way Viaduct have been developed and considered since 2001. An extensive screening effort to narrow the range of possible viaduct replacement solutions took place between 2001 and 2003. The screening effort included Phase 1 screening conducted in 2001, Phase 2 screening

conducted in 2002,¹ and Revised Screening conducted in 2003.² All of the screening concepts identified in Phases 1 and 2 were included in the 2003 Revised Screening analysis, which considered 76 design concepts. The 76 design concepts considered included retrofitting the existing viaduct or replacing it with a bridge across Elliott Bay. The 76 design concepts were narrowed to 26 concepts for reasons documented in *Final Revised Screening of Design Concepts*, June 2003.³ The 26 design concepts were assembled into the five alternatives that were evaluated in the 2004 Draft EIS: the Rebuild, Aerial, Tunnel, Bypass Tunnel, and Surface Alternatives.⁴ Changes to the project since 2004 have not altered the rationale for this screening and the results remain valid.

In late 2004, after the public comment period for the Draft EIS, the five alternatives were narrowed to two: a Tunnel (a six-lane cut-and-cover tunnel) and an Elevated Structure (a six-lane, double-level elevated structure). Between 2004 and 2006, design changes were made to the Tunnel and Elevated Structure Alternatives, the project was extended farther to the north, and different construction approaches were considered. These changes required further consideration of design concepts to improve the Battery Street Tunnel and SR 99 north of Denny Way and consideration of an additional tunnel structure type. This effort resulted in one updated Battery Street Tunnel design,⁵ two improvement concepts for the area north of the Battery Street Tunnel, and a stacked cut-and-cover tunnel⁶ in addition to a side-by-side cut-and-cover tunnel structure. These concepts were incorporated into the Elevated Structure and Tunnel Alternatives, which were evaluated in a Supplemental Draft EIS that was published in July 2006.⁷

After the 2006 Supplemental Draft EIS was published, concern about financing led Governor Gregoire to call for an advisory vote of Seattle residents. The Seattle City Council responded by authorizing a vote and placing the Elevated Structure Alternative and a four-lane Surface-Tunnel Hybrid Alternative on the ballot. The four-lane Surface-Tunnel Hybrid Alternative differed from the six-lane Tunnel Alternative evaluated in the 2006 Supplemental Draft EIS. On March 13, 2007, the citizens of Seattle voted down both alternatives.

After the March 2007 vote, Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels chose to move forward with critical safety and mobility improvement projects at the north and south ends of the Alaskan Way Viaduct.

¹ Parsons Brinckerhoff Quade and Douglas, Inc. 2002a,b.

² Parametrix 2003.

³ Parametrix 2003.

⁴ WSDOT et al. 2004.

⁵ Parametrix 2006a.

⁶ Parametrix 2006b.

⁷ WSDOT et al. 2006.

These projects were called the Moving Forward projects because they could proceed while executives worked together through a collaborative public process to develop a solution for replacing the viaduct along the central waterfront that would have broad consensus among the lead agencies, cooperating agencies, tribes, and the public.

The Moving Forward projects consist of the following improvements:

- Column safety repairs in the Pioneer Square area
- Electrical line relocation along the viaduct's south end
- Replacement of the viaduct (SR 99) between S. Holgate Street and S. King Street in the south end
- Battery Street Tunnel maintenance and repairs
- Transit enhancements and other improvements

Originally, there was a sixth Moving Forward project, which focused on replacing SR 99 between Lenora Street and the Battery Street Tunnel. However, this section of roadway was later included as part of the central waterfront's collaborative process discussed below.

Also following the March 2007 vote, Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels committed to a collaborative effort, referred to as the Partnership Process, to forge a solution for replacing the viaduct along Seattle's central waterfront. An updated Notice of Intent was published in the Federal Register on July 16, 2008,⁸ informing people and agencies of the work being performed as part of the Partnership Process to reconsider and develop various replacement concepts for the viaduct. The Notice of Intent was updated to inform the public and agencies, invite their participation, and incorporate the work done within the Partnership Process as part of expanded scoping under NEPA. The Partnership Process looked at how improvements to the broader transportation system (including Seattle surface streets and Interstate 5 [I-5]) could work in combination with various concepts for replacing the viaduct, including surface streets, a new elevated structure, or a tunnel. To help create a shared vision, WSDOT, King County, and the City of Seattle developed and agreed to a set of guiding principles that defined goals for replacing the viaduct along the central waterfront. The six guiding principles were to:

1. Improve public safety.
2. Provide efficient movement of people and goods now and into the future.
3. Maintain or improve downtown, regional, port, and state economies.

⁸ Federal Register 2008.

4. Enhance Seattle's waterfront, downtown, and adjacent neighborhoods as a place for people.
5. Create solutions that are fiscally responsible.
6. Improve the health of the environment.

Based on these guiding principles, eight scenarios were created to test the performance of various combinations of SR 99, I-5, surface street, transit, and transportation demand management elements. The intent of this step was not to select a particular scenario, but rather to learn which elements worked best together. This evaluation led to the development and analysis of three hybrid scenarios:

- I-5, Surface, and Transit Hybrid
- Elevated Bypass Hybrid
- Twin Bored Tunnel Hybrid, which was later refined into a single bored tunnel hybrid

The Partnership Process resulted in a recommendation from 22 of the then-active 25 members of a Stakeholder Advisory Committee to replace the viaduct with a single, large-diameter bored tunnel.

In January 2009, Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels recommended replacing the central waterfront portion of the Alaskan Way Viaduct and Seawall with a single, large-diameter bored tunnel; a restored seawall; a new waterfront surface street and connection from the waterfront to Western and Elliott Avenues; a waterfront promenade; transit enhancements; and a streetcar on First Avenue.⁹ On June 4, 2009, a Notice of Intent was published in the Federal Register informing the public and agencies that a Supplemental Draft EIS would be prepared and would continue the EIS process begun with the Notice of Intent published on June 22, 2001.¹⁰ For a more detailed chronology of the alternatives analyses that have occurred since 2001, refer to the Alaskan Way Viaduct Replacement Project History Report.¹¹

Purpose and Need Statement Updated

The project's purpose and need statement was updated by the Federal Highway Administration (FHWA), WSDOT, and the City of Seattle to clarify text and reflect the following:

⁹ WSDOT et al. 2009.

¹⁰ Federal Register 2009.

¹¹ WSDOT et al. 2009.

- The revised definition of the proposed action, which now consists of replacing the central waterfront portion of the viaduct.
- Current state and local priorities as expressed through the Partnership Process.
- Public and agency comments received following publication of the 2006 Supplemental Draft EIS.

The updated purpose and need statement is included as Appendix A. The primary purposes and needs of the project include the following:

- Reduce the risk of catastrophic failure in an earthquake by providing a facility that meets current seismic safety standards.
- Improve traffic safety.
- Provide capacity for automobiles, freight, and transit to efficiently move people and goods to and through downtown Seattle.
- Provide linkages to the regional transportation system and to and from downtown Seattle and the local street system.
- Avoid major disruption of traffic patterns due to loss of capacity on SR 99.
- Protect the integrity and viability of adjacent activities on the central waterfront and in downtown Seattle.

One of the notable changes to the updated purpose and need statement was the removal of the seawall replacement as a project need. During preparation of the 2010 Supplemental Draft EIS, the lead agencies determined that the primary purpose of this project is to address a transportation need – replacing the viaduct. Replacing the seawall is a potential benefit of this project, but it is not one of the purposes of the project. Removing the seawall as a project need affected the criteria used in screening design concepts. Under the updated purpose and need statement, a design concept could meet the purpose and need and thus be considered a reasonable concept even if it would not replace the seawall.

The other notable change was a revision of the southern terminus of the project to reflect a smaller project area for the Alaskan Way Viaduct Replacement Project. The prior terminus had been S. Spokane Street. The updated southern terminus is S. Royal Brougham Way. The change in the southern terminus location was made to reflect improvements in the area, which include replacing the viaduct from S. Holgate Street to S. King Street. This project, called the S. Holgate Street to S. King Street Viaduct Replacement Project, is an independent project that has completed its own environmental review and will be under construction in the summer of 2010. Because of this, the southern

terminus of the design concepts considered in this screening analysis is defined as S. Royal Brougham Way.

Screening Criteria Updated

The 2003 screening criteria were updated to reflect the changes made to the project's purpose and need statement. The screening criteria and evaluation measures used for this 2010 screening update are provided in Exhibit 1.

Exhibit 1

Updated Screening Criteria and Evaluation Measures

Purpose/Need	Screening Criteria	Evaluation Method
A. Reduce seismic vulnerability	1. A design concept must meet current WSDOT and AASHTO seismic design criteria.	1. Note design concepts that would not meet current WSDOT and AASHTO seismic design criteria.
B. Improve public safety	1. A design concept should improve traffic safety by following WSDOT-approved roadway design standards for lane widths, shoulder widths, ramps, and stopping sight distance.	1. Discuss aspects of proposed design concepts that would not follow WSDOT design standards and identify potential implications of not following the standards.
C. Provide capacity to move people and goods	<p>1. A design concept should maintain mobility and transportation-related functions, including movement of people, freight, and goods to and from the central downtown core; between manufacturing and industrial centers, and through traffic on SR 99.</p> <p>2. A design concept should support access for transit to and from SR 99 with connections to multiple transit modes.</p> <p>3. A design concept should be compatible with plans for local, express, and high-capacity transit.</p>	<p>1. Discuss expected mobility reductions and/or identify transportation functions not provided by a design concept, specifically the movement of people, freight, and goods to and from downtown, between the Duwamish industrial area and Ballard/Interbay, and through downtown.</p> <p>2. Discuss whether a design concept would not support transit access.</p> <p>3. Discuss whether a design concept would not be compatible with plans for local, express, or high-capacity transit.</p>

Exhibit 1
Updated Screening Criteria and Evaluation Measures

Purpose/Need	Screening Criteria	Evaluation Method
D. Maintain transportation system linkages	<ol style="list-style-type: none"> 1. A design concept should maintain existing regional linkages to I-5, SR 519, and the Mercer Corridor. 2. A design concept should integrate functionally with other transportation projects currently underway or planned. 3. A design concept should maintain vehicular and pedestrian access to the ferry system. 4. A design concept should allow pedestrian movement between the waterfront, downtown core, stadiums, Pioneer Square, and the Pike Place Market area. 5. A design concept should allow bicycle travel with connections to other established bicycle routes. 	<ol style="list-style-type: none"> 1. Identify transportation linkages that are precluded or restricted. 2. Discuss transportation projects that are precluded or restricted by a proposed design concept. 3. Identify vehicular and pedestrian access to the ferry system that would be precluded or restricted by a design concept. 4. Identify areas where pedestrian movement would be impeded or precluded. 5. Identify areas where bicycle travel would be impeded or precluded.
E. Avoid major disruption of traffic patterns	<ol style="list-style-type: none"> 1. A design concept should minimize the extent and duration of traffic disruptions during construction. 	<ol style="list-style-type: none"> 1. Briefly describe likely closures of SR 99, Alaskan Way, and surrounding surface streets during construction.
F. Protect the integrity and viability of adjacent activities on the central waterfront and in downtown Seattle	<ol style="list-style-type: none"> 1. A design concept should support land use and shoreline plans and policies related to the downtown, central waterfront. 2. A design concept should allow for expanded visual, physical, and aesthetic connections between downtown Seattle and the waterfront. 3. A design concept should maintain or improve public access to and along the waterfront. 	<ol style="list-style-type: none"> 1. Identify design concepts that are not supportive of existing land use and shoreline plans and policies. 2. Identify design concepts that preclude expanded visual, physical, and aesthetic connections. 3. Identify design concepts that would inhibit continued development of the waterfront for public access.

Design Concepts Considered

Design concepts for replacing the Alaskan Way Viaduct have been developed and considered since 2001. These design concepts fall into three categories based on structure type: elevated structures, surface arterials, and tunnels. This 2010 screening update evaluates 10 design concepts. The screening analysis relies on prior screening efforts and validates their conclusions. Specifically, this 2010 screening update validates the screening analysis and results documented in

Final Revised Screening of Design Concepts, June 2003.¹² The June 2003 screening process considered 76 design concepts. The 76 design concepts were narrowed to 26, which were assembled into the five alternatives evaluated in the 2004 Draft EIS.

This updated 2010 screening process rescreens the following 2004 Draft EIS Alternatives:

Elevated Structures

- 2004 Draft EIS Rebuild
- 2004 Draft EIS Aerial

Surface Arterials

- 2004 Draft EIS Surface

Tunnels

- 2004 Draft EIS Bypass Tunnel
- 2004 Draft EIS Tunnel

Additionally, this 2010 screening update considers the two alternatives evaluated in the 2006 Supplemental Draft EIS:

Elevated Structures

- 2006 Supplemental Draft EIS Elevated Structure

Tunnels

- 2006 Supplemental Draft EIS Tunnel

Finally, this 2010 screening update considers the three hybrid design concepts developed in the Partnership Process:

Elevated Structures

- Partnership Process Elevated Bypass Hybrid

Surface Arterials

- Partnership Process I-5, Surface, and Transit Hybrid

¹² Parametrix 2003.

Tunnels

- Partnership Process Bored Tunnel Hybrid

Screening Process

The screening methods used for this 2010 screening update are similar to those used since 2002. Screening criteria were developed for each element of the project purpose. The screening criteria were then used as the basis for determining which concepts meet the purpose and need. The concepts were evaluated as follows:

- These criteria were applied by first determining if a proposed design concept could meet the first element of the project purpose – providing a facility that meets current seismic safety standards. To meet this purpose, a design concept must satisfy current WSDOT and American Association of State Highway and Transportation Officials (AASHTO) seismic design criteria (item A1 in Exhibit 1). Concepts that met current WSDOT and AASHTO seismic design criteria were advanced in the screening process. Concepts that could not meet this criterion were eliminated from further consideration.
- Concepts that satisfied the seismic design criterion were evaluated against the screening criteria for the remaining elements of the project purpose. In this stage of the screening analysis, design concepts were not required to achieve each of the project purposes. Instead, they were evaluated based on their overall ability to achieve the project purposes. In cases where two similar concepts were being considered, the concept that better satisfied the screening criteria was advanced and the other was eliminated. In cases where a concept had significant deficiencies in its ability to achieve one or more elements of the project purpose, such that it would substantially compromise mobility, or if that concept had other major drawbacks, such as severe impacts on the local community, the concept was designated as unreasonable and was eliminated.

SCREENING ANALYSIS

The screening analysis in this section provides a description of each proposed design concept, identifies its key features, and explains how the concept does or does not meet the evaluation criteria shown previously in Exhibit 1.

For each design concept, this section provides (1) a general description, (2) a list of key features, and (3) screening results, which is a determination of whether the design concept should be carried forward.

The general description for each concept focuses on elements of a design concept that are relevant to determining its ability to meet the purpose and need. In addition, the general description indicates whether the design concept includes a replacement for the Alaskan Way Seawall. This information is not relevant in determining whether a design concept achieves the project's purpose and need, but it has been included in this discussion for ease of reference.

Elevated Structures

2004 Draft EIS Rebuild

General Description

The 2004 Draft EIS Rebuild concept would rebuild the viaduct in its existing location with a structure similar to what is there now. The rebuilt structure would be constructed to meet the project's structural design criteria. Nonstandard lane widths, shoulder widths, and ramps would remain, though they would be slightly improved. Ramps would be provided at Columbia Street, Seneca Street, Western Avenue, and Elliott Avenue as they are today. This concept includes replacing the seawall to provide the structural foundation required to support the rebuilt viaduct structure so it meets current seismic standards. It also includes replacing Alaskan Way, improving the Battery Street Tunnel to meet current seismic standards, and rebuilding the waterfront streetcar.

Key Features

- The rebuilt roadway would not meet existing WSDOT design standards for lane widths, shoulder widths, and ramps, so opportunities to improve safety for drivers would be limited.
- This concept assumes that the Battery Street Tunnel would be used for SR 99 traffic. The tunnel would be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance.

- This concept would maintain transportation-related functions of SR 99 for traffic moving to, from, and through downtown. Connections would be similar to existing conditions for drivers traveling to and from the waterfront, downtown, and Ballard/Interbay.
- Construction would substantially disrupt SR 99 and local traffic for many years. SR 99 would need to be closed for a period of months. Extensive lane restrictions and ramp closures on SR 99 would be required for many years, including a detour on Broad Street. Alaskan Way would be reduced to one lane in each direction for many years.
- A rebuilt facility would have similar effects on views and noise as the viaduct does today, limiting opportunities to improve visual, physical, and aesthetic connections between downtown and the waterfront.

Screening Results

This concept is eliminated from further consideration and is considered to be unreasonable for the following reasons:

- The rebuilt roadway would be similar to the existing roadway, which means it would not meet existing WSDOT design standards for SR 99 lane widths, shoulder widths, and ramps (criterion B1). Additionally, design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1). Other similar design concepts such as the 2006 Supplemental Draft EIS Elevated Structure (which is carried forward, as described below) would provide similar benefits as the 2004 Draft EIS Rebuild, while meeting WSDOT design standards to a greater extent.
- Construction impacts would be substantial and difficult to mitigate, since SR 99 would be closed for a period of months, SR 99 ramps would be closed and traffic would be detoured, and Alaskan Way would be restricted for many years (criterion E1).
- This concept would not support land use and shoreline plans (criterion F1) and would preclude expanded visual, physical, and aesthetic connections between downtown and the waterfront (criterion F2), since the rebuilt viaduct would have similar view and noise effects as the existing structure does today.

