Elliott Bay Seawall Project

Economics Discipline Report

FINAL

October 2012

Submitted to:

City of Seattle
Department of Transportation
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Elliott Bay Seawall Project

ECONOMICS DISCIPLINE REPORT

Agreement No. T09-24

FINAL

OCTOBER 2012

This Discipline Report provides detailed background and analysis to support the City of Seattle's SEPA (Washington State Environmental Policy Act) Environmental Impact Statement for the Elliott Bay Seawall Project. This report also serves the same role to support the United States Army Corps of Engineer's NEPA (National Environmental Policy Act) environmental analysis for the Elliott Bay Seawall Project. Thus, both SEPA and NEPA references and considerations are included.

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City of Seattle
Economics Discipline Report

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

AV	assessed value
AWV	Alaskan Way Viaduct
AWVSRP	Alaskan Way Viaduct and Seawall Replacement Program
B&O	Business and Occupation
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
BNSF	BNSF Railway
BSP	braced soldier pile
CFR	Code of Federal Regulations
City	City of Seattle
EBSDAM	Elliott Bay Seawall Damage Assessment Model
EBSP	Elliott Bay Seawall Project
EIS	Environmental Impact Statement
EQ	Environmental Quality
FHWA	Federal Highway Administration
FTE	full-time equivalent
IMPLAN	IMpact Analysis for PLANning
I-O	Input-Output
MSA	Metropolitan Statistical Area
NED	National Economic Development
NEPA	National Environmental Policy Act
PSRC	Puget Sound Regional Council
OSE	Other Social Effects
RED	Regional Economic Development
ROW	right of way
RTA	Regional Transit Authority
SDOT	Seattle Department of Transportation
SEPA	Washington State Environmental Policy Act
SMC	Seattle Municipal Code
USACE	United States Army Corps of Engineers
WSDOT	Washington State Department of Transportation
WSF	Washington State Ferries

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EXECUTIVE SUMMARY

This Discipline Report analyzes the economic impacts of the Elliott Bay Seawall Project (EBSP). The study area for this report is generally focused between S. Washington Street on the south, Broad Street on the north, First Avenue on the east and the waters of Elliott Bay on the west. The regional economic impact area for economic modeling is the Central Puget Sound Region, defined as the four-county region that includes King, Snohomish, Pierce, and Kitsap counties. There will be adverse effects on businesses during construction because of noise, traffic detours, and other factors. These effects on businesses could adversely affect regional economic activity during construction, but the effects would be mostly localized where construction is occurring and temporary while construction is in progress. The length of disruption depends on the build alternative. Total construction duration for Alternatives A and C is expected to be four construction seasons for the North Seawall and three construction seasons for the Central Seawall. For Alternative B, the North Seawall is expected to take slightly longer than four construction seasons and the Central Seawall is expected to take five construction seasons. These timelines assume summer construction shutdown periods. In the long term, the project is expected to have a beneficial effect on the regional economy due to an improved waterfront.

The federal objective that will be presented in the United States Army Corps of Engineers (USACE) Feasibility Study Report is to contribute to national economic development (NED) while protecting the environment. NED contributions are increases in the net values of national goods and services outputs. A plan that is consistent with federal objectives and maximized NED benefits is the "NED plan."

In addition to NED, three other accounts—regional economic development (RED), environmental quality (EQ), and other social effects (OSE)—are also considered in the federal planning process. Collectively, the four accounts are required to address all significant effects of a plan on the human environment. The RED account includes the regional incidence of economic effects, including income transfers and employment effects. The EQ account shows the non-quantifiable effects of a plan on ecological, cultural, and aesthetic attributes of significant natural and cultural resources. The OSE account displays the effects of a plan on urban and community settings and on life, health, and safety. This discipline report focuses on the RED effects of the alternatives.

Three build alternatives have been developed to allow for a range of design ideas that potentially can be merged and/or combined in future design phases to reflect public, agency, technical, and stakeholder input. The intent is to present a range of project design possibilities, associated impacts, and proposed mitigation to sufficiently "bookend" the project; thus defining and capturing the range of options and associated impacts on employment, taxes, and other revenue, localized business impacts, and the regional economy.

Alternative A proposes a soil improvement seawall structure, but a braced soldier pile (BSP) could be used and still maintain the wall location, habitat improvements, and other proposed features. Alternative B proposes a BSP seawall structure, but some combination of the BSP option, the soil improvement option, and buttress fill systems could be used and still maintain the wall location, habitat improvements, and other proposed features. Alternative C is a true hybrid alternative, representing features from both Alternatives A and B. The construction methods described for Alternative A (i.e., soil

improvement) also apply to Alternative C. This Discipline Report analyzes the potential adverse and beneficial impacts on the regional economy that may result from the construction and operation of the project.

In order to examine the impacts of project construction spending on the Central Puget Sound Region economy, 10% design level construction cost estimates were used to estimate the economic impacts from the infusion of new money into the regional economy for each alternative. The proportion of new money to total construction cost is assumed to be fixed (equal percentage across all alternatives). The amount of new money spent locally in the four-county regional economic impact area was determined using default adjustments in the IMPLAN (IMpact Analysis for PLANning) regional input–output (I-O) model applied for regional economic impact evaluation. The net influx of new money into the regional economy thus depends on the total cost of each Build Alternative. All other funding sources are coming from within either the state or the Central Puget Sound Region and would likely be spent in the local economy, even in the absence of this project.

A regional economic analysis shows the effects of alternatives on the distribution of regional economic activity in the area where the alternative will have significant income and employment effects. Regional economic effects considered in this analysis are quantified using the IMPLAN model. The resulting mathematical formulae allow I-O models to simulate or predict the economic impacts of a change in one, or several, economic activities on an economic region.

CONSTRUCTION IMPACTS

Significant adverse and beneficial regional and state economic impacts will result from the construction of Alternatives A, B, and C. This analysis assesses the projected overall economic impacts that would be attributed to construction, as measured by changes in employment, taxes, and other revenues, and local and regional business impacts. The following summarizes the key effects of construction:

- Increased employment and economic stimulation for the local economy from construction activities and procurement of supplies would be the primary, temporary economic benefit from implementing any of the three build alternatives.
- Sales taxes will be generated through the purchase of local goods and materials related to construction. The project sales tax estimates are based on the construction cost estimates and those estimates will be refined once a Preferred Alternative is selected and additional information is known regarding project design and funding.
- Construction will temporarily adversely affect parking supply in the study area. Effects on parking vary by alternative and are further broken down by Central versus North Seawall construction.
- A number of factors stemming from construction could have adverse impacts on local businesses. These factors include noise, traffic, detour routes, freight movements (both local and through), and temporary impacts to vehicular and non-motorized business access. There would be significant temporary impacts during construction on local businesses with Alternatives A or B.