2004 Draft EIS Aerial

General Description

With the 2004 Draft EIS Aerial, the existing viaduct would be replaced with a double-level aerial structure in the same location as the existing viaduct. The new facility would have three lanes in each direction up to the Battery Street Tunnel. The existing access connections at Columbia Street, Seneca Street,

Elliott Avenue, and Western Avenue would be replaced. The structure would be constructed to meet design standards for lane widths, shoulder widths, and ramps, where feasible. This concept includes replacing the seawall to provide the structural foundation required to support a new aerial structure so it meets current seismic standards. It also includes replacing Alaskan Way, improving the Battery Street Tunnel to meet current seismic standards, and rebuilding the waterfront streetcar.

Key Features

- This concept assumes that the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance. The remainder of SR 99 would be replaced with a facility that would meet WSDOT design standards, where feasible.
- This concept would maintain transportation-related functions of SR 99 by providing connections similar to existing conditions for drivers traveling to and from the waterfront, downtown, and Ballard/Interbay.
- For some trips, mobility would be improved compared to conditions on the existing facility in 2030.¹³
- This concept assumes that during construction, a large, temporary aerial structure would be built along the waterfront from S. Royal Brougham Way to Pike Street. This structure would have substantial impacts on Seattle's waterfront for many years.
- Construction would substantially disrupt SR 99 and local traffic for many years. SR 99 closure may be required for a period of months. Lane restrictions and ramp closures on SR 99 would be required for many years, including a detour on Broad Street. Alaskan Way would be reduced to one lane in each direction for many years.
- A new aerial structure would affect views to a greater degree than the existing viaduct, since it would be wider. Noise impacts would continue. These factors would limit opportunities to improve visual, physical, and aesthetic connections between downtown and the waterfront.

Screening Results

This concept is eliminated from further consideration for the following reasons:

- Design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1).

¹³ WSDOT et al. 2004.

- This concept would not avoid major disruption to traffic patterns because construction would substantially disrupt SR 99 and local traffic for many years (criterion E1).
- The construction of a large, temporary aerial structure along the waterfront would have substantial impacts on Seattle's waterfront for many years (criterion F2). Other elevated structure concepts, such as the 2006 Supplemental Draft EIS Elevated Structure, would provide similar benefits to the 2004 Draft EIS Aerial but without the impacts associated with the temporary waterfront structure.
- This concept proposes to replace the viaduct with a new one that is much wider than the current structure, which would not support land use and shoreline plans (criterion F1). A wider structure would preclude expanded visual, physical, and aesthetic connections between downtown and the waterfront (criterion F2).
- The 2006 Supplemental Draft EIS Elevated Structure concept (which is carried forward, as described below) would provide similar benefits in terms of mobility as the 2004 Draft EIS Aerial but would result in fewer overall impacts during construction and fewer impacts on views once the structure is built.

2006 Supplemental Draft EIS Elevated Structure

General Description

This concept combines elements of the 2004 Draft EIS Rebuild and 2004 Draft EIS Aerial concepts discussed previously to form a hybrid elevated structure concept, known as the 2006 Supplemental Draft EIS Elevated Structure. This concept would replace the existing viaduct with a stacked aerial structure along the central waterfront. The new elevated structure would have three lanes in each direction, and it would have wider lanes and shoulders than the existing viaduct that would meet current standards where feasible. Existing ramps at Seneca Street, Columbia Street, Elliott Avenue, and Western Avenue would be replaced near their existing locations. This concept includes replacing the seawall to provide the structural foundation required to support a new elevated structure so it meets current seismic standards. It also includes replacing Alaskan Way, improving the Battery Street Tunnel to meet current seismic standards, and rebuilding the waterfront streetcar.

Key Features

- This concept assumes that the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance.

The remainder of SR 99 would be replaced with a facility that would meet WSDOT design standards, where feasible.

- This concept would maintain transportation-related functions of SR 99 by providing connections similar to existing conditions for drivers traveling to and from the waterfront, downtown, and Ballard/Interbay.
- Construction would substantially disrupt SR 99 and local traffic for many years. SR 99 closure would be required for a period of months. Extensive lane restrictions and ramp closures on SR 99 would be required for many years, including a detour on Broad Street. Alaskan Way traffic would be restricted for many years.
- A new elevated structure would affect views to a greater degree than the existing viaduct, since it would be wider. Noise impacts would continue. These factors would limit opportunities to improve visual, physical, and aesthetic connections between downtown and the waterfront.

Screening Results

This concept does not meet the screening criteria in the following areas:

- Design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1).
- This concept would not avoid major disruption to traffic patterns because construction would substantially disrupt SR 99 and local traffic for many years (criterion E1).
- This concept proposes to replace the viaduct with a new one that is wider than the current structure, which would not support land use and shoreline plans (criterion F1). A wider structure would preclude expanded visual, physical, and aesthetic connections between downtown and the waterfront (criterion F2).

Even though this concept does not meet the screening criteria for the reasons noted above, it is carried forward for further analysis for the following reasons:

- It would maintain transportation-related functions of SR 99 by providing connections similar to existing conditions for drivers traveling to and from the waterfront, downtown, and Ballard/Interbay (criterion C1).
- It would improve mobility for some trips, compared to conditions on the existing facility in 2030¹⁴ (criterion C1).

¹⁴ WSDOT et al. 2004.

Partnership Process Elevated Bypass Hybrid

General Description

With this concept, SR 99 would be replaced with two side-by-side, independent, elevated roadways along Seattle's central waterfront. Each structure would have two lanes in one direction. Ramps would be provided at Elliott and Western Avenues. Ramps would not be provided at Columbia and Seneca Streets, but access to and from downtown via SR 99 could be provided near S. King Street. This concept includes transit investments and improvements to I-5 and Alaskan Way.¹⁵ This concept also includes replacing the seawall to provide the structural foundation required to support a new elevated structure so it meets current seismic standards. It also includes replacing Alaskan Way, improving the Battery Street Tunnel to meet current seismic standards, and building a streetcar along First Avenue.¹⁶

Key Features

- This concept assumes that the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance. The remainder of SR 99 would be replaced with a facility that would meet WSDOT design standards, where feasible.
- This concept relies on improvements to transit and I-5 to provide mobility for people and goods destined to, from, or through downtown. Proposed improvements to transit and I-5 are documented in the Project History Report.¹⁷
- Compared to the Partnership Process Bored Tunnel Hybrid, the Partnership Process Elevated Bypass Hybrid would increase travel times by up to 8 minutes because it assumes a one-lane diverge for the Western Avenue northbound off-ramp.¹⁸
- Construction would substantially disrupt SR 99 and local traffic for many years. SR 99 closure would be required for a period of months. Extensive lane restrictions and ramp closures on SR 99 would be required for many years. Alaskan Way traffic would be restricted for many years.
- A new elevated structure would continue to affect views along the waterfront. Noise impacts would continue. These factors would limit opportunities to improve visual, physical, and aesthetic connections

¹⁵ WSDOT et al. 2009.

¹⁶ WSDOT et al. 2009.

¹⁷ WSDOT et al. 2009.

¹⁸ Parsons Brinckerhoff Quade and Douglas, Inc. 2009.

between downtown and the waterfront, though this scenario could offer modest improvements in terms of open space along the waterfront compared to existing conditions.

Screening Results

This concept is eliminated from further consideration for the following reasons:

- Design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1).
- Even with proposed improvements to I-5 and transit, by 2015 this concept is expected to increase travel times for some trips compared to the Partnership Process Bored Tunnel Hybrid concept because it assumes a one-lane diverge for the Western Avenue northbound off-ramp¹⁹ (criterion C1).
- This concept would not avoid major disruption to traffic patterns because construction would substantially disrupt SR 99 and local traffic for many years (criterion E1).
- This concept would not support land use and shoreline plans (criterion F1) and would preclude expanded visual, physical, and aesthetic connections between downtown and the waterfront (criterion F2), since the new elevated structure would have similar view and noise effects as the existing structure does today.
- The 2006 Supplemental Draft EIS Elevated Structure concept (which is carried forward, as described above) would provide more benefits in terms of mobility than the Partnership Process Elevated Structure Hybrid, with similar impacts during construction and similar impacts on views once the structure is built.

¹⁹ Parsons Brinckerhoff Quade and Douglas, Inc. 2009.

Surface Arterials

2004 Draft EIS Surface

General Description

This surface roadway concept would replace the viaduct with an expanded Alaskan Way surface street (a multilane boulevard). Signalized intersections would be provided along Alaskan Way to manage traffic movements. Surface street connections would replace existing downtown ramps and provide access to the waterfront, downtown, and Ballard/Interbay. Roadway capacity would be reduced and improvements to transit and implementation of trip reduction measures could be included as mitigation. The facility would be constructed to meet design standards for lane and shoulder widths, where feasible. This concept includes replacing the seawall to provide the structural foundation required to support a surface street so it meets current seismic standards. It also includes improving the Battery Street Tunnel to meet current seismic standards and rebuilding the waterfront streetcar on First Avenue.

Key Features

- Assumes the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance. The remainder of SR 99 would be replaced with a facility that would meet WSDOT design standards for surface streets, where feasible.
- This concept would reduce mobility for trips to and through downtown and, for some trips, would substantially increase travel times compared to existing conditions (in some cases, travel times would more than double).²⁰
- Alaskan Way connections would replace existing downtown ramps and provide access to the waterfront, downtown, and Ballard/Interbay.
- This concept would substantially reduce north-south capacity on SR 99 by 2030, causing increased travel times and traffic congestion on SR 99 and other parallel roadways such as city streets and I-5.²¹
- Construction would substantially disrupt SR 99 and local traffic for many years, though the disruptions would be shorter than those associated with an elevated structure or a cut-and-cover tunnel. SR 99 closure would likely be required for a period of months. Extensive lane restrictions and ramp closures on SR 99 would be required for many

²⁰ WSDOT et al. 2004.

²¹ WSDOT et al. 2004, 2006.

years, including a detour on Broad Street. Alaskan Way traffic would be restricted for many years.

- This concept would remove the visual barrier along the waterfront, allowing for a variety of urban design options, though a highly congested six-lane surface street would be noisy and would have high traffic volumes.

Screening Results

This concept is eliminated from further consideration and is considered to be unreasonable for the following reasons:

- Design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1).
- Mobility for trips to and through downtown would be reduced; for some trips, travel times would increase substantially compared to existing conditions (in some cases, travel times would more than double)²² (criterion C1).
- North-south capacity in the transportation system would be reduced, resulting in added congestion on city streets and I-5 (criterion C2).
- This concept would not avoid major disruption to traffic patterns because construction would substantially disrupt SR 99 and local traffic for many years (criterion E1).
- This concept would create a barrier to pedestrian movement between downtown Seattle and the waterfront (criterion F3).

Partnership Process I-5, Surface, and Transit Hybrid

General Description

With this concept, SR 99 would be replaced with a pair of northbound and southbound one-way streets (a couplet) near Seattle's central waterfront. Western Avenue would become a one-way northbound street with three lanes and a bicycle lane. Alaskan Way would become a one-way southbound street with three lanes and a bicycle lane. Northbound Western Avenue would start near Yesler Way and continue through the Pike Place Market via an underpass. This concept includes a high level of transit investment and extensive I-5 improvements.²³ It also includes replacing the seawall to provide the structural foundation required to support the surface street so it meets current seismic

²² WSDOT et al. 2004.

²³ WSDOT et al. 2009.

standards. Finally, it includes improving the Battery Street Tunnel to meet current seismic standards and building a streetcar on First Avenue²⁴.

Key Features

- Assumes the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements. SR 99 would be replaced with a facility that would meet WSDOT design standards, where feasible.
- Extensive improvements to transit and I-5 would be required to provide sufficient mobility for people traveling to, from, or through downtown. Proposed improvements to transit and I-5 are discussed in the Project History Report.²⁵ Even with these investments, mobility would be restricted for some trips, and travel times would increase substantially.
- This concept would reduce north-south capacity in the transportation system, resulting in added congestion on city streets and I-5.
- This concept would change the character of Western Avenue, since it would be transformed into a one-way couplet with three lanes. This would substantially increase traffic volumes on Western Avenue, reduce parking, and increase traffic-related noise.
- Construction would disrupt SR 99 and local traffic, though the disruptions would be shorter than those associated with an elevated structure or a cut-and-cover tunnel. SR 99 closure would likely be required for a period of months. Lane restrictions and ramp closures on SR 99 would be required. Alaskan Way traffic would be restricted during construction.
- This concept would remove the visual barrier along the waterfront, allowing for a variety of urban design options.

Screening Results

This concept is eliminated from further consideration and is considered to be unreasonable for the following reasons:

- Mobility for trips to and through downtown would be reduced, and travel times would increase substantially compared to existing conditions or the other bypass concepts. This concept would result in the slowest travel along SR 99 of the hybrid concepts considered in the Partnership Process.²⁶ Travel times through the Central Business District are estimated to increase by up to 13 minutes compared to those of the other bypass concepts. Between the Dexter Avenue and E. Marginal Way

²⁴ WSDTO et al. 2009.

²⁵ WSDOT et al. 2009.

²⁶ Parsons Brinckerhoff Quade and Douglas, Inc. 2009.

ramps, AM and PM peak hour travel times are expected to more than double compared to the travel times for the Partnership Process Bored Tunnel Hybrid²⁷(criterion C1).

- North-south capacity in the transportation system would be reduced, resulting in added congestion on city streets and I-5 (criterion C1).

Tunnels

2004 Draft EIS Bypass Tunnel

General Description

This concept proposes to replace the viaduct with a cut-and-cover tunnel under Alaskan Way along the downtown waterfront. The tunnel would serve as a bypass route for through traffic and would have two lanes in each direction. The bypass tunnel would not have access ramps at Columbia Street, Seneca Street, Elliott Avenue, or Western Avenue. Downtown ramps would be provided near S. King Street, and access to downtown and Ballard/Interbay would be provided via Alaskan Way. This concept includes replacing the seawall to provide the structural foundation required to support the tunnel so it meets current seismic standards. The west wall of the cut-and-cover tunnel would become the new seawall. It also includes replacing Alaskan Way, improving the Battery Street Tunnel to meet current seismic standards, and rebuilding the waterfront streetcar.

Key Features

- This concept assumes that the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance. The remainder of SR 99 would be replaced with a facility that would meet WSDOT design standards, where feasible.
- Downtown ramps would be provided near S. King Street. Access to the waterfront, downtown, and Ballard/Interbay would be provided through surface street connections.
- The western wall of the tunnel would become the new Alaskan Way Seawall.
- Construction would substantially disrupt SR 99 and local traffic for many years. SR 99 closure would be required for a period of months, or as long as a few years. Extensive lane restrictions and ramp closures on SR 99

²⁷ Parsons Brinckerhoff Quade and Douglas, Inc. 2009.

would be required for many years. Alaskan Way traffic would be restricted to local access for many years.

- This concept would remove the visual barrier along the waterfront, allowing for a variety of urban design options.

Screening Results

This concept is eliminated from further consideration for the following reasons:

- Design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1).
- This concept would not avoid major disruption to traffic patterns because construction would substantially disrupt SR 99 and local traffic for many years (criterion E1).
- Of the four-lane tunnel bypass concepts evaluated (2004 Draft EIS Bypass Tunnel and the Partnership Process Bored Tunnel Hybrid), the Partnership Process Bored Tunnel Hybrid concept would best meet the purpose and need and the screening criteria because it is the only concept that would address the Battery Street Tunnel deficiencies and avoid and minimize disruptions to traffic during construction to the extent practicable.

2004 Draft EIS Tunnel

General Description

This concept proposes to replace the viaduct with a cut-and-cover tunnel under Alaskan Way along the downtown waterfront. With this design concept, three lanes would be provided in each direction. Existing ramps at Seneca Street, Columbia Street, Elliott Avenue, and Western Avenue would be replaced by ramps near S. King Street and Union Street. Waterfront, downtown, and Ballard/Interbay access would be provided through Alaskan Way surface street connections. This concept includes replacing the seawall to provide the structural foundation required to support the tunnel so it meets current seismic standards. The west wall of the cut-and-cover tunnel would become the new seawall. It also includes replacing Alaskan Way, improving the Battery Street Tunnel to meet current seismic standards, and rebuilding the waterfront streetcar.

Key Features

- Assumes the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance. The remainder of

SR 99 would be replaced with a facility that would meet WSDOT design standards, where feasible.

- Ramps to downtown and Ballard/Interbay would be provided near S. King Street and Union Street. Additional access to the waterfront, downtown, and Ballard/Interbay would be possible through Alaskan Way surface street connections north of Union Street.
- For some trips, mobility would be improved compared to conditions on the existing facility in 2030.²⁸
- The western wall of the tunnel would become the new Alaskan Way seawall.
- Construction would substantially disrupt SR 99 and local traffic for many years. SR 99 closure would be required for a period of months, or as long as a few years. Extensive lane restrictions and ramp closures on SR 99 would be required for many years. Alaskan Way traffic would be restricted to local access for many years.
- This concept would remove the visual barrier along the waterfront, allowing for a variety of urban design options.