- The adverse effects on businesses could adversely affect regional economic activity during construction, but the effects would be mostly localized along the waterfront where and when construction is occurring.
- The economic impacts at the regional and state levels due to influx of capital construction funds are quantified as direct and indirect impacts. The study region is defined as the Central Puget Sound Region, defined by the Puget Sound Regional Council as King, Pierce, Snohomish, and Kitsap counties. The impacts are calculated using the I-O IMPLAN model.

During construction of the Central Seawall, a vehicular detour would be provided east of the existing surface street, with three lanes under the existing viaduct and a fourth lane just west of the viaduct structure. During this period, parking would be removed from under the viaduct and would not return until completion of the Central Seawall. The existing Waterfront Streetcar tracks would be removed. Pedestrian access to the waterfront piers would be provided throughout the construction period. When construction work is occurring immediately adjacent to a specific pier, there may be temporary access restrictions during construction. Total construction duration for Alternatives A and C is expected to be four construction seasons for the North Seawall and three construction seasons for the Central Seawall. For Alternative B, the North Seawall is expected to take slightly longer than four construction seasons and the Central Seawall is expected to take five construction seasons. These timelines assume summer construction shutdown periods. The longer construction period for Alternative B is due to the complexity of Zone 4 work and the BSP construction method.

The construction impacts of all three build alternatives are similar except that Alternative B has a longer construction period than Alternatives A and C. There will be adverse impacts during construction, but they will be temporary in nature and are unlikely to affect the regional economy in the long term.

OPERATIONAL IMPACTS

The intent of the EBSP is to avoid potential future economic damages as a result of coastal storm damage and/or seismic events, and to protect and enhance the economic function of the working waterfront and its associated public infrastructure. All build alternatives will restore the roadway, sidewalks, and trails, so there will be minimal operational impacts with any of the three build alternatives. Alternative B restores all parking, and Alternatives A and C restore all parking except for seven on-street spaces. Therefore, there would be minimal impacts as a result of the operation of the project. The existing roadway is generally four lanes (two lanes in each direction), except in the vicinity of Colman Dock where there is one northbound lane, a dedicated left-turn lane into the ferry terminal, and two southbound lanes. Under Alternatives A and C, a second northbound lane would be added between S. Washington and Madison Streets to handle expected traffic volumes in this segment.

For the No Action Alternative, adverse impacts occur during the operational period (50 years) of analysis (third impact category). Adverse value-added impacts during this period amount to about -$203 million in net present value, or about -$10.5 million in annualized impact. Alternative A would result in a net positive impact of $7.7 million in annualized value added impact. Alternative B would result in a net positive impact of $12.3 million in annualized value added impact. Alternative C would result in a net positive impact of $8.3 million in annualized value added impact.

SUMMARY OF RESULTS

Table ES-1 presents results of the impact analysis for each alternative. Value added, state and local taxes, and parking revenue impacts are shown. Value added impact generally includes employee compensation, indirect business taxes, and profits. State and local tax impacts also include indirect business taxes in order to show the full magnitude of tax impacts.

TABLE ES-1. SUMMARY OF IMPACT-ANALYSIS RESULTS FOR THE ELLIOTT BAY SEAWALL PROJECT BUILD AND NO ACTION ALTERNATIVES

Impact Category	Scenario	Value Added ($1000)		State & Local Taxes ($1000)		Parking Revenue ($1000)	
		NPV	Annual	NPV	Annual	NPV	Annual
Adverse Impacts During Construction	No Action	$0	$0	$0	$0	$0	$0
	Alt A	-$79,358	-$3,774	-$7,508	-$357	-$16,151	-$768
	Alt B	-$95,501	-$4,541	-$9,035	-$430	-$23,114	-$1,099
	Alt C	-$79,358	-$3,774	-$7,508	-$357	-$16,151	-$768
Beneficial Impacts During Construction	No Action	$0	$0	$0	$0	$0	$0
	Alt A	$240,631	$11,442	$13,619	$648	$0	$0
	Alt B	$354,765	$16,869	$20,096	$956	$0	$0
	Alt C	$253,524	$12,055	$14,365	$683	$0	$0
Operational Impacts	No Action	-$202,627	-$10,463	-$1,254	-$60	-$15,537	-$739
	Alt A	$0	$0	$0	$0	-$1,727	-$82
	Alt B	$0	$0	$0	$0	$0	$0
	Alt C	$0	$0	$0	$0	-$1,727	-$82
No Action Net Impact		-$202,627	-$10,463	-$1,254	-$60	-$15,537	-$739
Alternative A Net Impact		$161,273	$7,668	$6,111	$291	-$17,878	-$850
Alternative B Net Impact		$259,264	$12,328	$11,061	$526	-$23,114	-$1,099
Alternative C Net Impact		$174,166	$8,281	$6,857	$326	-$17,878	-$850

Table ES-1 shows that for the No Action Alternative, adverse impacts occur during the operational period of analysis. Adverse value added impacts during this period amount to about -$203 million in net present value, or about -$10.5 million in annualized impact. In the No Action Alternative, a loss of parking revenue would also occur following seawall failure with an expected net present value of -$15.5 million or $739,000 annually over 50 years.

Considering Alternative A, net value added impacts are positive; beneficial value added impacts total about $161 million in net present value, or $7.7 million in annualized impact. Adverse impacts during construction of -$79.4 million net present value are offset by the beneficial impacts of $240 million net present value during construction. Alternative A yields operational impacts for the 50-year period of analysis due to a permanent loss of seven parking spaces along Alaskan Way, for a total operational impact of -$1.7 million in net present value, or -$82,000 in annualized impact.

Alternative B has the highest positive value added impact of about $259 million net present value, or $12.3 million annualized impact. Adverse impacts during construction have a net present value of -$95.5

million, or -$4.5 million in annualized impact. Beneficial impacts during construction of $354 million net present value, or $16.9 million annualized impact, more than offset this.

Finally, Alternative C yields positive net value added impact totaling about $174 million in net present value, for $8.3 million in annualized impact. Adverse impacts during construction have a net present value of -$79.4 million, or -$3.8 million in annualized impact. Beneficial impacts during construction of $253.5 million net present value, or $12.1 million annualized impact, more than offset this. Alternative C yields operational impacts for the 50-year period of analysis due to a permanent loss of seven parking spaces along Alaskan Way, for a total operational impact of -$1.7 million in net present value, or -$82,000 in annualized impact.

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CHAPTER 1. PROJECT DESCRIPTION

1.1 PROJECT BACKGROUND

The City of Seattle Department of Transportation (SDOT) is proposing to construct the Elliott Bay Seawall Project (EBSP), which will replace the existing seawall along the shoreline of downtown Seattle. Extending from S. Washington Street to Broad Street, the seawall supports and protects the adjacent upland areas, which contain residences, commercial businesses and restaurants, parks and public facilities, transportation infrastructure (including sidewalks, streets, and a rail line), and a large number of utilities (Figure 1-1). The harbor area in Elliott Bay is used by ferries, cruise ships, and commercial vessels, as well as for recreation. Overall, the waterfront is an important center of commerce and recreation for the entire city and region.

Figure 1-1. Elliott Bay Seawall Project Area

The existing seawall includes three types of structures, all constructed between 1911 and 1936 and ranging in size from approximately 15 to 60 feet wide. Over time, these structures have deteriorated as a result of various natural and physical processes. The seawall's poor condition makes it vulnerable to significant damage during a major storm or seismic event. Therefore, the EBSP is a critical public safety project. The completed seawall will provide protection from coastal storm damages, seismic damages, and shoreline erosion, and will thereby contribute to the preservation of Seattle's downtown, the local economy, and the region's economic competitiveness and quality of life. Seawall replacement will also provide the foundation and structural support for the downtown Seattle waterfront, including improvements planned as part of Waterfront Seattle.

The project's purpose is to reduce the risks of coastal storm and seismic damages and to protect public safety, critical infrastructure, and associated economic activities along Seattle's central waterfront. Additionally, the project will improve the degraded ecosystem functions and processes of the Elliott Bay nearshore in the vicinity of the existing seawall.

Construction of a new seawall would have both beneficial and adverse effects on environmental resources. This discipline report will examine the economic effects of the project as part of the project's overall environmental documentation.

1.2 PROJECT AREA LIMITS AND ZONES

The project area for the EBSP extends from S. Washington Street to Broad Street, from the eastern edge of pavement below State Route (SR) 99 to the waters of Elliott Bay. The project has been divided into six zones. Zones 1 through 4 constitute the Central Seawall Study Area. The two remaining zones, Zones 5 and 6, make up the North Seawall Study Area. A delineation of the zones is provided in Figure 1-2 and concept plans are included at the end of this chapter.

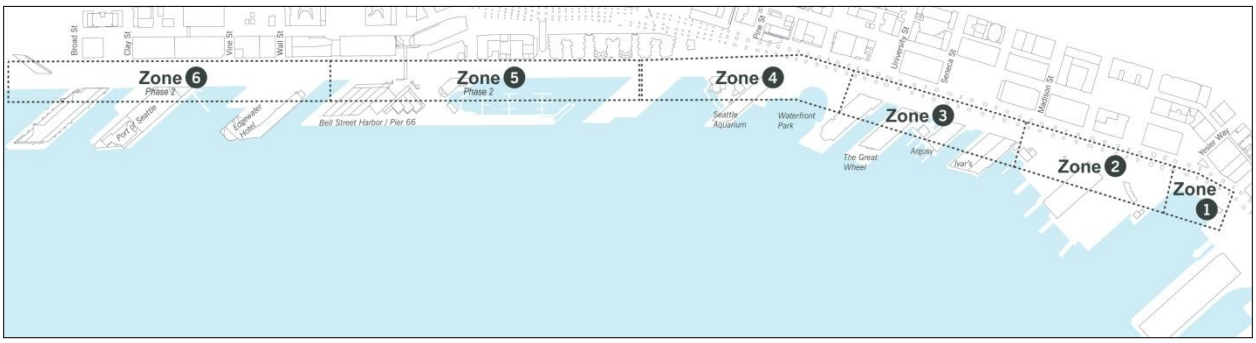


Figure 1-2. Elliott Bay Seawall Zone Designations

Central Seawall Study Area (S. Washington Street to Virginia Street):

- Zone 1, the Pioneer Square/Washington Street Boat Landing Zone, runs from S. Washington Street to Yesler Way.
- Zone 2, the Ferry Terminal Zone, stretches from Yesler Way to Madison Street, and includes the Colman Dock ferry terminal and Fire Station No. 5.
- Zone 3, the Central Pier Zone, includes the historic waterfront piers (Piers 54 to 57) and runs from Madison Street to just north of University Street.
- Zone 4, the Park/Aquarium Zone, includes Waterfront Park, the Seattle Aquarium, and Piers 62/63. This zone runs from north of University Street to approximately Virginia Street.

North Seawall Study Area (Virginia Street to Broad Street):

- Zone 5, the Bell Harbor Zone, runs from Virginia Street to Battery Street. This zone includes the Bell Harbor Conference Center, Cruise Ship Terminal, and Marina.
- Zone 6, the North Pier Zone, stretches from Battery Street to Broad Street, and includes the Edgewater Hotel, Port of Seattle Offices, and Pier 70.

1.3 PROJECT ALTERNATIVES

The EBSP Environmental Impact Statement (EIS) evaluates a No Action Alternative and three build alternatives for the project. As required by the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA), the build alternatives represent different ways of accomplishing the project purpose. Evaluating alternatives allows SDOT decision-makers, with input from the public, agencies, and tribes, to consider environmental impacts in conjunction with other decision factors such as cost, schedule, and feasibility.

The build alternatives for the EBSP are:

- **Alternative A**, which would reconstruct the seawall as close to its existing alignment as possible. Jet grouting, a subsurface soil improvement, would be used to form the seawall's structural support. Habitat improvements would include the addition of shoreline enhancements, installation of a continuous habitat bench, and intermittent light-penetrating surfaces (LPS) at piers.
- **Alternative B**, which would move the seawall up to 75 feet landward of its current location. Braced soldier piles (BSP) would be used to build an underground wall structure. Moving the seawall inland would allow the construction of expanded habitat enhancements and mostly continuous LPS, in addition to the habitat improvements and continuous habitat bench described for Alternative A.
- **Alternative C**, which would move the seawall up to 15 feet landward of its current location. This alternative would use subsurface soil improvements (likely including both jet grouting and deep soil mixing) to provide structural support. Alternative C would provide a continuous habitat bench and continuous LPS, in addition to shoreline enhancements similar to Alternative B.

These three build alternatives encompass a range of design ideas to establish "bookends" for the project, thus capturing a suite of potential options, impacts, and effects. Features of the alternatives could be blended in future design phases to reflect public, agency, and stakeholder input.

The following section (Section 1.4) describes the No Action Alternative. Section 1.5 discusses the features that are common to the three build alternatives and Section 1.6 provides an overview of project construction. Section 1.7 provides additional detail on specific features that differ among the build alternatives.

1.4 NO ACTION ALTERNATIVE

NEPA, SEPA, and the City of Seattle's (City's) implementing regulations (Seattle Municipal Code [SMC] 25.05) require that a No Action Alternative is evaluated in addition to the build alternatives in the EIS. The No Action Alterative provides a baseline against which the potential effects of the build alternatives can be compared.