Screening Results

This concept is eliminated from further consideration for the following reasons:

- Design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1).
- This concept would not avoid major disruption to traffic patterns because construction would substantially disrupt SR 99 and local traffic for many years (criterion E1).
- Of the six-lane cut-and-cover tunnel concepts evaluated, the 2006 Supplemental Draft EIS cut-and-cover tunnel would provide better mobility for SR 99 traffic traveling to and from the Ballard/Interbay area because it would maintain the Elliott/Western ramps near their existing location, compared to the Union Street ramps provided with this 2004 Draft EIS Tunnel concept.

2006 Supplemental Draft EIS Tunnel

General Description

This concept proposes to replace the viaduct with a cut-and-cover tunnel under Alaskan Way along the downtown waterfront. Three lanes would be provided in each direction. Existing ramps at Seneca Street, Columbia Street, Elliott

²⁸ WSDOT et al. 2004.

Avenue, and Western Avenue would be replaced by ramps near S. King Street and the existing ramps at Elliott and Western Avenues. This concept includes replacing the seawall to provide the structural foundation required to support the tunnel so it meets current seismic standards. The west wall of the cut-and-cover tunnel would become the new seawall. It also includes replacing Alaskan Way, improving the Battery Street Tunnel to meet current seismic standards, and rebuilding the waterfront streetcar.

Key Features

- Assumes the Battery Street Tunnel would be used for SR 99 traffic. The tunnel could be improved to meet seismic standards and fire and life/safety requirements, but it would not meet WSDOT design standards for lane widths, shoulder widths, and sight distance. The remainder of SR 99 would be replaced with a facility that would meet WSDOT design standards, where feasible.
- Ramps to downtown would be provided near S. King Street and the Elliott/Western ramps would be replaced near their existing location. Additional access to the waterfront, downtown, and Ballard/Interbay would be provided through Alaskan Way surface street connections
- For some trips, mobility would be improved compared to conditions on the existing facility in 2030.²⁹
- The western wall of the tunnel would become the new Alaskan Way seawall.
- Construction would substantially disrupt SR 99 and local traffic for many years. SR 99 closure would be required for a period of months, or as long as a few years. Extensive lane restrictions and ramp closures on SR 99 would be required for many years. Alaskan Way traffic would be restricted to local access for many years.
- This concept would remove the visual barrier along the waterfront, allowing for a variety of urban design options.

Screening Results

This concept does not meet the screening criteria in the following areas:

- Design deficiencies related to lane widths, shoulder widths, and sight distance in the Battery Street Tunnel would not be improved (criterion B1).
- This concept would not avoid major disruption to traffic patterns because construction would substantially disrupt SR 99 and local traffic for many years (criterion E1).

²⁹ WSDOT et al. 2004.

Even though this concept does not meet some of the screening criteria for the reasons noted above, it is carried forward for further analysis for the following reasons:

- It would maintain transportation-related functions of SR 99 by providing connections similar to existing conditions for drivers traveling to and from the waterfront, downtown, and Ballard/Interbay (criterion C1).
- It would improve mobility for some trips, compared to conditions on the existing facility in 2030 (criterion C1).

Partnership Process Bored Tunnel Hybrid

General Description

With this concept, SR 99 would be replaced with a single, large-diameter bored tunnel with two lanes of traffic in each direction between approximately S. Royal Brougham Way and Harrison Street. This scenario includes additional transit investments. Existing ramps at Seneca Street and Columbia Street would be replaced by ramps near S. King Street. The Elliott/Western ramps would not be replaced in their existing location, but these trips could be accommodated on Alaskan Way or via the bored tunnel and the Mercer Street corridor. This concept includes removing the existing viaduct along the central waterfront. The Battery Street Tunnel would no longer be needed, and it would be filled and closed. This concept does not include replacing the seawall, because the bored tunnel alignment would not travel along the central waterfront, and a bored tunnel could meet seismic standards without replacing the seawall. It also does not include improvements to Alaskan Way or rebuilding the waterfront streetcar.

Key Features

- In most cases, mobility and transportation connections would be maintained. Ramps to downtown would be provided near S. King Street. The ramps at Elliott and Western Avenues would not be replaced. Vehicles traveling to or from the Ballard/Interbay area would be accommodated on Alaskan Way or via the bored tunnel and the Mercer Street corridor. Travel times for this trip are expected to increase slightly depending on the route taken and the time of day.
- This concept assumes limited transit investments, and I-5 improvements are not included. Transit improvements would be advanced as separate projects as part of the Alaskan Way Viaduct and Seawall Replacement Program.
- This concept would improve mobility north of the Battery Street Tunnel, since the Battery Street Tunnel would be replaced with the new bored

tunnel, which would improve roadway conditions for drivers, with wider lanes and shoulders and improved sight distance. Additionally, the bored tunnel would come to the surface north of Denny Way, providing opportunities to connect the street grid and improving mobility for drivers, bicyclists, and pedestrians.

- During construction, this concept would minimize traffic disruption to SR 99 and the surrounding street grid since it would allow SR 99 to remain open. A short closure of SR 99 (less than a month) may be required. SR 99 traffic would be disrupted near the south and north portal areas throughout construction. Lane restrictions and, in some cases, closures would be required on area surface streets.
- Construction impacts, particularly along the waterfront, would be much less disruptive than those associated with the other concepts considered since much of the construction would take place underground.
- This concept would remove the visual barrier along the waterfront, allowing for a variety of urban design options.

Screening Results

This concept does not meet the screening criteria in the following areas:

- In most cases, mobility and transportation connections would be maintained; however, the Elliott/Western ramps would not be replaced (criterion C1). These trips would be accommodated via alternative routes either on Alaskan Way or through the bored tunnel; however, these routes are expected to increase travel times slightly depending on the route taken and the time of day.

Even though this concept does not meet one of the screening criteria for the reasons noted above, it is carried forward for further analysis because for the following reasons:

- It would improve mobility north of the Battery Street Tunnel, since the Battery Street Tunnel would be replaced with the new bored tunnel, which would improve roadway conditions for drivers, with wider lanes and shoulders and improved sight distance. Additionally, the bored tunnel would come to the surface north of Denny Way, providing opportunities to connect the street grid and improve mobility for drivers, bicyclists, and pedestrians.
- It would minimize traffic disruption to SR 99 and the surrounding street grid during construction since it would allow SR 99 to remain open.
- Construction impacts, particularly along the waterfront, would be much less disruptive since much of the construction would take place underground.

- It removes the visual barrier along the waterfront, allowing for a variety of urban design options.

SCREENING RESULTS SUMMARY

As discussed previously, the purpose of this memorandum is to update prior screening efforts with the following additional work:

- Rescreen alternatives evaluated in the 2004 Draft EIS and the 2006 Supplemental Draft EIS based on an updated project purpose and need statement and updated screening criteria.
- Consider additional design concepts developed as part of the Partnership Process.

Ten design concepts were evaluated and screened based on the updated purpose and need statement and screening criteria. None of the concepts met all of the screening criteria. Of the 10 concepts evaluated, 7 were eliminated for reasons described in this memorandum and summarized in Exhibit 2.

Exhibit 2
Screening Results Summary Table

Design Concept	Reasons for Concept Elimination
Elevated Structures	
2004 Draft EIS Rebuild	<ul style="list-style-type: none"> ▪ It would not meet existing WSDOT design standards. ▪ Construction would substantially disrupt SR 99 and local traffic for many years. ▪ It would rebuild the existing viaduct, which would not support land use and shoreline plans.
2004 Draft EIS Aerial	<ul style="list-style-type: none"> ▪ Design deficiencies in the Battery Street Tunnel would not be improved. ▪ Construction would substantially disrupt SR 99 and local traffic for many years. ▪ Assumes a large, temporary aerial structure along the waterfront would be constructed that would substantially affect Seattle's waterfront for many years. ▪ It would replace the viaduct with a new one that is much wider than the current structure, which would not support land use and shoreline plans.

Exhibit 2
Screening Results Summary Table

Design Concept	Reasons for Concept Elimination
Partnership Process Elevated Bypass Hybrid	<ul style="list-style-type: none"> ▪ Design deficiencies in the Battery Street Tunnel would not be improved. ▪ This concept is expected to increase travel times for some trips compared to the Partnership Process Bored Tunnel Hybrid because it assumes a one-lane diverge for the Western Avenue northbound off-ramp. ▪ Construction would substantially disrupt SR 99 and local traffic for many years. ▪ It would replace the existing viaduct with another elevated structure, which would not support land use and shoreline plans.
Surface Arterials	
2004 Draft EIS Surface	<ul style="list-style-type: none"> ▪ Design deficiencies in the Battery Street Tunnel would not be improved. ▪ Mobility for trips to and through downtown would be reduced; for some trips, travel times would increase substantially compared to existing conditions (in some cases, travel times would more than double). ▪ North-south capacity would be reduced, resulting in added congestion on city streets and I-5. ▪ Construction would substantially disrupt SR 99 and local traffic for many years. ▪ It would create a barrier to pedestrian movement between downtown Seattle and the waterfront.
Partnership Process I-5, Surface, and Transit Hybrid	<ul style="list-style-type: none"> ▪ Mobility for trips to and through downtown would be reduced; for some trips, travel times would increase substantially compared to existing conditions or mobility for the bypass concepts. ▪ North-south capacity would be reduced, resulting in added congestion on city streets and I-5.

Exhibit 2
Screening Results Summary Table

Design Concept	Reasons for Concept Elimination
Tunnels	
2004 Draft EIS Bypass Tunnel	<ul style="list-style-type: none"> ▪ Design deficiencies in the Battery Street Tunnel would not be improved. ▪ Construction would substantially disrupt SR 99 and local traffic for many years. ▪ Of the four-lane tunnel bypass concepts evaluated, the Partnership Process Bored Tunnel Hybrid would best meet the project purposes and needs because it is the only concept that would address the Battery Street Tunnel deficiencies and avoid and minimize disruptions to traffic during construction to the extent practicable.
2004 Draft EIS Tunnel	<ul style="list-style-type: none"> ▪ Design deficiencies in the Battery Street Tunnel would not be improved. ▪ Construction would substantially disrupt SR 99 and local traffic for many years. ▪ Of the six-lane tunnel concepts evaluated, the 2006 Supplemental Draft EIS Tunnel would best meet the project purposes and needs because it would maintain the Elliott/Western ramps near their existing location, which would better meet the travel needs than the ramps at Union Street provided with this concept.

Three concepts including one elevated structure and two tunnel concepts will be advanced for further consideration in a Supplemental Draft EIS. The concepts that will be advanced and the reasons why they are carried forward are summarized below.

- **2006 Supplemental Draft EIS Elevated Structure** – This concept will be carried forward because it would maintain transportation-related functions of SR 99 by providing connections similar to existing conditions for drivers traveling to and from the waterfront, downtown, and Ballard/Interbay and improve mobility for some trips, compared to conditions on the existing facility in 2030.
- **2006 Supplemental Draft EIS Tunnel** – This concept offers similar benefits as those described for the 2006 Supplemental Draft EIS Elevated Structure. Additionally, it would support existing land use and shoreline plans by improving views and reducing noise along the waterfront.
- **Partnership Process Bored Tunnel Hybrid** – This concept would improve traffic safety by replacing the Battery Street Tunnel with a new bored tunnel, which would improve traffic safety and roadway

conditions for drivers, with wider lanes and shoulders and improved sight distance. Additionally, this concept would provide opportunities to connect the street grid between Denny Way and Harrison Street. This concept would minimize traffic disruption on SR 99 and the surrounding street grid, since it would allow SR 99 to remain open during construction. It would also minimize construction impacts along the waterfront, because much of the construction would take place underground. Finally, it would remove the viaduct along the waterfront, improving views and reducing noise, which would support land use and shoreline plans.

These concepts represent reasonable alternatives that satisfy most of the screening criteria, meet the identified project needs to varying degrees, and reflect different tradeoffs that warrant further evaluation in an EIS.

REFERENCES

- Federal Register. 2008. Volume 73, No. 137. Wednesday, July 16, 2008.
- Federal Register. 2009. Volume 74, No. 106. Thursday, June 4, 2009.
- Parametrix. 2003. SR 99: Alaskan Way Viaduct and Seawall Replacement Project, Final Revised Screening of Design Concepts. June 2003.
- Parametrix. 2006a. SR 99: Alaskan Way Viaduct and Seawall Replacement Project, 2006 Alternatives Screening Battery Street Tunnel. March 2006.
- Parametrix. 2006b. SR 99: Alaskan Way Viaduct and Seawall Replacement Project, Final Revised Screening of Design Concepts, June 2003–2006 Addendum. March 2006.
- Parsons Brinckerhoff Quade and Douglas, Inc. 2002a. SR 99: Alaskan Way Viaduct Project, Screening of Initial Concepts Technical Memorandum.
- Parsons Brinckerhoff Quade and Douglas, Inc. 2002b. Alaskan Way Viaduct Project, Development and Screening of Conceptual Alternatives. February 2002.
- Parsons Brinckerhoff Quade and Douglas, Inc. 2009. Revised Travel Times for Hybrid Scenarios, AWW Central Waterfront Analysis. January 16, 2009.
- WSDOT, Federal Highway Administration (FHWA), and the City of Seattle. 2004. SR 99: Alaskan Way Viaduct and Seawall Replacement Project Draft Environmental Impact Statement. Reference from Exhibits 2-6 and 2-8. March 2004.
- WSDOT, FHWA, and the City of Seattle. 2006. SR 99: Alaskan Way Viaduct and Seawall Replacement Project Supplemental Draft Environmental Impact Statement and Draft Section 4(f) Evaluation. Reference from page 10, “Reasons Why the Surface Alternative Was Eliminated.” July 2006.
- WSDOT, FHWA, City of Seattle, and King County. 2009. Alaskan Way Viaduct Replacement Project History Report. September 2009.

Appendix A: Purpose and Need Statement

Alaskan Way Viaduct Replacement Project Purpose and Need Statement

Introduction

Project limits in the south were modified to connect to the S. Holgate Street to S. King Street Viaduct Replacement Project, which is an independent project adjacent to the Alaskan Way Viaduct Replacement Project.

The Federal Highway Administration (FHWA), the Washington State Department of Transportation (WSDOT), and the City of Seattle are proposing to replace the Alaskan Way Viaduct because it is seismically vulnerable and at the end of its useful life. To protect public safety and provide essential vehicle capacity to and through downtown Seattle, the viaduct must be replaced. The Alaskan Way Viaduct is part of State Route (SR) 99 located in downtown Seattle, King County, Washington. As defined for this project, SR 99 needs to be replaced or substantially modified from approximately S. Royal Brougham Way to Roy Street. Alternatives to replace this portion of SR 99 within its existing corridor have been considered in a 2004 Draft Environmental Impact Statement (EIS) and a 2006 Supplemental Draft EIS. Subsequently WSDOT, Seattle, and King County evaluated a range of solutions that also included improvements to the transportation system outside of the existing SR 99 corridor. This updated purpose and need statement is largely the result of this expanded evaluation; our previous EIS evaluations; comments received after publication of prior EIS documents; and scoping comments received from a wide range of citizens, businesses, and organizations. Text summarizing the changes made to the project's purpose and need statement since the 2006 Supplemental Draft EIS is provided under each heading.

Purpose and Need for the Proposed Action

Removed reference to the seawall and clarified project purposes and needs.

The Alaskan Way Viaduct is seismically vulnerable and at the end of its useful life. To protect public safety and provide essential vehicle capacity to and through downtown Seattle, the viaduct must be replaced. Because this facility is at risk of sudden and catastrophic failure in an earthquake, FHWA, WSDOT, and the City of Seattle seek to implement a replacement as soon as possible. Moving people and goods to and through downtown Seattle is vital to maintaining local, regional, and statewide economic health. FHWA, WSDOT, and the City of Seattle have identified the following purposes and needs the project should address.

The purpose of the proposed action is to provide a replacement transportation facility that will:

- Reduce the risk of catastrophic failure in an earthquake by providing a facility that meets current seismic safety standards.
- Improve traffic safety.
- Provide capacity for automobiles, freight, and transit to efficiently move people and goods to and through downtown Seattle.

- Provide linkages to the regional transportation system and to and from downtown Seattle and the local street system.
- Avoid major disruption of traffic patterns due to loss of capacity on SR 99.
- Protect the integrity and viability of adjacent activities on the central waterfront and in downtown Seattle.

The following paragraphs provide further information regarding the needs underlying each of the project purposes that are listed above.

Reduce Seismic Vulnerability

Removed references to the seawall and added detailed information explaining the viaduct’s seismic deficiencies.

Because of its seismic vulnerability, the Alaskan Way Viaduct must be removed. The viaduct is deteriorating and at risk of sudden and catastrophic failure in an earthquake because of its design, age, and location. The viaduct was constructed in the 1950s and conformed to the design standards of that time. The structure was designed to seismic criteria that are less than one-third as stringent as today’s criteria.¹ The viaduct’s existing foundations are embedded in liquefiable soil, and the structure is deteriorating. These factors make the structure vulnerable to earthquakes and necessitate its removal.¹ The replacement for SR 99 must meet current standards for earthquake resistance.

Improve Traffic Safety

Combined and condensed “traffic safety” and “roadway deficiencies.”

The viaduct and Battery Street Tunnel do not meet current roadway design standards and have deficiencies that need to be improved.¹ Current design standards reflect the latest agreement among the states and FHWA on how to safely design new and upgraded highways. As now configured, the viaduct does not meet current standards for lane width, shoulder width, and stopping sight distance.¹ The Battery Street Tunnel does not meet current standards for lane width, shoulder width¹, and stopping sight distance.² North of the Battery Street Tunnel, several streets connect directly to SR 99 without room for drivers to accelerate or decelerate without affecting traffic flow or safety. These deficiencies result in higher than average collision rates for some segments of SR 99 within the project limits compared to similar facilities.² The replacement for SR 99 should meet current standards for roadway design.

Provide Capacity to Move People and Goods

Clarified the purpose and need to provide sufficient capacity for north-south trips to and through downtown.

The Alaskan Way Viaduct portion of SR 99 provides essential capacity to and through downtown Seattle, carrying 20 to 25 percent of the traffic traveling through downtown.

¹ Parsons Brinckerhoff 2002.

² Parsons Brinckerhoff 2004.

Together, I-5 and SR 99 through Seattle carry over \$80 billion in goods each year.³ The central waterfront portion of the SR 99 mainline is one of two primary north-south highway routes through Seattle. Maintaining this north-south through route is critical to supporting a robust, integrated regional transportation system and the economic vitality of the city, Puget Sound region, and state. The through capacity provided by the viaduct cannot be provided elsewhere in the region if the facility were to close. This section of SR 99 also serves as a transit route to and from downtown for local and express bus service. For these and other reasons, the United States Congress has identified it as a project of national and regional significance.⁴ The replacement for SR 99 should provide sufficient capacity for north-south trips to and through downtown.

Provide Transportation System Linkages

Moved from “Goals” section and updated text.

This portion of SR 99 provides important linkages for the regional and local transportation system. Directly south of the central waterfront section of SR 99, the highway interacts with the Port of Seattle and Seattle’s Duwamish industrial area. This area is home to one of the West Coast’s largest industrial ports and just over 80 percent of Seattle’s designated industrial lands.⁵ The transportation system in this area plays a crucial role in the movement of freight and goods for the entire state and the Pacific Northwest region. As such, the connection provided by SR 99 to Port facilities and industrial activities is important to the efficient movement of freight and goods to and from Seattle.

Along the central waterfront, SR 99 provides efficient through access for traffic bound for locations north and south of the downtown core. In addition to providing an efficient through connection, the existing viaduct also provides access to and from the south and downtown Seattle via the Seneca Street off-ramp and Columbia Street on-ramp. Further, this section of SR 99 provides a connection for the Interbay, Magnolia, and Ballard neighborhoods in northwest Seattle with areas south of downtown via the Elliott and Western Avenues and Railroad Way on- and off-ramps. This connection is used by many businesses and residents in northwest Seattle and is not easily duplicated by other routes.

Directly north of the central waterfront, SR 99 provides links to the local streets that serve the Seattle Center, a major regional civic center that welcomes more than 12 million visitors each year, generating \$1.15 billion in business activity.⁶ In this area, SR 99 separates Seattle Center and the Uptown neighborhood from the South Lake Union neighborhood and provides limited connections to these neighborhoods. Improvements to SR 99 should improve these inter-neighborhood connections as well as provide regional access to and from SR 99.

The replacement for SR 99 should provide linkages to the regional transportation system, and to and from downtown Seattle and the local street system.

³ Larson et al. 2005.

⁴ SAFETEA-LU 2005.

⁵ City of Seattle 2007.

⁶ City of Seattle 2008.

Avoid Major Disruption of Traffic Patterns

Recognized the purpose and need to avoid major traffic disruption

The existing Alaskan Way Viaduct provides substantial capacity for north-south travel to and through downtown Seattle. The loss of substantial capacity on SR 99 for an extended period would adversely affect conditions for through traffic by increasing congestion on I-5 and the adjacent local roadway network. Since many of these adjacent facilities are already congested, extended loss of SR 99 capacity would add substantial delay for the traveling public (including transit) and would cause economic hardships for local and regional businesses. While disruption cannot be completely avoided, there is a need to replace the existing viaduct in a manner that minimizes disruption of traffic patterns by minimizing the time lapse between closure of the existing viaduct and opening of a replacement facility or facilities.

Protect the Integrity and Viability of Adjacent Activities on the Central Waterfront and in Downtown Seattle

Clarified the description and moved text from “goals and objectives”.

The presence of the viaduct impedes the City’s ability to implement its vision for redeveloping the central waterfront. The central waterfront section of the Alaskan Way Viaduct travels through and adjacent to downtown Seattle’s urban core and the Seattle waterfront. The structure is elevated through the city, providing views of the waterfront to drivers, but substantially impairing views to and from the waterfront to the city. The high volume of traffic carried by the double-level structure contributes substantial noise that affects the adjacent downtown and waterfront areas.

Since the viaduct was constructed in the 1950s, the Seattle downtown waterfront has been transformed from its origins as a working waterfront, characterized by shipping, warehouse, and industrial activities, to an important area for tourism and recreation. The central waterfront now has a mix of uses that include office, retail, hotel, residential, conference center, aquarium, museum, parks, cruise ship terminal, ferry terminal, and various types of commercial and recreational moorage. As such, the view and noise impacts caused by the existing elevated viaduct structure detract from the land uses found on the Seattle waterfront today. Seattle’s vision for the central waterfront is based on reconnecting downtown with the waterfront, enhancing the waterfront’s environmental sustainability, increasing views of Elliott Bay and the landforms beyond, facilitating revitalization of Seattle’s waterfront, maintaining transportation access to and through the waterfront, and increasing opportunities for the public to access and enjoy the shoreline and waterfront. Therefore, the replacement for SR 99 should support land use plans for the central Seattle waterfront and downtown as described above.

Since the seawall and Alaskan Way surface street have been removed as a project purpose and need, references to bicycle and pedestrian safety and accessibility and “goals and objectives” were removed from the purpose and need statement. Bicycle and pedestrian safety and accessibility are associated with replacing the seawall, Alaskan Way surface street improvements, and the waterfront promenade. Bicycle and pedestrian safety needs will be addressed as part of the planning process for those improvements.

References:

- City of Seattle. 2007. Seattle's Industrial Lands Background Report. May 2007. Department of Planning and Development. Available at: http://www.seattle.gov/dpd/cms/groups/pan/@pan/@plan/@industriallands/documents/web_informational/dpdp_020037.pdf.
- City of Seattle. 2008. Council Passes Seattle Center Master Plan. News release dated August 8, 2008. Available at: <http://www.seattle.gov/council/newsdetail.asp?ID=8758&Dept=28>. Accessed November 18, 2009.
- Larson, R., et al. 2005. Letter dated May 11, 2005 to the House Transportation Committee members Young, Petri, Oberstar, and DeFazio. May 2005.
- Parsons Brinckerhoff Quade & Douglas, Inc. 2002. SR 99: Alaskan Way Viaduct Project No Action Alternative. Reference located in the Executive Summary. August 2002.
- Parsons Brinckerhoff Quade & Douglas, Inc. 2004. SR 99: Alaskan Way Viaduct and Seawall Replacement Project Draft EIS, Appendix C Transportation Discipline Report. Reference located in section 4.10.2. March 2004.
- SAFETEA-LU, Public Law 109-59. 2005. Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. Section 1301. August 10, 2005.

Appendix W

Screening Documents

2011 Surface and Transit
Scenario Year Analysis
Results

This Page Intentionally Left Blank

2011 Surface and Transit Scenario
Year 2030 Analysis Results
Alaskan Way Viaduct Replacement Project

This Page Intentionally Left Blank

TABLE OF CONTENTS

Chapter 1 Introduction and Summary	1
1.1 Introduction	1
1.2 Summary	2
1.2.1 Volumes and System-wide Metrics	2
1.2.2 Congestion	2
1.2.3 Travel Times	3
1.2.4 Conclusion	3
Chapter 2 Background Information	5
2.1 Project History	5
2.1.1 Partnership Process.....	5
2.1.2 Seattle Urban Mobility Plan.....	5
2.2 Surface and Transit Scenarios Developed During the Partnership Process	6
2.2.1 Scenario A: Demand Management and Low Capital	6
2.2.2 Scenario B: Surface Boulevard and Transit.....	7
2.2.3 Scenario C: Alaskan Way and Western Avenue One-Way Couplet	8
2.2.4 Scenario L: I-5, Surface, and Transit Hybrid Scenario.....	8
Chapter 3 ST Scenario 2030 Transportation Analysis	11
3.1 Regional/Center City Context and Travel Patterns	11
3.1.1 Vehicle Miles Traveled	11
3.1.2 Vehicle Hours of Travel.....	11
3.1.3 Vehicle Hours of Delay.....	11
3.1.4 Vehicle Volumes at Screenlines.....	12
3.1.5 Person Throughput	13
3.2 Traffic Operations on SR 99	14
3.2.1 Volumes	14
3.2.2 Speeds.....	17
3.3 Traffic Operations at Key Arterial Intersections	18
3.4 AM and PM Peak Hour Travel Times	24
3.4.1 Trips to Downtown Seattle	25
3.4.2 Trips through Downtown Seattle.....	26
3.4.3 Trips within Downtown Seattle.....	26
3.5 Transit Services	27
3.5.1 Modeled Transit Ridership (Person Trips)	27
3.5.2 Transit Mode Share.....	27
3.6 Freight	28
3.7 Parking	28
3.8 Pedestrians and Bicycles	29
3.9 Ferries	29
3.10 Safety	30
3.11 Event Traffic	30
Chapter 4 References	31

LIST OF EXHIBITS

Exhibit 1. Scenario L Map.....	9
Exhibit 2. Vehicle Miles of Travel, Vehicle Hours of Travel, and Vehicle Hours of Delay for Center City and Region ...	12
Exhibit 3. Model-Estimated Vehicle Volumes at Selected Screenlines.....	13
Exhibit 4. Model-Estimated Person Throughput at Selected Screenlines.....	13
Exhibit 5. 2030 ST Scenario AM and PM Peak Hour Mainline and Ramp Volumes.....	15
Exhibit 6. 2030 Tolloed Bored Tunnel AM and PM Peak Hour Mainline and Ramp Volumes	16
Exhibit 7. Comparison of Vehicle Volumes for 2030 ST Scenario and 2030 Tolloed Bored Tunnel.....	17
Exhibit 8. Comparison of Southbound SR 99 Peak Hour Speeds (Miles per Hour)	17
Exhibit 9. Comparison of Northbound SR 99 Peak Hour Speeds (Miles per Hour)	18
Exhibit 10. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (Seconds), South.....	19
Exhibit 11. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (seconds), Central	21
Exhibit 12. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (Seconds), North	23
Exhibit 13. Comparison of Corridor Travel Times (Minutes)	25
Exhibit 14. Comparison of Model-Estimated Transit Ridership at Selected Screenlines (Person Trips)	27
Exhibit 15. Comparison of Model-Estimated Daily Transit Mode Shares To, From, and Within Seattle’s Center City.....	28

ACRONYMS AND ABBREVIATIONS

CBD	Central Business District
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
I-5	Interstate 5
LOS	level of service
project	Alaskan Way Viaduct Replacement project
SDOT	Seattle Department of Transportation
SODO	South of Downtown
SR	State Route
ST scenario	I-5, Surface, and Transit Hybrid Scenario
UMP	Urban Mobility Plan
VHD	vehicle hours of delay
VHT	vehicle hours of travel
VMT	vehicle miles of travel
WSDOT	Washington State Department of Transportation

Chapter 1 INTRODUCTION AND SUMMARY

1.1 Introduction

This appendix discusses the Interstate 5 (I-5), Surface, and Transit Hybrid Scenario (hereafter referred to as the ST scenario) that was developed for the replacement of the Alaskan Way Viaduct during the Partnership Process of 2007. During the Partnership Process, all transportation modeling was for the year 2015, when a replacement facility could be opened. The normal practice for environmental review is to consider a design year in addition to the opening year. For the Alaskan Way Viaduct Replacement Project, the design year is 2030.

During the development of the 2010 Supplemental Draft Environmental Impact Statement (EIS), the concepts considered in the Partnership Process (along with alternatives considered in the 2004 Draft EIS and 2006 Supplemental Draft EIS) were reevaluated to determine whether they should be considered as reasonable alternatives. That reevaluation addressed the ST scenario, and concluded that it was not a reasonable alternative for the following reasons:

- Mobility for trips to and through downtown would be reduced, and travel times would increase substantially compared to existing conditions or the other bypass concepts. This concept would result in the slowest travel along State Route (SR) 99 of the hybrid concepts considered in the Partnership Process. Travel times through the Central Business District (CBD) are estimated to increase by as much as to 13 minutes compared to those of the other bypass concepts. Between the Dexter Avenue and East Marginal Way ramps, AM and PM peak hour travel times are expected to more than double, as compared to the travel times for the Partnership Process Bored Tunnel Hybrid.
- North-south capacity in the transportation system would be reduced, resulting in added congestion on city streets and I-5.¹

Because the ST scenario did not meet the screening criteria, it was not carried forward for detailed study in the 2010 Supplemental Draft EIS.² In response to comments received from the City and other stakeholders, the Federal Highway Administration (FHWA) and Washington State Department of Transportation (WSDOT) have prepared this additional analysis of the ST scenario in the year 2030, the same year that was used for evaluating build alternatives in the Final EIS. This additional analysis is documented in this report and is summarized in the Final EIS, in Chapter 2, Question 7.

This appendix provides information for the ST scenario in 2030 and discusses the following topics:

- Background information on the creation of the ST scenario
- Traffic analysis of the 2030 ST scenario

¹ “Revised Screening of Design Concepts 2010 Update” (Aug. 2010), pp. 19–20.

² Final EIS, Exhibit 2-7, Screening Results Summary Table.

- Comparison of travel demand modeling and traffic analysis results for the 2030 ST scenario and the 2030 Tolleled Bored Tunnel, which was used as the basis for comparison because it has been identified as the preferred alternative

The information provided in this appendix is referred to in the discussion in Chapter 2, Alternatives Development, of the Final EIS.

1.2 Summary

This section of the report summarized some of the key differences between the ST scenario and the Tolleled Bored Tunnel Alternative in 2030. More detailed information is provided in this report in Chapter 3, ST Scenario 2030 Transportation Analysis.

1.2.1 Volumes and System-wide Metrics

Under the ST scenario, fewer vehicles are expected to pass through downtown Seattle, compared with the 2030 Tolleled Bored Tunnel scenario. Fewer vehicles result in the 2030 ST scenario showing lower vehicle miles of travel (VMT), vehicle hours of delay (VHD), and vehicle hours of travel (VHT) within the City Center compared with the 2030 Tolleled Bored Tunnel scenario. VHD is a measure that is often used as an indicator of overall traffic congestion.

Lower VHT, VMT, and VHD in the City Center are a direct result of the lower capacity and travel speeds within the downtown area expected under the 2030 ST scenario. To avoid increased congestion and lower travel speeds through the City Center expected under the 2030 ST scenario, drivers are expected to avoid traveling to downtown Seattle altogether or to shift to use routes east of I-5.

This result is captured in the screenline analysis summarized in Section 3.1.4. The screenlines evaluated include facilities from the waterfront to I-5. They did not include facilities east of I-5 and therefore do not capture traffic that may redistribute to these roadways. As a result, the 2030 ST scenario has lower screenline volumes than the 2030 Tolleled Bored Tunnel scenario.

Outside of the City Center, VMT, VHD, and VHT are expected to be higher under the 2030 ST scenario, and VMT is expected to be lower for the four-county region, as compared to the 2030 Tolleled Bored Tunnel scenario. This is a direct result of higher vehicle volumes and related increases in congestion outside of the City Center, as drivers redistribute to travel on facilities that do not require passing through the City Center.

Results of the analysis also indicate that while transit ridership forecasted for the 2030 ST scenario is approximately 1 percent higher than for 2030 Tolleled Bored Tunnel scenario, this mode shift to higher transit would not be enough to result in higher person throughput under the 2030 ST scenario. Therefore, the 2030 Tolleled Bored Tunnel scenario is expected to move more people through the downtown area due to overall higher vehicle volumes.

1.2.2 Congestion

Intersections across the S. Atlantic Street/S. Royal Brougham Way and Mercer Street/Denny Way corridors are expected to be congested under the 2030 ST scenario, as all traffic must exit SR 99

and travel along surface streets. These congested intersections create bottlenecks in both the north and south areas. These bottlenecks effectively meter the volume of traffic that is able to reach intersections in the CBD.

This metering, combined with the expected redistribution of traffic outside the downtown area, yields reasonable level of service (LOS) conditions at most intersections in the CBD under the 2030 ST scenario. Also, additional capacity on Second Avenue under the 2030 ST scenario, which is not present under the 2030 Tolleled Bored Tunnel scenario, helps yield reasonable LOS conditions. This additional capacity on Second Avenue is achieved by removing on-street parking.

1.2.3 Travel Times

The bottlenecks and the metering effect they have on traffic conditions in the study area under the 2030 ST scenario are captured in the travel time analysis, described in Section 3.4. For example, longer travel times are expected from West Seattle to the CBD under the 2030 ST scenario, compared to the 2030 Tolleled Bored Tunnel scenario, a direct result of increased travel times along SR 99 between the Spokane Street on-ramp and S. Royal Brougham Way.