The No Action Alternative is projected over the next 50 years. Given the age and condition of the seawall, continued deterioration and some level of failure will likely occur within the 50-year timeframe. Because the existing seawall is vulnerable to various types of damage, the No Action Alternative must

anticipate the possibility of degrees of seawall failure. Therefore, three No Action scenarios have been evaluated:

1. Minimal Damage: This scenario would not require a significant repair of the seawall, and any needed repairs could be undertaken by the City. Small failures caused by tidal erosion (as are currently happening today) or minor seismic events would result in settlement of the wall or collapse of the roadway or sidewalk on Alaskan Way. This scenario assumes continued operation of the seawall with ongoing maintenance as needed.

2. Loss of Functionality: This scenario would result from sustained damage, and the seawall would no longer be considered safe for public access and could no longer perform the majority of its essential functions. As with the Minimal Damage scenario, this scenario could result from either tidal or seismic events.

3. Collapse of the Seawall: This scenario would occur only as a result of seismic damage; however, collapse resulting from a seismic event could trigger additional damage from tidal erosion. Seawall failure would have significant impacts on the public, Seattle, the Puget Sound region, Washington State, and the nation. Loss of the seawall's function would disrupt or destroy the critical transportation infrastructure that runs along the Seattle waterfront, potentially displacing hundreds of thousands of vehicles on roadways, 30,000 daily ferry passengers who use Colman Dock ferry terminal, and 24 freight trains and six passenger trains that run near the waterfront. It would also jeopardize critical utility corridors that serve downtown Seattle and the region, and would impair the viability of the waterfront as a major tourist destination and regional economic engine.

Conditions without the project were defined as part of a separate Elliott Bay Seawall Feasibility Study, conducted by the United States Army Corps of Engineers (USACE). The "without project" conditions serve a similar purpose in the feasibility study as does the No Action Alternative under SEPA. The without project conditions are summarized below to provide additional detail about the No Action scenarios.

- The City would continue to repair minimal damage failures unless three or more sections of the seawall fail in a single year, at which point the seawall is assumed to have lost its functionality.
- The City would stabilize the shoreline following seawall collapse to minimize erosion impacts. This stabilization would help to prevent the permanent loss of landward structures, utilities, and the Burlington Northern Santa Fe (BNSF) rail line to erosion.
- If functionality of the seawall were lost, the City would construct a trestle bridge to maintain access to Colman Dock Ferry Terminal and Fire Station No. 5.
- If functionality of the seawall were lost, the City would repair or relocate affected utilities.

1.5 DESIGN FEATURES COMMON TO THE BUILD ALTERNATIVES

If implemented, the EBSP would replace the failing seawall that runs along Elliott Bay and underneath Alaskan Way and would restore and enhance aquatic habitat along the seawall's new face. A new

seawall would reduce the risk of seismic damage and protect Seattle's downtown waterfront from wind-driven storm waves and erosive tidal forces; safeguard major public and private utilities, including power for downtown Seattle and the region, natural gas, and telecommunications; support SR 99, Colman Dock ferry terminal, and rail lines; and enhance habitat for juvenile salmon and other marine life. Additionally, the project would be compatible with future improvements currently being planned at and near the waterfront.

All build alternatives encompass three major categories of design features: the new seawall itself, improvements to aquatic habitat, and improvements to upland areas. Each of these categories is described briefly below.

1.5.1 Seawall

The primary function of the new seawall is to provide protection from storm and wave erosion, impacts from floating objects, and resistance from lateral pressures such as those caused by an earthquake. A new seawall face would generally be placed either close to or somewhat landward of its current position. Depending on the build alternative selected, the final location of the seawall face would vary from approximately 3 feet waterward to 75 feet landward of the existing alignment. It would be most efficient to leave the existing seawall in place during construction of the new seawall and to build the new structure either behind or in front of the existing face.

The new seawall would also reduce the risks related to seismic activity. How these risks are reduced would differ between the alternatives. Soil improvement in the form of jet grouting with or without deep soil mixing (Alternatives A and C) would minimize the risk of liquefaction by physically stabilizing liquefiable soils behind the seawall, while the BSP method (Alternative B) would not prevent liquefaction but rather would resist the lateral spreading and migration of soil that results from liquefaction. Both methods would stabilize the seawall during seismic events. The design life of the new seawall is 75 years.

1.5.2 Habitat Improvements

Rebuilding the seawall would provide the opportunity to improve adjacent aquatic habitat. Habitat improvement measures would be implemented as part of each build alternative. These measures would be designed to restore a functional intertidal migration corridor along the seawall for juvenile salmonids, and would also improve ecosystem productivity to enhance the marine nearshore food web. Figure 1-3 shows a conceptual rendering of the proposed habitat improvements.

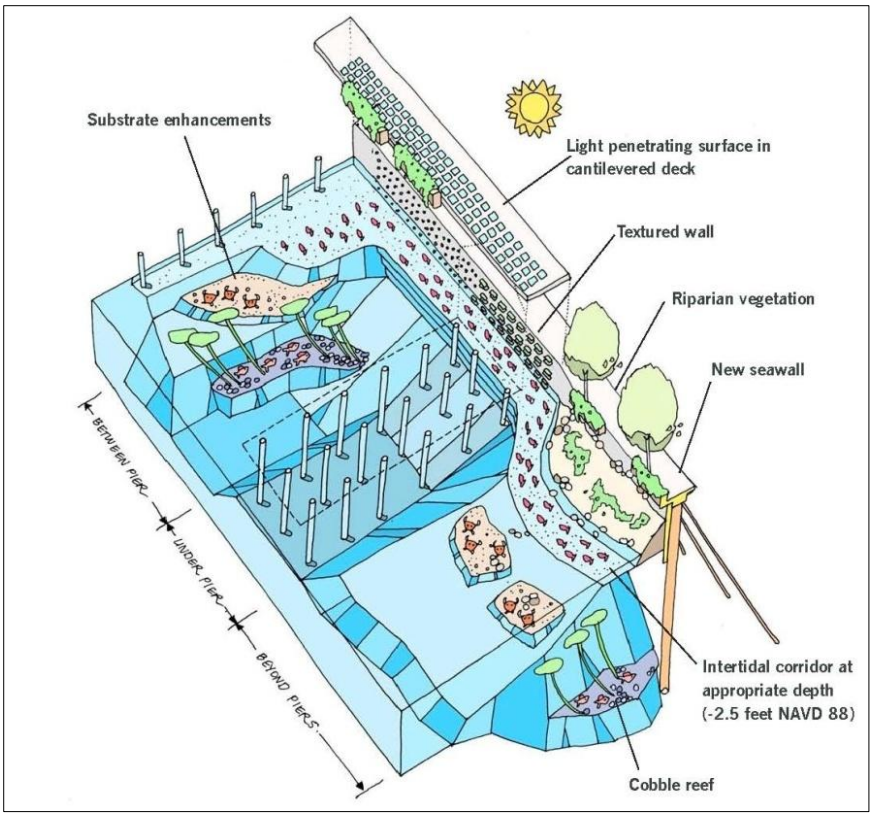


Figure 1-3. Conceptual Rendering of Proposed Habitat Improvements

The intertidal migration corridor for juvenile salmonids would be improved by:

- Modifying substrate depths to create a habitat bench and achieve appropriate intertidal and shallow-water habitat elevations;
- Improving the diversity of off-shore substrate by supplementing it with coarse substrate;
- Increasing textures on the seawall face to encourage the development of marine nearshore habitat and attachment of aquatic organisms;
- Adding riparian plants along the wall and sidewalk to provide food (insects and detritus) for migrating salmon; and
- Increasing daylight illumination of the habitat bench and other nearshore habitat by including LPS in a cantilevered or pile-supported sidewalk.