With the ST scenario, this segment of SR 99 would have signals at S. Royal Brougham Way and S. Atlantic Street that are not present for the 2030 Tolleled Bored Tunnel scenario. This causes congestion, which acts as a bottleneck in this location. Drivers would experience congestion as they approach the bottleneck; after the bottleneck, congestion would be reduced. Overall, the bottleneck would result in longer travel times for trips from West Seattle to downtown.

The same result can be seen in the travel time results from the Woodland Park to Spokane Street travel time route. For this route, the travel times for the 2030 ST scenario are substantially longer than those for the 2030 Tolleled Bored Tunnel, because traffic along this route would travel through the highly congested arterials between Denny Way and Atlantic Street, unlike the 2030 Tolleled Bored Tunnel, in which traffic uses the bored tunnel in the core CBD section for this segment.

1.2.4 Conclusion

This analysis of the ST scenario shows that, if this package of improvements was implemented, it would create a significant bottleneck in the SR 99 corridor. This bottleneck would cause congestion on SR 99, which would limit the flow of traffic into downtown Seattle and redistribute travel to facilities that do not require passing through downtown. The removal of SR 99 as a limited-access route in downtown Seattle would substantially increase travel times for trips through downtown Seattle in the SR 99 corridor. In addition, while congestion in downtown Seattle under this scenario would be somewhat less than with the 2030 Tolleled Bored Tunnel, congestion on a regional basis would be greater.

While the ST concept may yield some benefits that are not associated with the Tolleled Bored Tunnel, it would substantially reduce north-south transportation capacity and would substantially increase travel times for north-south trips, particularly through-trips. Therefore, as documented in the 2010 screening report, the ST concept is not a reasonable alternative for consideration in this NEPA process.

This Page Intentionally Left Blank

Chapter 2 BACKGROUND INFORMATION

2.1 Project History

In early 2002, 76 viaduct replacement concepts and 7 seawall concepts were screened and packaged into five alternatives and several options that were evaluated in the 2004 Draft EIS (WSDOT et al. 2004).

The 2004 Draft EIS evaluated five Build Alternatives and a No Build Alternative. In December 2004, a Cut-and-Cover Tunnel Alternative and Elevated Structure Alternative were carried forward for further analysis. The 2006 Supplemental Draft EIS (WSDOT et al. 2006) analyzed two alternatives—a refined Cut-and-Cover Tunnel Alternative and a modified rebuild alternative called the Elevated Structure Alternative. After continued public and agency debate, Governor Gregoire called for an advisory vote to be held in the city of Seattle. The March 2007 ballot included an elevated structure alternative and a surface-tunnel hybrid alternative. The citizens voted down both alternatives.

2.1.1 Partnership Process

After the March 2007 advisory vote, Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels committed to a collaborative process to find a solution to replace the viaduct along Seattle’s central waterfront. This collaborative effort, referred to as the Partnership Process, was created to find a solution for replacing the Alaskan Way Viaduct and seawall in a manner that could be broadly supported and implemented. The three parties formalized this effort in a Memorandum of Understanding in December 2007.

The Partnership Process looked at how improvements to the broader transportation system could work with different ways to replace the function of the viaduct. Three of the initial transportation system scenarios and one of the final hybrid scenarios developed by the Partnership Process relied on improvements to surface streets, the transit system, and I-5 to replace the capacity currently provided by the viaduct. These scenarios are described in Section 1.3.

The process was advised by a 29-member Stakeholder Advisory Committee, which included representatives from business and economic stakeholders, neighborhoods, and public interest groups. The Partnership Process is described in more detail in Appendix S of the 2010 Supplemental Draft EIS, Project History Report. In January 2009, Governor Gregoire, King County Executive Sims, and Seattle Mayor Nickels announced that the agencies had reached a consensus and recommended replacing the aging viaduct with a bored tunnel.

2.1.2 Seattle Urban Mobility Plan

In response to Seattle City Council Ordinance 122406 adopted in May 2007, the Seattle Department of Transportation (SDOT) began developing the Urban Mobility Plan (UMP). Although the UMP originated before the Partnership Process, it included similar goals. The intent of the UMP was to replace the Alaskan Way Viaduct through the use of a systems approach, including enhanced transit service and road improvements to provide the following:

- Better mobility and access to and through Seattle’s Center City area, which is roughly bounded by S. Royal Brougham Way in the south, just north of Mercer Street in the north, Broadway to the east, and Elliott Bay to the west.
- Surface improvements to the central waterfront portion of the Alaskan Way corridor.

The UMP was to be focused on the movement of people and goods to and through downtown rather than maintaining the vehicle capacity of the SR 99 corridor. The UMP was designed to meet the goals of the City of Seattle Comprehensive Plan, the Seattle Shoreline Master Program, and other city policies. The goals of the UMP were achieved through the Partnership Process.

2.2 Surface and Transit Scenarios Developed During the Partnership Process

During the Partnership Process, the partnership agencies developed building blocks, or strategies for keeping people and goods moving, in five different categories: surface streets, I-5, transit, transportation policies and management, and SR 99 replacements. More than 170 possible solution elements were identified. The partnership agencies then grouped the most promising building blocks into eight scenarios, or comprehensive solutions, for replacing the viaduct’s central waterfront section.

Three of these eight scenarios consisted of combinations of building blocks that excluded a limited-access roadway element as a replacement for SR 99; they were referred to as the surface and transit scenarios. All eight scenarios contained many improvements to surface streets, transit service and facilities, transportation demand management, and I-5 that are not described in this appendix. They are explained in detail in Appendix S of the 2010 Supplemental Draft EIS, Project History Report.

The Partnership Process evaluated the original eight scenarios and developed hybrid scenarios by assembling the best-performing combinations from the original eight scenarios based on the findings of the evaluation. The hybrid scenarios were developed so that tradeoffs among the scenarios could be considered.

Each of the hybrid scenarios included an SR 99 element along with various I-5, surface street, and transit policies and management elements.

Section 1.3.2 describes the three surface and transit scenarios (Scenarios A, B, and C) that were included in the original eight scenarios as well as the ST scenario.

2.2.1 Scenario A: Demand Management and Low Capital

Scenario A combined lower-cost investments in new roads and transit service with a maximum effort to manage transportation systems and demand. This scenario included the most aggressive program of actions to manage roadway demand and was the only scenario that tested tolling. Scenario A would replace SR 99 with an improved Alaskan Way surface boulevard that would be two lanes in each direction north of Yesler Way; bicycle lanes, parking, and signalized intersections on the waterfront; and a connection to the Battery Street Tunnel.

This scenario would also reconnect the east-west street grid north of the Battery Street Tunnel with new signalized intersections on Aurora Avenue. Transit lanes would be added on several downtown streets, including a second transit lane on Second and Fourth Avenues.

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

On I-5, a northbound transit-only lane from Olive Way to SR 520 and a southbound managed lane from Mercer Street to S. Spokane Street were also included. This scenario would offer an open space along the central waterfront approximately 76 feet wide.

2.2.2 Scenario B: Surface Boulevard and Transit

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

SR 99 would be replaced with an improved Alaskan Way that would be two lanes in each direction north of Yesler Way, with bike lanes and parking. There would be signalized intersections along the waterfront. A new street would be constructed in the footprint of the existing viaduct to connect surface Alaskan Way near Pier 59 to Elliott and Western Avenues and the Battery Street Tunnel.

The waterfront streetcar would not be replaced. Instead, a new streetcar would connect the International District Station to Pioneer Square and Seattle Center via First Avenue. The east-west streets north of the Battery Street Tunnel would be reconnected with new signalized intersections on Aurora Avenue. A new arterial would be built through the north parking lot of Qwest Field connecting from Second Avenue to Airport Way. In this scenario, the streetcar system would be extended, with lines to Fremont/Ballard, University District, central downtown, and Capitol Hill/First Hill. New RapidRide (bus rapid transit) lines would be introduced between Burien and downtown Seattle via Ambaum Boulevard SW and Delridge Way and on Lake City Way. Service levels on Pacific Highway South, Ballard, West Seattle, and Aurora RapidRide lines would all be improved. Seattle's transit system would be enhanced through the creation of a nine-route network of rapid trolley buses. Incorporating elements of RapidRide into the electric trolley bus network would provide frequent service meeting the goals of Seattle's Urban Village Transit Network.

On I-5, instead of the transit-only lane starting at Olive Way as proposed in Scenario A, an additional northbound managed lane would start near Seneca Street and go north to SR 520. A southbound managed lane on I-5 was included in Scenario B as well. This scenario would also offer an open space approximately 76 feet wide along the central waterfront.

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

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

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

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

Scenario L was formed through the analysis of the three surface scenarios (Scenarios A, B, and C). As a result of these findings, the team developed an I-5, Surface and Transit Hybrid, based on elements from the original surface scenarios.

The SR 99 configuration in Scenario L would resemble Scenario C: Alaskan Way and Western Avenue One-Way Couplet. SR 99 would run along a pair of north- and southbound one-way streets, a couplet, similar to Scenario C. Western Avenue would become a one-way northbound street with three lanes and a bike lane. Alaskan Way would become a one-way southbound street with three lanes and a bike lane. Northbound Western Avenue would start near Yesler Way and continue through the Pike Place Market via an underpass. The street grid north of the Battery Street Tunnel would be reconnected with signalized intersections on Aurora Avenue.

Scenario L would offer an open space 80 to 114 feet wide along the central waterfront. This scenario would offer a high level of investment in transit. New RapidRide (bus rapid transit) lines would be introduced between Burien and downtown Seattle via Ambaum Boulevard and Delridge Way and on Lake City Way. Additional service would enhance the Ballard, West Seattle, and Aurora RapidRide lines. A network of eight rapid trolley bus routes would connect many of Seattle's Urban Villages. Incorporating elements of RapidRide into the electric trolley bus network would provide frequent service meeting the goals of Seattle's Urban Village Transit Network. A new streetcar line would serve areas along First Avenue from Pioneer Square to Seattle Center and Uptown/Queen Anne.

There would be extensive I-5 improvements, including an additional northbound lane on I-5 that would start near Seneca Street and go north to SR 520 and a direct transit access ramp from I-5 northbound to Industrial Way and the E3 Busway.

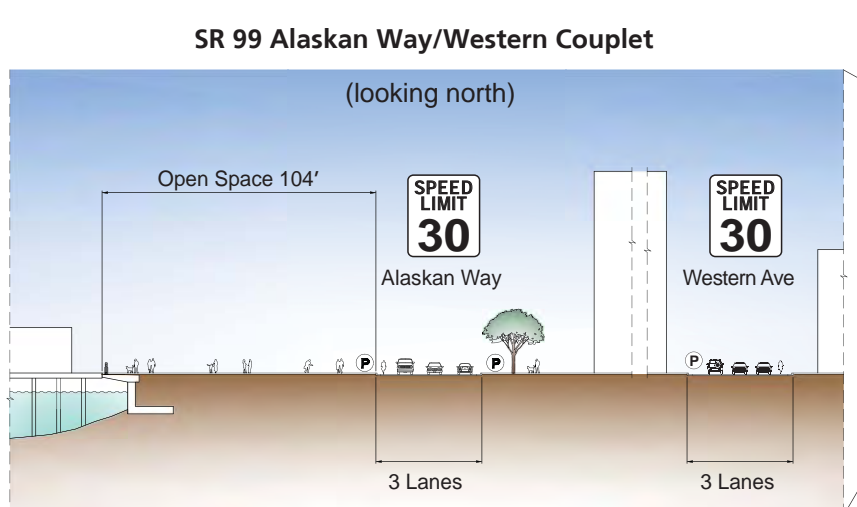
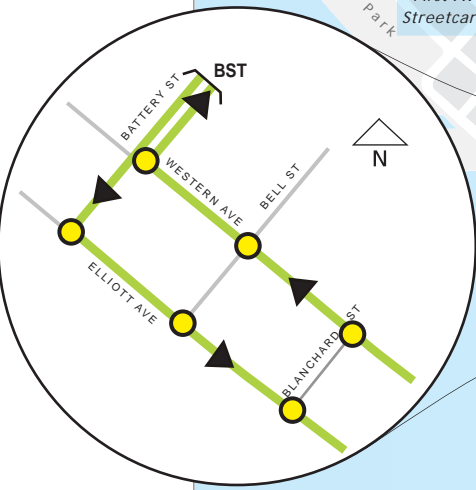
The couplet under Scenario L was viewed as a compromise that would provide better transportation performance for through-trips and the smallest possible Alaskan Way roadway cross section, while also altering the character of Western Avenue. The components of Scenario L are shown in Exhibit 1.

Regional Elements Located Off Map

I-5
 NB Industrial Way Transit Direct Access Ramp from HOV Lanes

Surface Streets
 Elliott/15th NW BAT Lanes (Harrison to NW 65th)
 Spokane Street Viaduct Project
 East Marginal Way Ramps Grade Separation
 Surface Street Connections to Industrial Way from I-5 Transit Ramps

Transit
 Rapidride: New Lake City Way Route
 Park and Rides: Burien, White Center, Aurora/192nd Expansion
 Rapid Trolley bus : 8 routes with improved speed, reliability, and frequency (shown on future maps)
 Additional Downtown off-street terminal and layover capacity
 Central Maintenance Facility Expansion



SR 99

- Tunnel
- At-Grade
- Elevated Structure
- New Traffic Signals
- Underpass

Surface Streets

- Street Extension
- Operational Changes
- Change to 2-Way
- Street Vacated
- Change to One-Way

Transit

- Transit and Limited Local Access
- Transit Lanes
- Existing South Lake Union Streetcar
- New Streetcar Lines
- Increased Direct Service

I-5

- New Lane
- Lane Operational Change
- Express Lane Ramp Usage Change
- Ramp Closed/Managed

TDM/TSM Hybrid Package

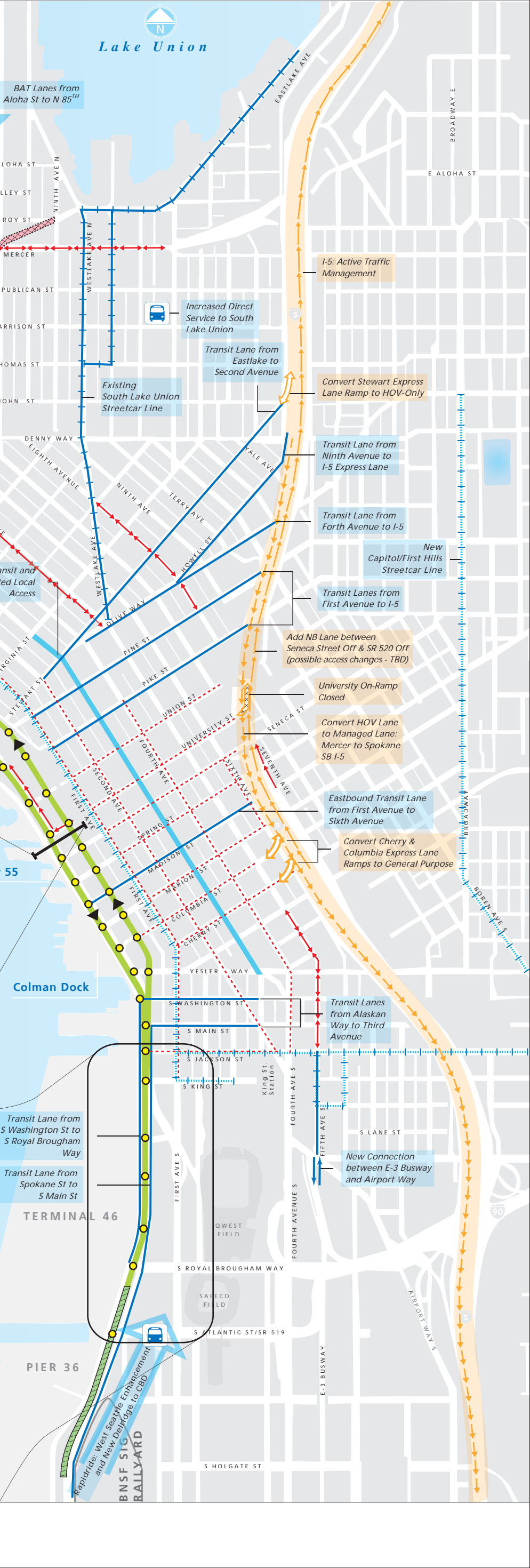
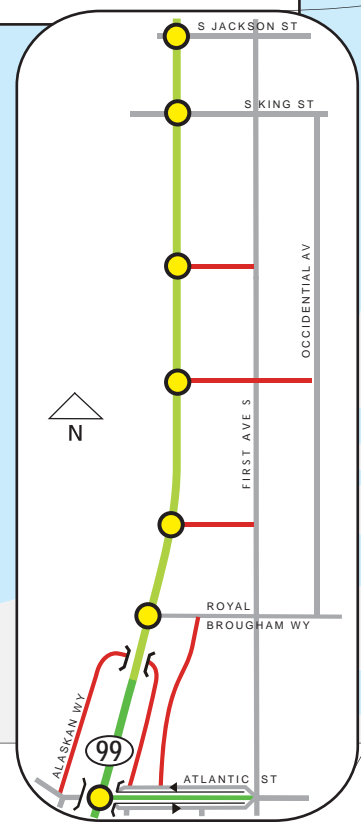


Exhibit 1
Scenario L: I-5, Surface and Transit Hybrid

This Page Intentionally Left Blank

Chapter 3 ST SCENARIO 2030 TRANSPORTATION ANALYSIS

This section presents the findings of the travel demand modeling and transportation analysis of the 2030 ST scenario as compared to the 2030 Tolloed Bored Tunnel.

3.1 Regional/Center City Context and Travel Patterns

3.1.1 Vehicle Miles Traveled

Exhibit 2 shows vehicle miles of travel (VMT) for the AM peak hour, the PM peak hour, and daily for the 2030 ST scenario and the 2030 Tolloed Bored Tunnel. VMT is defined as the total number of miles traveled by vehicles in either the four-county Puget Sound region or Seattle's Center City area for a given time period.

As shown in Exhibit 2, peak period and daily VMT values for the 2030 ST scenario are expected to be lower than peak period and daily VMT values for the 2030 Tolloed Bored Tunnel in Seattle's Center City. This is likely due to the fact there is reduced capacity for travel through Seattle with the surface and transit hybrid; therefore, some trips redistribute to different destinations to avoid the added congestion.

3.1.2 Vehicle Hours of Travel

Exhibit 2 shows vehicle hours of travel (VHT) for the three study periods for each scenario. VHT is defined as the total number of hours traveled by vehicles in either the four-county Puget Sound region or Seattle's Center City area for a given time period.

VHT for the 2030 ST scenario is expected to be lower than VHT for Center City with the 2030 Tolloed Bored Tunnel, primarily due to fewer vehicle trips passing through downtown because of trip redistribution caused by lower capacity and travel speeds within that area.

For the four-county region, VHT increases would occur with the 2030 ST scenario, relative to the 2030 Tolloed Bored Tunnel. Similar to the case with VMT as travel speeds are reduced on facilities that would see higher vehicle volumes caused by changes in trip distribution to avoid traveling though downtown Seattle, but the overall change is very small.

3.1.3 Vehicle Hours of Delay

Exhibit 2 also shows vehicle hours of delay (VHD) for the three study periods for each scenario. VHD is defined as the calculated total number of hours of delay incurred (i.e., travel time above that incurred during free-flow operations) by traffic on roadways in either the four-county Puget Sound region or Seattle's Center City area for a given time period. This measure is often used as an indicator of overall traffic congestion.

VHD for Seattle's Center City with the 2030 ST scenario is expected to be lower than with the 2030 Tolloed Bored Tunnel, because fewer vehicle trips passing through downtown due to trip redistribution caused by lower capacity and travel speeds within that area. Delay

per mile traveled and per hour traveled would also be lower, but by only a slight margin, for the 2030 ST scenario relative to the 2030 Tolloed Bored Tunnel.

Exhibit 2. Vehicle Miles of Travel, Vehicle Hours of Travel, and Vehicle Hours of Delay for Center City and Region

Performance Measure		Time Period	2030 ST Scenario	2030 Tolloed Bored Tunnel
Seattle's Center City	VMT	AM	409,000	445,700
		PM	510,500	559,400
		Daily	2,334,700	2,534,400
	VHT	AM	18,500	19,900
		PM	29,800	32,600
		Daily	99,500	107,900
	VHD	AM	7,000	7,600
		PM	15,100	16,800
		Daily	35,100	38,700
Four-County Region	VMT	AM	20,232,800	20,250,200
		PM	23,927,300	23,962,400
		Daily	109,381,100	109,541,400
	VHT	AM	1,105,200	1,097,400
		PM	1,230,300	1,226,400
		Daily	4,425,200	4,415,500
	VHD	AM	534,700	526,600
		PM	548,700	544,200
		Daily	1,377,300	1,364,400

VHD = vehicle hours of delay; VHT = vehicles hours of travel; VMT = vehicle miles of travel

In addition, the four-county region is expected to see a relatively small increase in VHD with the 2030 ST scenario, relative to the 2030 Tolloed Bored Tunnel, due to higher vehicle volumes and related increases in congestion on certain facilities outside of the Center City due to changes in trip distribution to destinations that do not require passing through the Center City.

3.1.4 Vehicle Volumes at Screenlines

Exhibit 3 shows AM peak period, PM peak period, and daily model-estimated vehicle volumes at three selected screenlines for the 2030 ST scenario and the 2030 Tolloed Bored Tunnel. At all three screenlines, volumes for the 2030 ST scenario are lower than those for the 2030 Tolloed Bored Tunnel. Since the screenlines include facilities from the waterfront to I-5, lower screenline volumes in the 2030 ST scenario are likely an indication of the redistribution of trips to avoid traveling through downtown Seattle or the reassignment of trips to routes east of I-5.

For the 2030 ST scenario, a portion of the reduction in vehicle volumes at the north screenline can be attributed to the competition of the two-way Mercer Corridor, which would increase directness of trips in Uptown and South Lake Union, where east-west trips would no longer need to travel north-south to travel through the corridor.

Exhibit 3. Model-Estimated Vehicle Volumes at Selected Screenlines

Screenline Location	Time Period	2030 ST Scenario	2030 Tolled Bored Tunnel
South (south of S. King Street)	AM	35,080	37,630
	PM	39,440	43,220
	Daily	519,700	561,500
Central (north of Seneca Street)	AM	31,770	33,300
	PM	35,130	37,100
	Daily	469,500	490,800
North (north of Thomas Street)	AM	37,050	40,600
	PM	42,080	45,970
	Daily	520,400	572,200

3.1.5 Person Throughput

Exhibit 4 shows AM peak hour, PM peak hour, and daily model-estimated person throughput at three selected screenlines for the 2030 ST scenario and the 2030 Tolled Bored Tunnel. The higher vehicle volumes for the 2030 Tolled Bored Tunnel would result in higher person throughput for the 2030 Tolled Bored Tunnel compared to the 2030 ST scenario, and indicates that the mode shift to transit would not be sufficient to offset the difference resulting from the decrease in vehicle volumes. Similar to the vehicle volumes at the screenlines, the lower person throughput under the 2030 ST scenario is likely an indication of the redistribution of trips away from downtown or the reassignment of trips to routes east of I-5.

Exhibit 4. Model-Estimated Person Throughput at Selected Screenlines

Screenline Location	Time Period	2030 ST Scenario	2030 Tolled Bored Tunnel
South (south of S. King Street)	AM	63,380	66,230
	PM	74,310	79,050
	Daily	837,200	885,300
Central (north of Seneca Street)	AM	57,610	60,090
	PM	65,680	69,360
	Daily	766,900	798,100
North (north of Thomas Street)	AM	64,930	67,800
	PM	76,170	80,120
	Daily	832,700	887,200

3.2 Traffic Operations on SR 99

3.2.1 Volumes

Exhibit 5 shows the estimates of AM and PM peak hour traffic volumes on the SR 99 mainline and ramps for the 2030 ST scenario. South of the Battery Street Tunnel, southbound SR 99 traffic continues on Elliott Avenue to Alaskan Way. North of Atlantic Street, northbound SR 99 traffic continues on Alaskan Way and Western Avenue before reaching the Battery Street Tunnel. The Alaskan Way and Western Avenue arterial couplet is assumed to be designated as SR 99.

The AM peak hour traffic volumes on SR 99 are fairly directional; with heavier volumes inbound to the central downtown area from all directions. The PM peak hour traffic volumes along SR 99 are also directional (though generally not as pronounced as the AM peak hour volumes), with heavier volumes leaving the central downtown area.

Exhibit 6 shows the estimates of AM and PM peak hour traffic volumes on the SR 99 mainline and ramps for the 2030 Tolleled Bored Tunnel. The pattern of directionality is similar to that shown for the 2030 ST scenario, but the overall volumes on SR 99 are considerably higher for the 2030 Tolleled Bored Tunnel.

Exhibit 7 compares the AM and PM peak hour volumes for the 2030 ST scenario and the 2030 Tolleled Bored Tunnel at selected locations along the SR 99 roadway and relevant ramps. In general, under the 2030 ST scenario, SR 99 conveys lower volumes due to its lower capacity compared to the 2030 Tolleled Bored Tunnel in both the northbound and southbound directions.

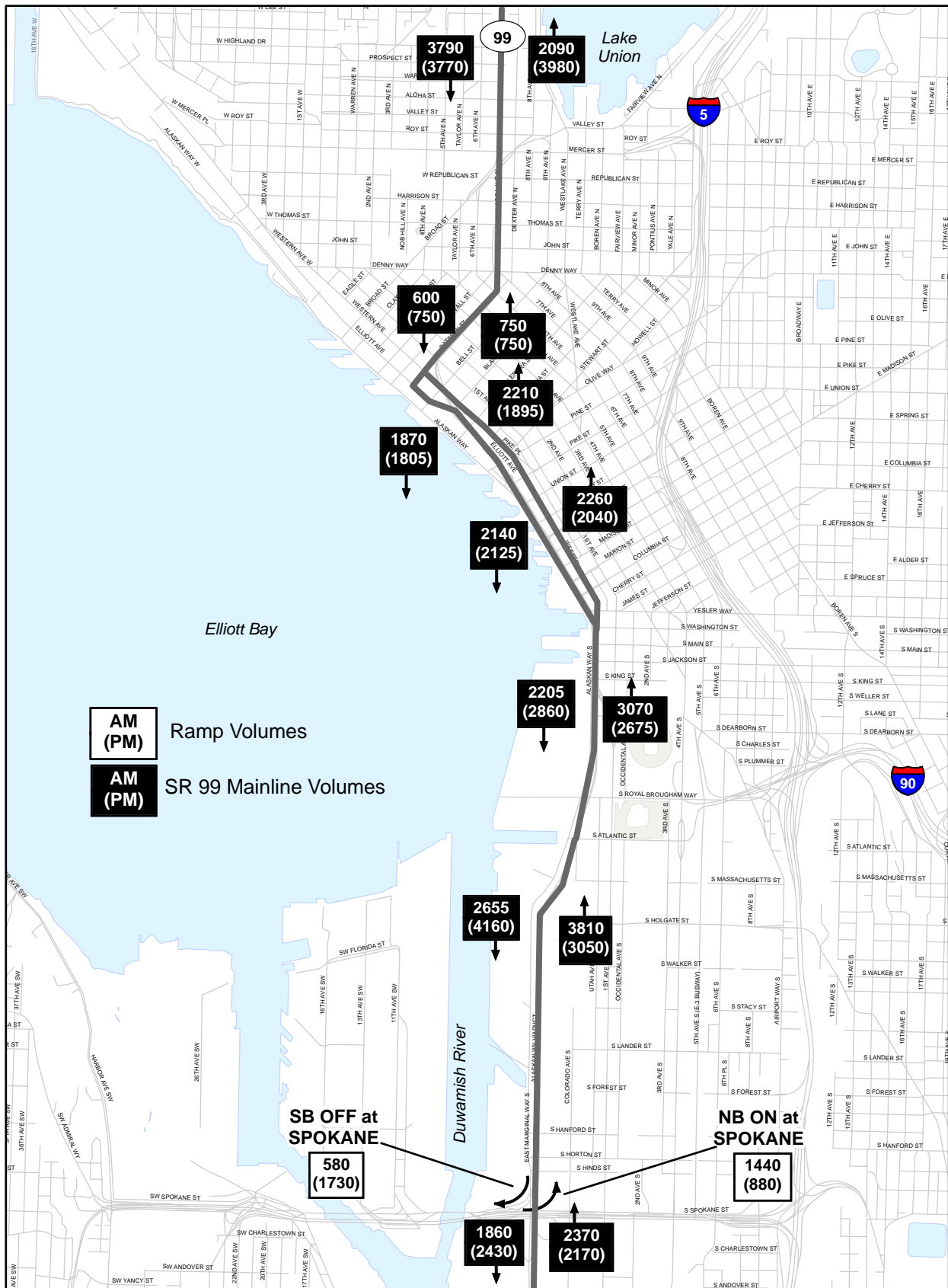


Exhibit 5
AM and PM Peak Hour
Mainline and Ramp Volumes
2030 Surface and Transit

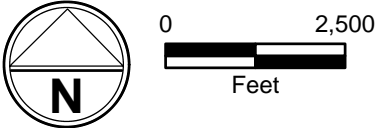
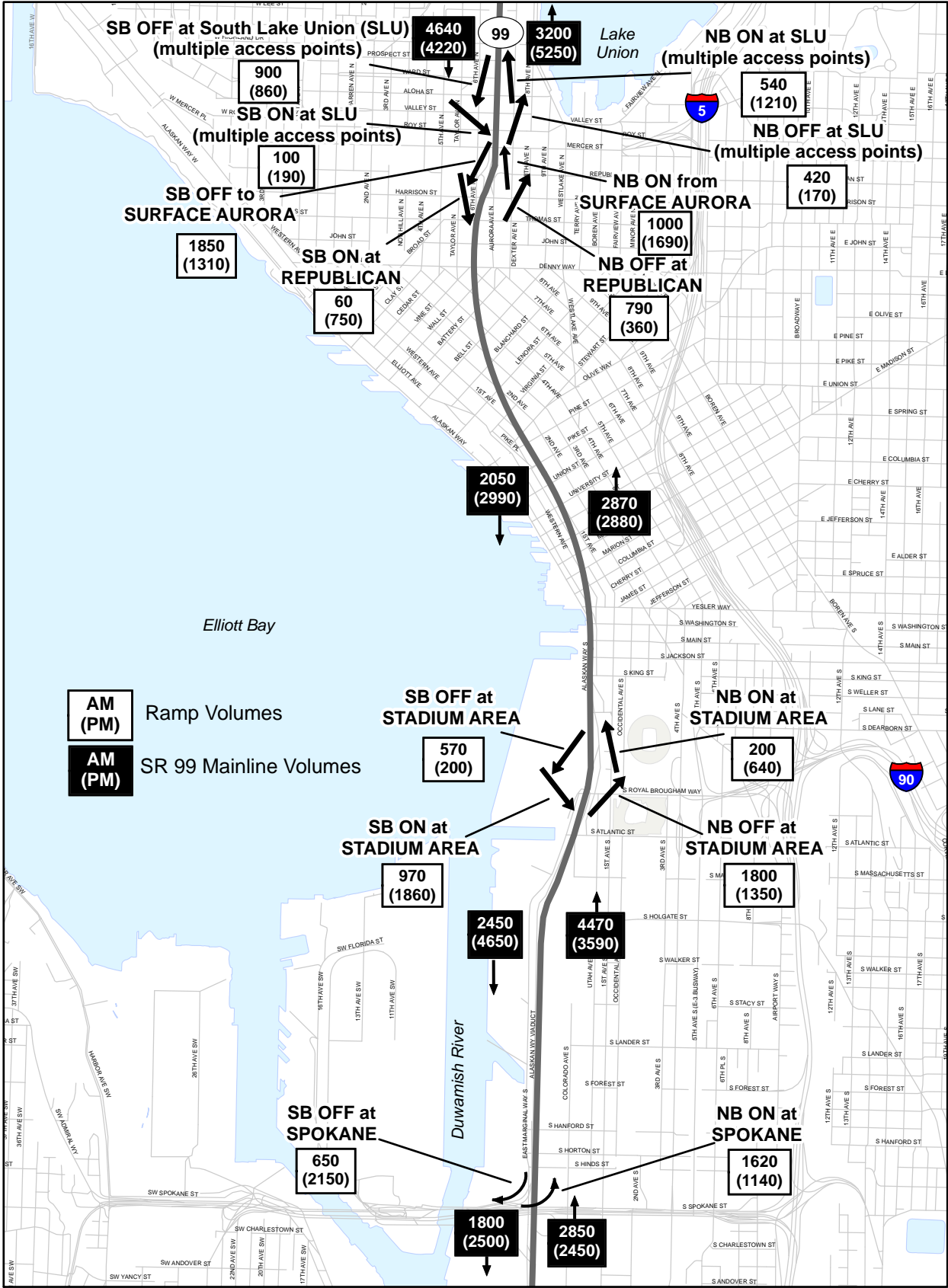


Exhibit 6
AM and PM Peak Hour
Mainline and Ramp Volumes
2030 Bored Tunnel - Tolled

Exhibit 7. Comparison of Vehicle Volumes for 2030 ST Scenario and 2030 Tolloled Bored Tunnel

Mainline/Ramp Location	Time Period	2030 ST Scenario	2030 Tolloled Bored Tunnel
Northbound Direction			
On-ramp from West Seattle	AM	1,440	1,620
	PM	880	1,140
North of Spokane Street	AM	3,810	4,470
	PM	3,050	3,590
North of Seneca Street	AM	2,260	2,870
	PM	2,040	2,880
North of Aloha	AM	2,090	3,200
	PM	3,980	5,250
Southbound Direction			
North of Aloha	AM	3,790	4,640
	PM	3,770	4,220
North of Seneca Street	AM	2,140	2,050
	PM	2,125	2,990
North of Spokane Street	AM	2,440	2,450
	PM	4,160	4,650
Off-ramp to West Seattle	AM	580	650
	PM	1,730	2,500

3.2.2 Speeds

SR 99 traffic operations were assessed for the AM and PM peak hours using a traffic simulation model developed in the VISSIM modeling environment (version 5.1). The VISSIM model includes SR 99 segments (including segments on Alaskan Way and Western Avenue), ramps, and ramp termini intersections. The model replicates traffic flow by simulating discrete vehicle movements. Exhibits 8 and 9 show average peak hour travel speeds for southbound and the northbound corridor segments under the 2030 ST scenario and the 2030 Tolloled Bored Tunnel.