Enhanced ecosystem productivity would generally be accomplished by:

- Enhancing substrate by supplementing it with cobble, pea gravel, and shell hash; and
- Constructing the textured wall face, riparian plantings, LPS, and suitable bench substrate.

1.5.3 Upland Improvements

In addition to replacing the seawall and restoring aquatic habitat, the three build alternatives would provide a number of upland improvements. The existing Alaskan Way roadway, multi-use trail, and parking would be restored to their original function and capacity after construction. The restored

sidewalk along the waterfront would range from 15 to 30 feet in width and include a cantilevered portion with LPS that would benefit the marine habitat below. Viewing areas would be provided waterward of the sidewalk and would offer opportunities for public gathering space. New railings, formal and informal seating, bicycle racks, wayfinding elements, and other design amenities would also be included as project improvements. All build alternatives would restore the historic Washington Street Boat Landing, either maintaining its current location or moving it 15 feet waterward.

Currently, there are no water quality facilities for treating surface water runoff from Alaskan Way. Stormwater drainage pipes in the project area would be reconstructed and stormwater quality would be improved through the installation of treatment to meet code by removing the bulk of suspended solids, oils, and greases. These actions would improve water quality in the nearshore of the project area. It would be expected that new stormwater structures would initially require less maintenance than those currently in place and, as a result, have fewer detrimental impacts on the environment. As the project design moves forward, other stormwater management strategies could be identified that provide greater environmental benefit without increasing environmental impacts.

1.6 PROJECT CONSTRUCTION

1.6.1 Construction Schedule

Central Seawall construction is expected to begin in fall of 2013 and would progress from north to south, beginning in Zone 4 and ending in Zone 1. Based on current schedules, Central Seawall construction would last three to five construction seasons depending on the alternative, with construction seasons extending from approximately Labor Day to Memorial Day to avoid major disruption during the peak tourist season. The North Seawall would be built as a separate construction phase and would require an additional four construction seasons.

1.6.2 Temporary Roadway and Construction Work Zone

To accommodate construction activities during replacement of the seawall, the existing Alaskan Way roadway would be relocated beneath the Alaskan Way Viaduct. Three lanes of traffic would be maintained underneath the viaduct throughout construction. The resulting space along the waterfront would be used as a work zone during construction of the Central Seawall (Figure 1-4). During North Seawall construction, this dedicated construction work zone would not be available, and the temporary roadway would be accommodated in the available right-of-way.

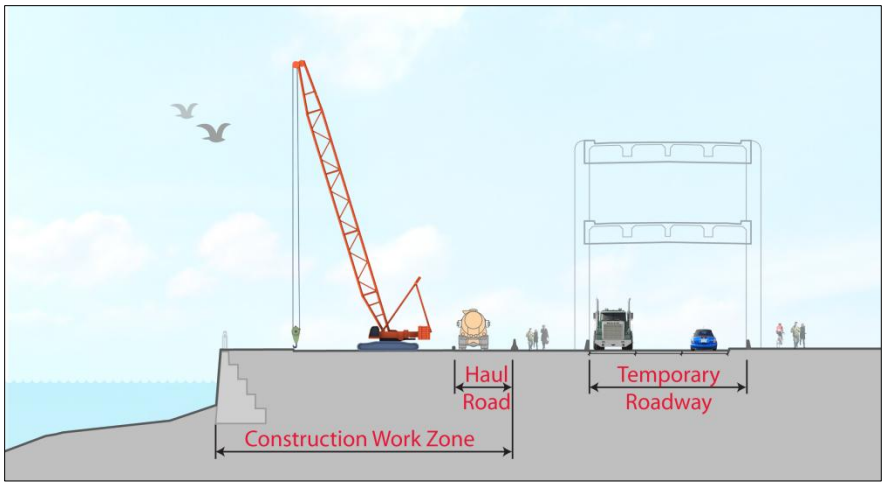


Figure 1-4. Construction Work Zone and Temporary Roadway

The construction work zone would extend from the western edge of the existing multi-use path on Alaskan Way to the water. Existing street trees would be removed to provide additional space within this area and would either be replaced as riparian plantings with the EBSP or replaced during future waterfront improvement projects. The existing streetcar tracks that run along Alaskan Way would also be removed during construction.

Construction would be staged from several locations within the work zone. Staging areas would vary in size and would be used for delivery and storage of construction materials and equipment. The staging areas would be sited to avoid disrupting access to piers, residences, and businesses along the waterfront. In addition to the upland staging areas, construction activities may also be staged from barges and tugs in Elliott Bay.

During Central Seawall construction, some temporary parking spaces could be provided as part of each construction stage. During the first stage of construction, parking could be provided on the existing Alaskan Way roadway south of the active work zone. During the later stages when construction has progressed to the southern portion of the project area, parking could be provided on the restored roadway to the north of active construction. During North Seawall construction, a similar program of temporary parking would be implemented, to the extent possible.

To the greatest extent possible, construction materials and personnel would be transported to the construction work zone and staging areas via freeways and arterials. However, other city streets could provide access to the site when needed. The eastern border of the construction work zone along Alaskan Way would serve as a haul road to channel truck traffic within the project area.

The existing multi-use trail would be maintained (with the potential for temporary detours), and access to the piers would be maintained throughout construction.

1.6.3 Construction Methods

The seawall would be replaced using soil improvement, BSP, or a combination of these two methods. A brief description of each method is provided below.

1.6.3.1 Soil Improvement

Soil improvement is a general term for a variety of techniques that are used to stabilize existing soils by improving their internal structure and strength. Two techniques that are being considered for the EBSP are jet grouting and deep soil mixing. Jet grouting consists of adding grout to existing soils to form a "block" of improved soil mass that extends down to the competent foundation below. This technique has been identified as a feasible way to strengthen the material underlying the project area, which includes an existing timber relieving platform, buried timber piles, utilities, and other potential obstructions.