Exhibit 8. Comparison of Southbound SR 99 Peak Hour Speeds (Miles per Hour)

Southbound	2030 ST Scenario		2030 Tolloled Bored Tunnel	
	AM	PM	AM	PM
SR 99 – stadium on-ramp to S. Spokane Street	NA	NA	48	35
SR 99 – S. Royal Brougham Way to S. Spokane Street	35	34	NA	NA

**Exhibit 8. Comparison of Southbound SR 99 Peak Hour Speeds (Miles per Hour)
(continued)**

Southbound	2030 ST Scenario		2030 Tolled Bored Tunnel	
Midtown				
Bored tunnel	NA	NA	48	47
Elliott Avenue/Alaskan Way – Battery Street to S. Royal Brougham Way	13	16	NA	NA
Battery Street Tunnel	18	18	NA	NA
North Corridor				
North of Battery Street Tunnel	13	9	NA	NA
North of bored tunnel	NA	NA	18	36

NA = not applicable

Exhibit 9. Comparison of Northbound SR 99 Peak Hour Speeds (Miles per Hour)

Northbound	2030 ST Scenario		2030 Tolled Bored Tunnel	
	AM	PM	AM	PM
South Corridor				
SR 99 – S. Spokane Street to stadium off-ramp	NA	NA	26	45
SR 99 – S. Spokane Street to S. Royal Brougham Way	7	18	NA	NA
Midtown				
Bored tunnel	NA	NA	46	46
Alaskan Way/Western Avenue – S. Royal Brougham Way to Battery Street	16	17	NA	NA
Battery Street Tunnel	27	28	NA	NA
North Corridor				
North of Battery Street Tunnel	29	26	NA	NA
North of bored tunnel	NA	NA	32	29

NA = not applicable

3.3 Traffic Operations at Key Arterial Intersections

Intersection operations under the 2030 ST scenario and the 2030 Tolled Bored Tunnel were evaluated at selected locations. The primary performance measure used for this analysis is LOS, which is a commonly used measure of operational effectiveness for transportation facilities. LOS is used to assess a variety of transportation facilities ranging from arterials to freeway segments.

For the evaluation of signalized intersections, LOS is specifically based on the average vehicle delay calculated for a given intersection. LOS is represented by a letter grade ranging from “A” (low delays and free-flow traffic conditions) to “F” (very congested or break-down conditions). The intersection analysis results are summarized for the south, central, and

north sub-areas. Intersections that are projected to operate at LOS E or F are those most likely to experience higher levels of congestion during the peak hour. Intersections that are projected to operate at LOS A through D would experience little to moderate congestion during the peak hour and generally are not of concern.

While traffic congestion is a common occurrence in the urban environment, determining the intersections that would operate at LOS E or F identifies those areas that warrant consideration of how congestion may affect major travel movements and specific travel modes such as transit or freight. Also of interest is whether congestion may result in concentrations of air pollutants that approach the thresholds of concern.

South Sub-area

Exhibit 10 shows the projected LOS at signalized intersections in the south sub-area for the 2030 ST scenario and the 2030 Tolloled Bored Tunnel. Of the 36 intersections evaluated in the south sub-area for the 2030 ST scenario, 7 are expected to operate at LOS E or F during the AM peak hour, and 11 are expected to operate at LOS E or F during the PM peak hour. The intersections that are expected to operate under congested conditions are generally located around S. Atlantic Street and S. Royal Brougham Way, as SR 99 enters the south sub-area and transitions from a limited-access facility to an urban arterial with signalized intersections. The congested conditions at the intersections with S. Atlantic Street and S. Royal Brougham Way are expected to create a bottleneck. Because of this congestions and the redistribution of traffic outside the downtown area by the travel demand model, traffic volumes at intersections north of these bottleneck intersections are substantially constrained, which yields reasonable LOS conditions for these downstream intersections. The LOS at intersections north of Royal Brougham Way is D or better, suggesting that southbound and northbound transit lanes on Alaskan Way do not substantially degrade their performance.

Exhibit 10. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (Seconds), South

Street	Cross Street	2030 ST Scenario				2030 Tolloled Bored Tunnel			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Alaskan Way	Yesler Way	C	22	B	17	D	39	B	13
Alaskan Way S.	S. Main Street	B	12	A	7	B	15	A	4
Alaskan Way S.	S. Jackson Street	C	20	A	9	A	8	A	3
Alaskan Way S.	S. King Street	D	41	B	12	C	28	B	15
Alaskan Way S.	S. Dearborn Street	D	39	A	7	D	55	D	39
Alaskan Way S.	S. Charles Street	C	34	C	23	NA	NA	NA	NA
Alaskan Way S.	S. Royal Brougham Way	D	46	D	38	NA	NA	NA	NA
Alaskan Way S.	S. Atlantic Street	F	126	E	78	NA	NA	NA	NA
East Frontage Road	S. Royal Brougham Way	F	93	E	64	B	15	C	24
East Frontage Road	S. Atlantic Street	C	29	B	15	C	30	B	17
East Frontage Road	S. Charles Street	C	25	E	67	NA	NA	NA	NA

Exhibit 10. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (Seconds), South (continued)

Street	Cross Street	2030 ST Scenario				2030 Tolled Bored Tunnel			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
East Frontage Road	S. Dearborn Street	C	24	C	34	NA	NA	NA	NA
Western Avenue	Yesler Way	A	7	B	12	NA	NA	NA	NA
East Marginal Way	h-shaped overcrossing	B	12	B	11	C	26	B	16
East Marginal W/ T 46	S. Atlantic Street	F	107	D	40	C	30	D	50
East Marginal Way	S. Hanford Street	D	38	C	28	D	41	C	34
Colorado Avenue	S. Atlantic Street	D	52	C	24	D	46	C	26
First Avenue	Yesler Way	C	25	C	28	F	97	F	178
First Avenue S.	S. Main Street	C	23	D	40	B	17	A	8
First Avenue S.	S. Jackson Street	C	26	E	62	C	20	B	17
First Avenue S.	S. King Street	B	20	D	54	C	21	D	45
First Avenue S.	S. Dearborn Street	C	23	E	64	C	21	D	42
First Avenue S.	S. Charles Street	C	31	E	73	NA	NA	NA	NA
First Avenue S.	S. Royal Brougham Way	D	46	E	72	C	26	D	35
First Avenue S.	S. Atlantic Street	F	91	F	139	D	38	F	107
First Avenue S.	S. Holgate Street	C	28	D	38	D	48	C	33
First Avenue S.	S. Lander Street	B	18	C	24	C	20	C	29
Second Avenue	Yesler Way	B	13	B	14	C	27	B	20
Second Avenue S.	S. Main Street	D	39	B	12	F	88	D	44
Second Avenue S.	S. Jackson Street	F	97	F	117	F	137	F	146
Fourth Avenue S.	S. Main Street	B	16	B	15	A	6	A	6
Fourth Avenue S.	S. Jackson Street	E	77	F	114	F	86	F	130
Fourth Avenue S.	Airport Way S.	F	170	F	319	F	125	F	100
Fourth Avenue S.	S. Royal Brougham	C	28	C	26	C	30	E	77
Fourth Avenue S.	S. Holgate Street	C	34	C	32	D	45	F	154
Fourth Avenue S.	S. Lander Street	C	22	C	21	C	22	E	66

NA = not applicable; T46 = Terminal 46

LOS for the 2030 ST scenario and the 2030 Tolled Bored Tunnel could be compared for only 29 intersections out of the 36 intersections evaluated in the south sub-area. Of these 29 intersections, under the 2030 Tolled Bored Tunnel, only 5 are expected to operate at LOS E or F during the AM peak hour and 8 are expected to operate at LOS E or F during the PM peak hour.

One difference in roadway geometry between the two scenarios (other than differences along Alaskan Way) is that for the 2030 ST scenario, it was assumed that parking would be restricted on First Avenue during the PM peak period and that the parking lane would be used as a travel lane, providing two lanes in each direction. For the 2030 Tolled Bored Tunnel, it was assumed that on-street parking would be allowed along First Avenue through Pioneer Square, thereby limiting travel to only one lane in each direction. However, even

with parking removed along First Avenue in Pioneer Square, 2030 volumes forecasted on First Avenue are higher under the 2030 ST scenario, compared to the 2030 Tolloled Bored Tunnel, resulting in more congested conditions during the PM peak hour.

Central Sub-area

Exhibit 11 shows the projected LOS at signalized intersections in the central sub-area for the 2030 ST scenario and the 2030 Tolloled Bored Tunnel. Of the 54 intersections evaluated in the central sub-area for the 2030 ST scenario, 4 are expected to operate at LOS E or F during the AM peak hour, and 8 are expected to operate at LOS E or F during the PM peak hour. As discussed previously, the expected traffic demand would not be fully served by intersections at the south and north ends of the downtown core. Intersections across Atlantic/Royal Brougham and Mercer/Denny effectively meter traffic that reaches the central intersections in the CBD. Because of this, and the redistribution of traffic outside the downtown area by the travel demand model, traffic volumes forecasted within the central CBD area yield reasonable LOS conditions at most intersections. Also, additional capacity on Second Avenue under the 2030 ST scenario helps yield reasonable LOS conditions. This additional capacity is achieved by removing on-street parking.

LOS for the 2030 ST scenario and the 2030 Tolloled Bored Tunnel could be compared for only 51 out of the 54 intersections evaluated in the central sub-area. Of these 51 intersections, under the 2030 Tolloled Bored Tunnel, 5 intersections are expected to operate at LOS E or F during the AM and 9 intersections are expected to operate at LOS E or F during the PM peak hour. The increase in intersections that operate under LOS E or F conditions under the 2030 Tolloled Bored Tunnel scenario compared to the 2030 ST scenario during the AM peak can be attributed to capacity along Second Avenue. Under the Tolloled Bored Tunnel scenario, Second Avenue has one less general-purpose travel lane than under the 2030 ST scenario.

Exhibit 11. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (seconds), Central

Street	Cross Street	2030 ST Scenario				2030 Tolloled Bored Tunnel			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Alaskan Way	Madison Street	A	3	A	3	A	6	B	14
Alaskan Way	Marion Street	C	32	B	11	C	20	B	14
Alaskan Way	Columbia Street	A	9	C	13	C	20	A	6
Elliott Avenue	Broad Street	C	25	B	19	C	39	D	44
Elliott Avenue	Wall Street	A	9	B	14	B	13	B	16
Elliott Avenue	Bell Street	A	3	B	19	A	2	A	2
Western Avenue	Broad Street	E	61	F	135	C	25	E	58
Western Avenue	Wall Street	B	16	A	8	B	19	C	27
Western Avenue	Battery Street/ SR 99 off-ramp	E	70	E	71	A	2	A	3
Western Avenue	Blanchard Street	A	2	A	6	NA	NA	NA	NA

Exhibit 11. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (seconds), Central (continued)

Street	Cross Street	2030 ST Scenario				2030 Tolloed Bored Tunnel			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Western Avenue	Lenora Street	C	21	C	30	NA	NA	NA	NA
Western Avenue	Spring Street	A	6	A	5	B	19	B	11
Western Avenue	Columbia Street	A	8	B	18	NA	NA	NA	NA
Western Avenue	Madison Street	A	10	A	8	B	17	C	23
Western Avenue	Marion Street	B	19	B	14	C	21	B	11
First Avenue	Seneca Street	C	33	C	34	C	25	C	28
First Avenue	Spring Street	C	23	B	17	D	43	E	59
First Avenue	Madison Street	A	8	B	18	A	7	B	13
First Avenue	Marion Street	C	26	B	18	C	33	B	17
First Avenue	Columbia Street	C	22	C	34	A	9	B	15
Second Avenue	Wall Street	B	15	B	19	C	21	C	21
Second Avenue	Battery Street	B	14	A	8	A	7	A	8
Second Avenue	Bell Street	B	16	B	16	A	5	B	14
Second Avenue	Blanchard Street	B	17	D	45	B	11	B	17
Second Avenue	Lenora Street	A	8	A	5	A	5	D	38
Second Avenue	Virginia Street	B	13	C	34	B	12	D	50
Second Avenue	Stewart Street	F	84	C	33	E	65	A	8
Second Avenue	Pine Street	D	41	C	24	B	11	D	35
Second Avenue	Pike Street	B	13	B	10	B	14	B	14
Second Avenue	Union Street	A	9	B	13	B	17	D	51
Second Avenue	University Street	A	5	A	9	C	25	D	47
Second Avenue	Seneca Street	B	14	D	46	C	23	C	28
Second Avenue	Spring Street	A	9	A	9	F	101	D	36
Second Avenue	Madison Street	B	16	A	8	C	33	C	30
Second Avenue	Marion Street	C	27	B	14	F	142	F	139
Second Avenue	Columbia Street	B	17	A	6	A	7	A	7
Second Avenue	Cherry Street	B	13	A	7	C	35	B	12
Fourth Avenue	Wall Street	C	22	C	23	A	8	B	16
Fourth Avenue	Battery Street	A	6	B	13	B	10	C	25
Fourth Avenue	Bell Street	B	12	A	8	A	7	B	13
Fourth Avenue	Blanchard Street	B	10	A	7	A	7	B	11
Fourth Avenue	Lenora Street	A	9	A	5	A	9	B	17
Fourth Avenue	Virginia Street	A	5	B	13	A	8	C	21
Fourth Avenue	Stewart Street	B	10	A	8	C	28	C	25

Exhibit 11. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (seconds), Central (continued)

Street	Cross Street	2030 ST Scenario				2030 Tolled Bored Tunnel			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Fourth Avenue	Pine Street	C	29	E	67	D	36	E	56
Fourth Avenue	Pike Street	C	31	B	18	D	42	D	48
Fourth Avenue	Union Street	B	13	D	49	B	17	D	39
Fourth Avenue	University Street	A	6	D	36	A	7	C	30
Fourth Avenue	Seneca Street	D	41	E	78	C	24	F	91
Fourth Avenue	Spring Street	B	20	E	63	C	31	E	61
Fourth Avenue	Madison Street	C	28	E	77	E	72	F	92
Fourth Avenue	Marion Street	B	16	E	77	D	50	F	124
Fourth Avenue	Columbia Street	F	104	E	56	F	111	E	61
Fourth Avenue	Cherry Street	C	21	B	16	B	17	B	18

NA = not applicable

North Sub-area

Exhibit 12 shows the Bored Tunnel LOS at signalized intersections in the north sub-area for 2030 ST scenario and the 2030 Tolerated Bored Tunnel. Of the 36 intersections evaluated in the north sub-area for the 2030 ST scenario, 12 are expected to operate at LOS E or F during the AM peak hour, and 16 are expected to operate at LOS E or F during the PM peak hour. Similar to the south sub-area, intersections at the north of this sub-area, such as Aurora Avenue at Valley and Roy Streets, are expected to operate under highly congested conditions, creating a bottleneck.

With the 2030 Tolerated Bored Tunnel, 10 intersections are expected to operate at LOS E or F during the AM peak hour, and 18 are expected to operate at LOS E or F during the PM peak hour.

Exhibit 12. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (Seconds), North

Street	Cross Street	2030 ST Scenario				2030 Tolerated Bored Tunnel			
		AM		PM		AM		PM	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Western Avenue W.	Elliott Avenue W.	A	9	C	26	C	23	E	58
W. Mercer Place	Elliott Avenue W.	E	79	E	66	F	115	F	156
First Avenue	Denny Way	E	78	D	39	F	129	D	51
Second Avenue	Denny Way	A	8	B	20	B	12	F	107
Broad Street	Denny Way	C	21	C	22	B	18	D	49
Fifth Avenue	Denny Way	D	43	C	23	D	50	E	69
Fifth Avenue N.	Broad Street	D	36	D	36	E	59	E	60

Exhibit 12. Comparison of Signalized Intersection Level of Service and Average Vehicle Delay (Seconds), North (continued)

Street		Cross Street		2030 ST Scenario				2030 Tolled Bored Tunnel			
				AM		PM		AM		PM	
				LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
Fifth Avenue N.	Harrison Street	A	4	A	9	A	7	B	11		
Fifth Avenue N.	Mercer Street	D	39	E	56	D	38	E	78		
Fifth Avenue N.	Roy Street	E	67	E	62	F	96	F	96		
Taylor Avenue N.	Mercer Street	NA	NA	NA	NA	C	35	C	21		
Sixth Avenue	Battery Street	B	13	E	58	B	16	F	171		
Sixth Avenue	Denny Way	B	19	E	57	D	44	E	71		
Sixth Avenue N.	Thomas Street	NA	NA	NA	NA	B	11	B	14		
Sixth Avenue N.	Harrison Street	NA	NA	NA	NA	A	10	B	13		
Sixth Avenue N.	Republican	B	10	B	10	A	3	A	1		
Sixth Avenue N.	Mercer Street	E	63	D	53	A	7	B	15		
Aurora Avenue NB	Denny Way	B	15	C	28	NA	NA	NA	NA		
Aurora Avenue SB	Denny Way	C	30	E	58	NA	NA	NA	NA		
Aurora Avenue	Denny Way	NA	NA	NA	NA	C	34	E	75		
Aurora Avenue	Thomas Street	B	19	D	38	C	21	C	27		
Aurora Avenue	Harrison Street	B	17	B	18	C	25	B	16		
Aurora Avenue	Republican Street	B	15	F	98	NA	NA	NA	NA		
Aurora Avenue	Roy Street	E	71	F	185	NA	NA	NA	NA		
Aurora Avenue	Valley Street	E	79	F	136	NA	NA	NA	NA		
Dexter Avenue	Denny Way	F	167	F	144	F	182	F	246		
Dexter Avenue N.	Thomas Street	NA	NA	NA	NA	B	13	F	92		
Dexter Avenue N.	Harrison Street	C	20	F	145	B	16	D	50		
Dexter Avenue N.	Republican Street	NA	NA	NA	NA	C	27	C	22		
Dexter Avenue N.	Mercer Street	F	94	F	166	E	71	F	99		
Dexter Avenue N.	Roy Street	D	45	F	83	C	21	E	66		
Dexter Avenue N.	Aloha Street	E	60	B	13	E	73	E	56		
Ninth Avenue N.	Mercer Street	E	56	F	89	E	68	F	133		
Westlake Avenue N.	Mercer Street	E	75	F	199	E	58	F	185		
Fairview Avenue N.	Valley Street	D	42	C	32	D	45	D	43		
Fairview Avenue/ I-5 ramp	Mercer Street	E	56	F	216	E	71	F	199		

NA = not applicable; NB = northbound; SB = southbound

3.4 AM and PM Peak Hour Travel Times

Exhibit 13 shows corridor travel times between selected locations during the AM and PM peak hours for the 2030 ST scenario and the 2030 Tolled Bored Tunnel. These trip

segments were chosen to illustrate the travel time characteristics for different representative trips (to, through or within downtown Seattle) in the corridor.