Jet grouting creates circular columns of soil cement by means of a hollow drill pipe measuring a few inches in diameter that is inserted into the soil. Grout is then sprayed into the surrounding soil under high pressure through horizontal nozzles in the rotating drill pipe. This process cuts the existing soil and mixes the soil with the grout. The strength of the soil would be substantially improved through this process, thus greatly reducing the soil's potential for liquefaction during an earthquake.

The grout columns would be constructed in a grid pattern to create a block of improved soil. The grid pattern would be installed between the timber piles of the existing seawall to eliminate the need to remove the existing piles. The finished arrangement of the grouted columns would create a "spine" for the new seawall. The grouting process generates spoils that would be disposed of using appropriate means, in accordance with applicable regulations.

Deep soil mixing, another technique that could be used for soil improvement, uses an auger that penetrates the ground surface to mix and consolidate the underlying soils to a depth of up to 20 feet. With deep soil mixing, no grout is applied under pressure and there are minimal spoils for disposal.

1.6.3.2 Braced Soldier Piles

BSP is an alternative structural stabilization method. This method would involve drilling large holes (approximately 8 feet in diameter) to a depth of approximately 75 feet below the present street level of Alaskan Way where the firm layer of glacial till is located. An oscillator, a specialized piece of drilling equipment, would install a steel casing as the drilling progresses to prevent the holes from collapsing and to contain the soils to be excavated. The leading edge of the casing would be equipped with cutting teeth to carve through the timber boards and piles of the existing relieving platform and into the soils below.

Once the holes have been drilled and excavated to the final depth, a steel reinforcing cage would be placed into the shaft casing and the casing would be filled with concrete. The casing would be extracted as the concrete is poured and would leave behind a reinforced concrete cylinder, or soldier pile. A line of these soldier piles would be constructed to form the spine of the seawall. Soil anchors would then be installed to brace or tie back these soldier piles.

1.6.4 Soil Dewatering and Spoils Disposal

Regardless of the construction method that is selected, excavations into soils in the construction zone would need to be dewatered, which generally involves disposing of the wastewater offsite or pumping

the excess water to a location where it can be settled and/or before discharge. Wet spoils from jet grouting or other soil improvement activities must be managed or disposed of as well. SDOT is currently exploring various methods for managing and disposing wastewater and jet grout spoils, which would be detailed in the project's dewatering and erosion control submittals required as part of the Clean Water Act Section 401 and National Pollutant Discharge Elimination System (NPDES) construction general stormwater permit processes, as well as by the City's standard construction specifications.

1.6.5 Utility Protection and/or Relocation

The project area contains a large number of utilities, including water, sanitary sewer, combined sewer, stormwater, electrical transmission and distribution, steam, gas, fire alarm, and numerous telecommunication systems. These utilities range from major transmission lines serving portions of Seattle and the region to individual connections serving adjacent properties. As shown in Figure 1-5, some of these utilities are directly beneath the Alaskan Way roadway and sidewalk and above the relieving platform of the existing seawall, while others extend through the seawall to the piers.

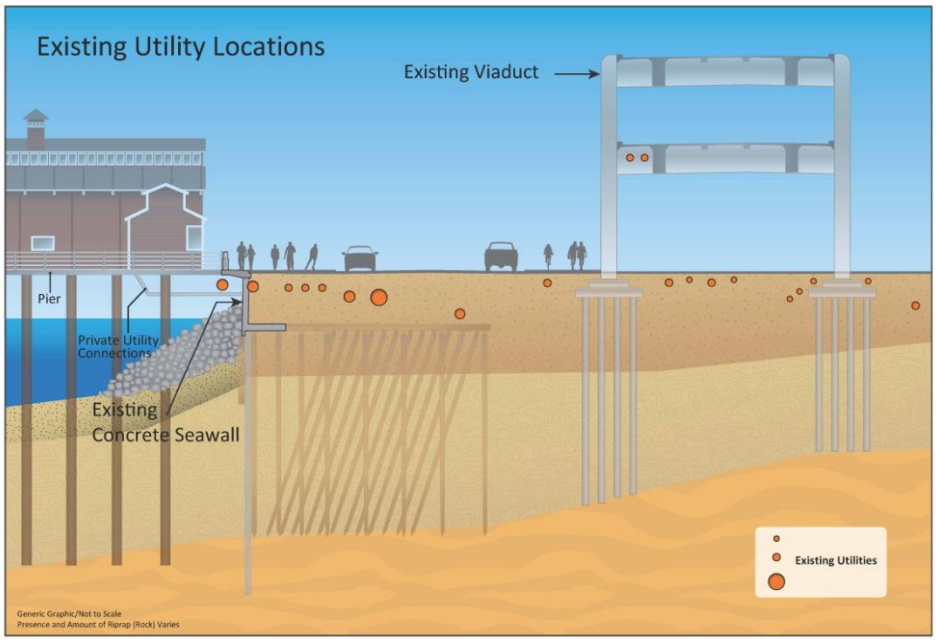


Figure 1-5. Representative Cross Section Showing Typical Existing Utility Locations within Project Limits

SDOT's objective will be to maintain utility service to the greatest extent possible during construction, although the means and methods for doing so would vary depending on the construction method used. Alternatives A and B assume that all soil overlying the relieving platform would need to be excavated. Excavation would require temporary or permanent relocation of the majority of existing utilities. Alternative C assumes that most soil improvement could be accomplished through small penetrations at street level, which would allow the majority of the utility lines above the relieving platform to remain in place during that construction activity. With either method, most individual service lines would be temporarily relocated and reinstalled in their final locations as seawall construction progresses. Final points of service to the waterfront piers would remain the same to alleviate the need to update the

facilities to the current Uniform Building Code. The final construction method chosen will not preclude the ability of utilities to provide future new services to the downtown waterfront area.

1.7 BUILD ALTERNATIVES

The preceding sections provided information on project elements that would be similar among the three build alternatives. The following discussion focuses on the primary differences among Alternatives A, B, and C in terms of the seawall's location, the configuration of Alaskan Way, habitat improvements, public amenities, and construction sequence and schedule. Table 1-1 (at the end of this chapter) compares key features of the alternatives.

1.7.1 Alternative A

Alternative A would reconstruct the seawall as close to its existing alignment as possible, with jet grouting forming the structural support. Habitat improvements would include the addition of shoreline enhancements and the installation of a continuous habitat bench and LPS at piers. Figures 1-18 and 1-19 at the end of this chapter depict Alternative A.

1.7.1.1 Seawall

In Alternative A, the new seawall would be reconstructed as close to the alignment of the existing seawall as possible, with only a minimal setback (as outlined in the bulleted list below). This placement would allow construction to proceed without requiring the removal of the existing wall first.

The approximate proposed location of the seawall face for Alternative A relative to the existing seawall face would be:

- Zone 1 – in place (no change),
- Zone 2 – 15 feet landward,
- Zone 3 – 3 feet waterward, and
- Zones 4, 5, and 6 – 10 feet landward.