Exhibit 13. Comparison of Corridor Travel Times (Minutes)

	2030 ST Scenario		2030 Tolled Bored Tunnel	
	AM	PM	AM	PM
Trips To Downtown Seattle				
West Seattle to CBD (Fourth Avenue and Seneca Street)				
Northbound	35	–	32	–
Southbound	–	26	–	31
Trips Through Downtown Seattle				
Woodland Park to S. Spokane Street				
Southbound	25	25	16	14
Northbound	31	25	12	15
Ballard to S. Spokane Street (via Alaskan Way, AWV)				
Southbound	21	19	20	23
Northbound	33	35	27	27
Trips Within Downtown Seattle				
Second Avenue (Wall Street to S. Royal Brougham Way)				
Southbound	15	17	20	24
Fourth Avenue (S. Royal Brougham Way to Battery Street)				
Northbound	21	24	21	21

AWV = Alaskan Way Viaduct
 CBD = Central Business District

3.4.1 Trips to Downtown Seattle

West Seattle to CBD

This route represents trips between West Seattle (specifically the intersection of California Avenue and SW Alaska Street) and the CBD (specifically at Fourth Avenue and Seneca Street) and is presented for the peak traffic flow direction only (i.e., northbound in the AM and southbound in the PM peak period). The AM northbound travel time is expected to be longer under the 2030 ST scenario (35 minutes) than the travel time under the 2030 Tolled Bored Tunnel (32 minutes). The longer travel time for the 2030 ST scenario is due to the increased travel time along SR 99 between the Spokane Street on-ramp and S. Royal Brougham Way. This segment has signals at Royal Brougham Way and Atlantic Street that are not present in the 2030 Tolled Bored Tunnel.

In the PM peak hour, the 2030 ST scenario is faster than the 2030 Tolled Bored Tunnel by approximately 5 minutes (31 minutes vs. 26 minutes). Under the 2030 Tolled Bored Tunnel scenario, traffic from the southbound on-ramp must merge with traffic traveling southbound

through the Bored Tunnel. With the 2030 ST scenario, no merging activity is required since there is no upstream roadway.

3.4.2 Trips through Downtown Seattle

Woodland Park to S. Spokane Street

For this route, the travel times for the 2030 ST scenario are dramatically longer than those for the 2030 Tolloed Bored Tunnel because the traffic flows through the highly congested arterials between Denny Way and Atlantic Street unlike under the 2030 Tolloed Bored Tunnel in which traffic uses the bored tunnel in the core CBD section for this segment. The difference in travel times between the 2030 ST scenario and the 2030 Tolloed Bored Tunnel ranges from 9 to 19 minutes and is greatest for the northbound direction during the AM peak hour.

Ballard to S. Spokane Street

For this route, the AM peak travel times in the northbound direction for the 2030 ST scenario are significantly longer than those for the 2030 Tolloed Bored Tunnel. The AM peak hour travel times for the northbound direction are 33 and 27 minutes for the 2030 ST scenario and the 2030 Tolloed Bored Tunnel, respectively. The difference in PM peak travel times for the northbound direction are 35 and 27 minutes for the 2030 ST scenario and the 2030 Tolloed Bored Tunnel, respectively. This difference primarily results from the queues on SR 99 south of Atlantic Street. In the southbound direction, the difference in terms of AM peak hour travel times is relatively minor; the travel time is approximately 2 minutes longer for the 2030 ST scenario. PM peak hour travel times are expected to be 4 minutes faster under the 2030 ST scenario compared to the 2030 Tolloed Bored Tunnel due to the Elliott/Western connection and increased capacity along these Alaskan Way, provided under the 2030 ST scenario. The Elliott/Western connection and increases to capacity along Alaskan Way are provided not provided under the 2030 Bored Tunnel but would be provided under the 2030 Program scenario.

3.4.3 Trips within Downtown Seattle

The analysis shows that travel times for representative trips within downtown Seattle would be similar, or in some cases shorter, with the ST scenario, as compared to the Tolloed Bored Tunnel. These results reflect travel times for trips on north-south surface streets (Second Avenue and Fourth Avenue). As discussed earlier, the removal of SR 99 as a controlled-access facility in downtown Seattle would tend to redirect traffic outside to areas outside downtown, which improves travel times (relative to the Tolloed Bored Tunnel) for some trips within downtown.

Second Avenue (Wall Street to S. Jackson Street)

For this route, the travel time is faster during both the AM and PM peak hours for the 2030 ST scenario and the 2030 Tolloed Bored Tunnel. Under the 2030 ST scenario, existing parking along Second Avenue from Jackson Street to Pine Street would be removed during the peak hours to provide another general purpose travel lane. The Bored Tunnel Alternative does not include removal of existing on-street parking along Second Avenue. If the Bored Tunnel Alternative were modified to include removal of on-street parking, the

travel times along Second Avenue under this alternative would likely be similar to the modeled travel times for the ST scenario.

Fourth Avenue (S. Jackson Street to Battery Street)

For this route, the AM peak hour travel times are expected to be similar under the 2030 ST scenario and 2030 Tolloled Bored Tunnel scenario. The difference in travel time is approximately 3 minutes slower with the 2030 ST scenario compared with the 2030 Tolloled Bored Tunnel during the PM peak hour. The ST scenario is slower as the result of additional traffic using this street due to the absence of the Alaskan Way Viaduct.

3.5 Transit Services

3.5.1 Modeled Transit Ridership (Person Trips)

Exhibit 14 shows model-estimated AM peak hour and daily transit ridership at the selected screenlines for the 2030 ST scenario and the 2030 Tolloled Bored Tunnel. Ridership levels are expected to be similar across all three screenlines. During the AM peak period, transit ridership is expected to be highest across the south screenline. However, daily ridership would be highest across the central screenline.

In general, forecasted transit ridership for the 2030 ST scenario is higher than that for the 2030 Tolloled Bored Tunnel, except for ridership at the central screenline during the AM peak period where ridership for the 2030 ST scenario is expected to be lower compared to the 2030 Tolloled Bored Tunnel. The decrease in transit ridership across the Seneca Street screenline can be attributed to the conversion of the Stewart Street ramp to and from the I-5 reversible lanes to HOV-only, which would prevent express bus routes that currently use the Columbia/Cherry Street ramp from crossing the central screenline twice.

Exhibit 14. Comparison of Model-Estimated Transit Ridership at Selected Screenlines (Person Trips)

Screenline Location	2030 ST Scenario		2030 Tolloled Bored Tunnel	
	AM Period	Daily	AM Period	Daily
South (south of S. King Street)	56,850	172,100	56,130	164,400
Central (north of Seneca Street)	53,170	178,800	54,270	177,300
North (north of Thomas Street)	55,120	175,900	52,700	168,000

3.5.2 Transit Mode Share

Exhibit 15 shows the model-estimated transit mode share for travel to and from Seattle’s Center City for home-based work trips (“commute”) and non-work trips.

Similar to most urban environments, a higher percentage of home-based work trips are expected to arrive in the Center City via transit compared with non-work trips. Under the 2030 ST scenario, these percentages for home-based work trips and non-work trips are slightly higher than those for the 2030 Tolloled Bored Tunnel.

Exhibit 15. Comparison of Model-Estimated Daily Transit Mode Shares To, From, and Within Seattle’s Center City

	2030 ST Scenario	2030 Tolled Bored Tunnel
Home-based work	41.7%	41.0%
Non-work	10.5%	9.9%

3.6 Freight

Under the 2030 ST scenario, freight traffic to and from port facilities in the South of Downtown (SODO) area is expected to be adversely affected by poor LOS at key intersections in the south sub-area, including intersections along S. Atlantic Street at East Marginal Way S., Alaskan Way S., Colorado Avenue S., and First Avenue S., as well as along Alaskan Way S. and S. Royal Brougham Way. Freight connections between SR 99 and streets in the SODO area, including the stadium area ramps and East Marginal Way, would be improved under the Bored Tunnel Alternative and reflected by the truck and freight traffic conditions under the 2030 Tolled Bored Tunnel.

Direct freight connections to the Interbay and Ballard Interbay Northend Manufacturing and Industrial Center (BINMIC) areas would no longer be provided on SR 99 at the north end of the central waterfront (Elliott/Western ramps area) under the 2030 Tolled Bored Tunnel or 2030 ST scenario. Under both scenarios, freight traffic from Elliott and Western Avenues would connect to Alaskan Way via Broad Street. These trucks would incur potentially longer delays at Broad Street due to increased traffic as well as regular train crossings.

Under both the 2030 ST scenario and the 2030 Tolled Bored Tunnel, hazardous and flammable cargo and over-height loads would also have to be transported on either Alaskan Way or I-5. This change would affect freight from the Ballard/Interbay areas. Currently, hazardous and flammable materials are prohibited only during the peak periods on the Alaskan Way Viaduct and all day in the Battery Street Tunnel.

3.7 Parking

Under the 2030 ST scenario, substantial quantities of existing on-street parking would be removed or restricted during peak and off-peak periods. The net loss of on-street parking spaces is expected to be more than 1,000 spaces during the off-peak periods and more than 1,250 spaces during the PM peak period. The net loss of off-street parking spaces would be more than 400 spaces.

Changes in on-street parking and loading availability would occur for several reasons. Along the central waterfront, the reconfigured street design would likely result in less space for parking than the area currently provided under the viaduct. A number of surface street and transit improvements would provide additional travel lanes or transit lanes at the expense of parking.

Although some on-street parking would be affected permanently, several hundred additional parking spaces would be affected during peak periods of traffic. During the PM peak period, for example, parking on some streets, like Second Avenue through the CBD and First Avenue

through Pioneer Square, would be removed to provide increased roadway capacity or transit lanes.

Reductions in on-street parking would not be distributed evenly across the Center City. The waterfront, Pioneer Square, and Uptown would likely experience the greatest changes in on-street parking supply. The Office Core, Retail Core, International District, Denny Triangle, and South Lake Union would experience relatively little change in parking supply.

In comparison, under the 2030 Tolloled Bored Tunnel, approximately 580 on-street parking spaces and 260 off-street parking spaces would be removed, resulting in a net loss of 840 parking spaces compared to the net loss of more than 1,600 spaces under the 2030 ST scenario. Similar to the 2030 ST scenario, reductions in on-street parking are not distributed evenly across the City Center. The waterfront, Pioneer Square, and Uptown would likely experience the greatest changes in on-street parking supply. However, unlike the 2030 ST scenarios, the Office Core, Retail Core, International District, Denny Triangle, and South Lake Union would experience relatively little change in parking supply.

3.8 Pedestrians and Bicycles

Under the 2030 ST scenario, pedestrian and bicycle traffic are expected to be adversely affected by high traffic volumes and congested operating conditions at the outer intersections of the south and north sub-areas. Additionally, increased volumes along Western Avenue under this scenario could have an adverse affect on pedestrians and bicycles. In the central sub-area, the travel demand model assigns traffic in the bored tunnel, which removes it from the surface streets. Therefore, traffic is expected to be at reasonable levels, and conditions for pedestrian and bicycle traffic are not expected to be adversely affected.

By comparison, traffic congestion at the outer intersections of the south and north sub-area with the 2030 Tolloled Bored Tunnel is expected to be less than that of the 2030 ST scenario. Therefore, pedestrian and bicycle traffic are also not expected to be as adversely affected under the 2030 Tolloled Bored Tunnel and compared to the 2030 ST scenario.

3.9 Ferries

Under the 2030 ST scenario, traffic conditions at intersections near Colman Dock are projected to operate at LOS C or better in the AM and PM peak hours. Thus, access for ferry traffic to and from the immediate area around the terminal is not expected to be adversely affected by the 2030 ST scenario. However, ferry traffic attempting to access the ferry terminal from outside the downtown area, particularly via southbound Aurora Avenue would experience delays as it encounters signalized intersections along SR 99 entering the downtown area. Northbound ferry traffic on SR 99 would continue to experience delays as it encounters signalized intersections.

Under the 2030 Tolloled Bored Tunnel, traffic conditions at intersections near Colman Dock are projected to operate at LOS C or better in the AM and PM peak hours. Ferry traffic attempting to access the ferry terminal from the north, outside the downtown area, is expected to experience fewer delays under the 2030 Tolloled Bored Tunnel compared to the 2030 ST scenario, as there are fewer signalized intersections along Alaskan Way entering the downtown area.

3.10 Safety

With the 2030 ST scenario, high traffic volumes and congested traffic conditions in the north, central and south sub-areas could result in a relatively high potential for accidents. There is also a potential for collisions at exits from SR 99 north and south of the closed portions of the corridor resulting from abrupt changes in speed and severe congestion at the exits. Also, there is an increased potential for conflicts between vehicles, pedestrians and cyclists, resulting from additional traffic on streets throughout the downtown, South Lake Union, waterfront, and stadium areas.

The improvements proposed in the north area of the 2030 Tolled Bored Tunnel could potentially decrease collision rates on SR 99 between Denny Way and Mercer Street. In addition, decommissioning the Battery Street Tunnel, associated northbound on-ramp and southbound off-ramp (the Battery Street Tunnel ramps), and the Elliott/Western ramps would eliminate areas with higher than average collision rates at the ramps and within the Battery Street Tunnel. The replacement of the current midtown ramps at Seneca and Columbia Streets with new ramps in the stadium area connecting to Alaskan Way would eliminate the current diverging, merging, and weaving movements associated with the Seneca and Columbia Street ramps that lead to queuing and collisions on the mainline. The 2030 Tolled Bored Tunnel would eliminate the identified northbound collision analysis location at the south end of the viaduct, roughly between S. Massachusetts Street and S. Royal Brougham Way, through improved design of the replacement roadway facility.

Under the 2030 Tolled Bored Tunnel scenario, traffic would divert from the SR 99 corridors to other routes. The traffic diversion could increase potential conflicts between vehicles, pedestrians, and bicycles on alternate routes. The 2030 Tolled Bored Tunnel is expected to increase the total volume of traffic on Alaskan Way surface street, which could increase the number of conflicts between vehicles, pedestrians, and cyclists, similar to the 2030 ST scenario.

Also similar to the 2030 ST scenario, increased congestion is expected at exit points north and south of downtown. Increased rates of congestion-related collision types (e.g., rear-end collisions) could occur at these locations under tolled conditions.

3.11 Event Traffic

High levels of congestion projected at some intersections near the stadiums, including First Avenue S./S. Atlantic Street and SR 99/S. Atlantic Street, could adversely affect access to large events at the stadiums. Similarly, congested conditions in the north sub-area could make access to events at Seattle Center difficult. In both cases, access to these areas from outside of downtown via Aurora Avenue and SR 99 would be the most severely affected. However, access from within the downtown area would not be as severely affected, as traffic volumes and congestion levels are expected to be lower due to the inability of traffic to enter the downtown system.

Overall levels of traffic congestion are expected to be similar during events in the stadium area. Improved access to and from SR 99 near the north portal and added network redundancy across SR 99 for the 2030 Tolled Bored Tunnel would likely result in reduced congestion before and after Seattle Center events, as compared to the 2030 ST scenario.

Chapter 4 REFERENCES

WSDOT, City of Seattle, and U.S. Department of Transportation, Federal Highway Administration. 2004. SR 99: Alaskan Way Viaduct & Seawall Replacement Bored Tunnel draft environmental impact statement. Washington State Department of Transportation, Urban Corridors Office, Seattle, Washington.

WSDOT, City of Seattle, and U.S. Department of Transportation, Federal Highway Administration. 2006. SR 99: Alaskan Way Viaduct & Seawall Replacement Bored Tunnel supplemental draft environmental impact statement and section 4(f) evaluation. Washington State Department of Transportation, Urban Corridors Office, Seattle, Washington.

WSDOT, City of Seattle, and U.S. Department of Transportation, Federal Highway Administration. 2010. SR 99: Alaskan Way Viaduct Replacement Project Supplemental Draft Environmental Impact Statement and Section 4(f) Evaluation. Washington State Department of Transportation, Urban Corridors Office, Seattle, Washington.

This Page Intentionally Left Blank