In Zone 1, the seawall would be reconstructed in its existing location to minimize potential conflicts with construction of the SR 99 bored tunnel, which is being built as part of a separate project. In Zones 2, 4, 5, and 6, the new wall would be constructed behind (east of) the existing wall, and then the existing seawall west of the new seawall face would be demolished. In Zone 3, the new seawall structure would be constructed to the west of the existing wall, resulting in the new seawall face being set three feet waterward of its current location.

1.7.1.2 Roadway

The existing Alaskan Way is generally four lanes (two lanes in each direction), except in the vicinity of Colman Dock (Yesler Way to Spring Street), where it consists of one northbound lane and two southbound lanes. Alternative A would add a permanent northbound lane between S. Washington and

Madison Streets[1] to handle traffic in this segment headed to Colman Dock and through to other destinations. A temporary second northbound lane (constructed by the Washington State Department of Transportation [WSDOT]) is currently in place. Parking and loading zones in the finished configuration would be similar to today.

A sidewalk of approximately the same width as the existing sidewalk (15 to 20 feet) would be provided on the west side of the street. The sidewalk would be cantilevered or pile supported in Zones 2 through 6 and would extend back to the piers in all zones, with LPS provided where feasible. The mixed-use trail on the east side of Alaskan Way would be extended from its existing terminus north to Clay Street. At Clay Street, the trail would cross Alaskan Way and continue on the west side of Alaskan Way to Broad Street, where it would connect to the existing trail system that runs along Olympic Sculpture Park and Myrtle Edwards Park.

1.7.1.3 Habitat Improvements

Alternative A would provide an effective intertidal corridor along the seawall to support juvenile salmonid migration and would enhance ecosystem productivity. Habitat benches, a sidewalk with LPS, a textured wall face, subtidal substrate enhancements, cobble reefs, and riparian plants would be installed. No net loss of ecological function or intertidal elevation would occur.

1.7.1.4 Upland Improvements

Under Alternative A, public amenities would include the restored historic Washington Street Boat Landing, improved water-viewing opportunities at various locations, new or replaced railings, new sidewalks, waterfront planters, and street plantings. Reconstructed sidewalks would extend from the curb line of the restored Alaskan Way to the western edge of the existing sidewalk. These improvements would add variety to the waterfront by defining gathering spaces, viewing areas, and building entries.

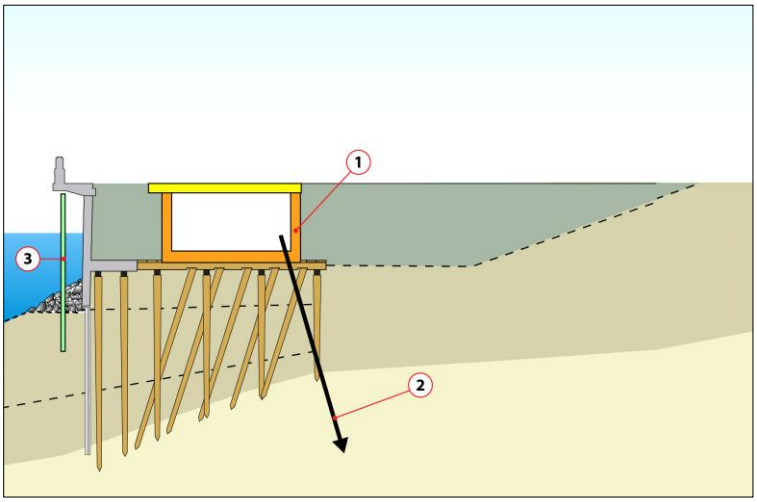
1.7.1.5 Construction and Schedule

Under Alternative A, the construction method proposed for the primary structural element of the seawall is soil improvement. With this method, construction of the Central Seawall would require approximately three construction seasons with two summer shutdown periods. Construction of the North Seawall would require an additional four construction seasons with three summer shutdown periods. The current plan for Alternative A is to begin construction of the Central Seawall in Zone 4, move southward to Zone 3, and then progress to Zones 2 and 1. The Central Seawall construction would be followed by the North Seawall construction in Zones 6 and 5.

The anticipated construction activities and probable sequence for Alternative A, using jet grouting for the soil improvement, are depicted in Figures 1-6 through 1-9. The figures describe four primary stages of work that would occur along the waterfront. The construction activities within each zone would vary

[1] The Elliott Bay Seawall Project would build the additional lane from S. Washington Street to Madison Street. The portion between S. King Street and S. Washington Street would be constructed as part of the Alaskan Way Viaduct Replacement Project.

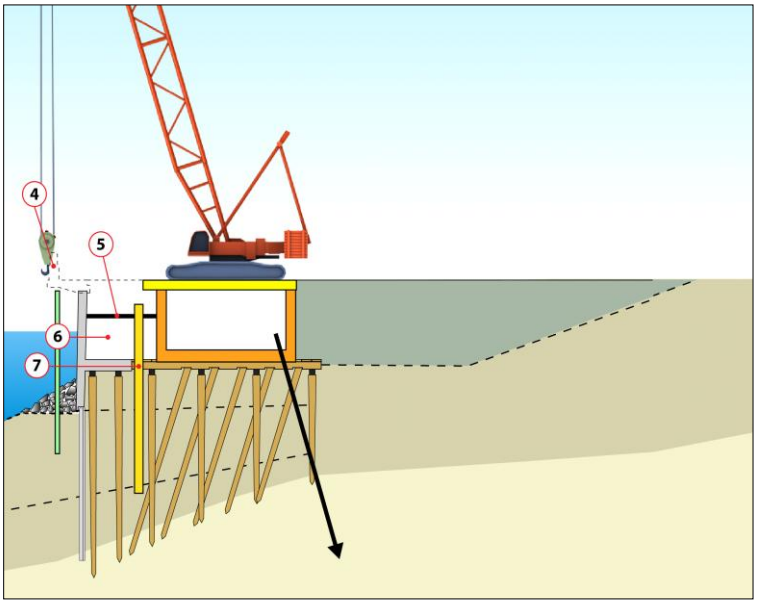
depending on the type of existing seawall. The figures depict the Type A seawall. (Type A seawall is a sheet-pile supported, reinforced, concrete face panel, which is tied back to a buried timber relieving platform supported by vertical and battered timber piles.) For Alternative A, it was assumed that the area above the existing relieving platform would be excavated before jet grouting begins.



Alternative A, Stage 1

1. Excavate to the top of relieving platform, relocate utilities, and install shoring
2. Install soil anchors
3. Remove existing riprap and install temporary containment wall

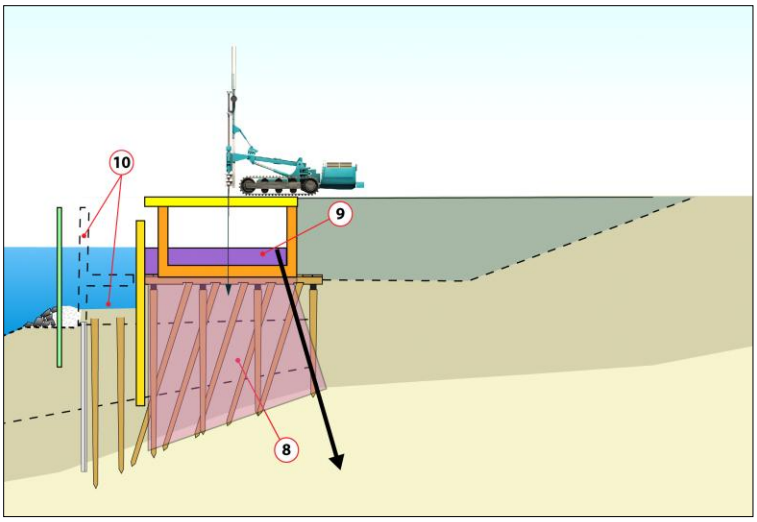
Figure 1-6. Alternative A, Stage 1



Alternative A, Stage 2

4. Remove existing cantilever sidewalk
5. Brace existing concrete face panel
6. Excavate remaining soil
7. Install concrete face panel

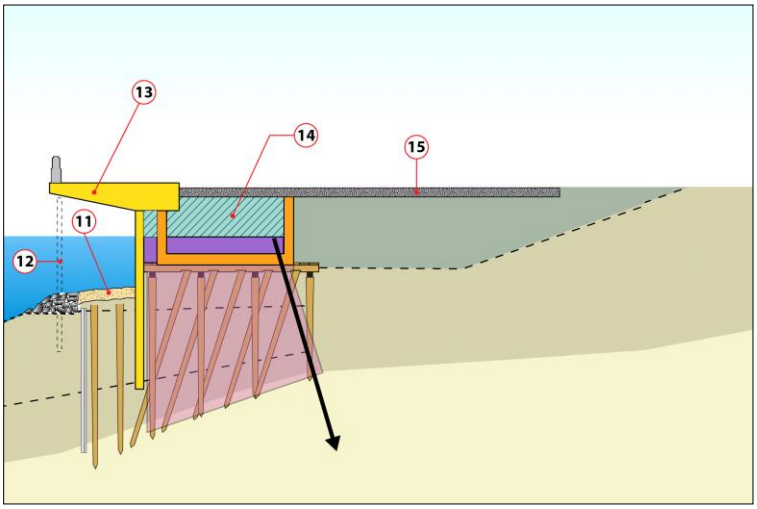
Figure 1-7. Alternative A, Stage 2



Alternative A, Stage 3

8. Install soil improvement (jet grouting)
9. Install anchor slab
10. Remove portion of existing wall

Figure 1-8. Alternative A, Stage 3



Alternative A, Stage 4

11. Place substrate
12. Remove temporary containment wall
13. Install sidewalk
14. Restore utilities and backfill
15. Complete restored roadway

Figure 1-9. Alternative A, Stage 4

1.7.2 Alternative B

Alternative B would move the seawall up to 75 feet landward of its current location, with BSP forming an underground wall structure to protect against coastal storm damage and seismic forces. In addition to the habitat improvements described for Alternative A, this alternative would construct a continuous habitat bench and continuous LPS at the piers. Figures 1-20, 1-21, and 1-22 at the end of this chapter depict Alternative B.

1.7.2.1 Seawall

Under Alternative B, the new seawall would be constructed up to 75 feet east of the existing seawall alignment and would provide a range of potential design opportunities. The approximate proposed location of the seawall face for Alternative B, relative to the existing seawall face, would be:

- Zone 1 – 0 to 15 feet landward,
- Zone 2 – 15 feet landward,
- Zone 3 – 30 feet landward,
- Zone 4 – 30 to 75 feet landward following the restored road curb alignment, and
- Zones 5 and 6 – 10 feet landward.

In Zones 1, 2, 5, and 6, the new wall would be constructed 10 to 15 feet east of the existing wall. In Zones 3 and 4, the new wall would be constructed 30 to 75 feet farther east, allowing greater flexibility for future habitat and public amenity spaces. This eastward realignment would largely reshape the downtown Seattle waterfront. After the new seawall was in place, the existing seawall would be demolished.

1.7.2.2 Roadway

Under Alternative B, the lane configuration of Alaskan Way would remain identical to the current configuration because of the confined space that would be available between the location of the seawall (eastward of the existing seawall) and the existing Alaskan Way Viaduct structure. A temporary northbound lane between Yesler Way and Spring Street has been installed by WSDOT, and it may be used during seawall construction.

Similar to the other build alternatives, the existing roadway, sidewalk, and multi-use trail would be restored to their original function and capacity after construction, with the multi-use trail connecting to the existing trail system that runs along Olympic Sculpture Park and Myrtle Edwards Park. However, due to space constraints, southbound parking and loading in Zone 3 may be restricted between University and Madison Streets.

1.7.2.3 Habitat Improvements

Alternative B would include the installation of habitat benches, a sidewalk with LPS, a textured wall face, subtidal substrate enhancements, cobble reefs, and riparian plants. However, the intertidal habitat

would be larger because the seawall would be set back farther east (landward). Alternative B would provide substantial enhancements within the new aquatic land available in Zones 1, 3, and 4.

Zone 1 would include an intertidal habitat bench and backshore that would be bordered by riparian plants, rocks, and drift logs. In Zone 3, the 30-foot seawall setback would allow the installation of a confined-substrate habitat bench with LPS installed above. In Zone 4, the 75-foot seawall setback would allow expanded upland riparian planting or increased intertidal habitat.

1.7.2.4 Upland Improvements

Alternative B would improve water viewing at various locations and provide additional public gathering spaces, as well as interpretive, recreational, and cultural opportunities. The new sidewalks would be enhanced with LPS and reconfigured with planters and new or replaced railings along the length of the seawall. These additional and enhanced gathering and overlook spaces would be provided in Zones 1, 3, 4, 5, and 6.

In Zone 1, Washington Street Boat Landing would be restored and reinstalled within the Washington Street right-of-way, west of its current location to improve its connection to the water. A new gangway and short-stay boat moorage could be created to restore the landing's historic connection with Elliott Bay. North of the boat landing, steps and a boardwalk (Option 1) or boulders (Option 2) could be added for seating and for physical access to or viewing of the new intertidal habitat bench.

Zones 3, 5, and 6 would include viewpoints between the piers. These viewpoints would create opportunities for public gathering, seating, and water viewing. The viewpoints would be parallel with the adjacent piers, thereby directing the view out to Elliott Bay. The viewpoints would include seating steps and stairs to bring people closer to the water.

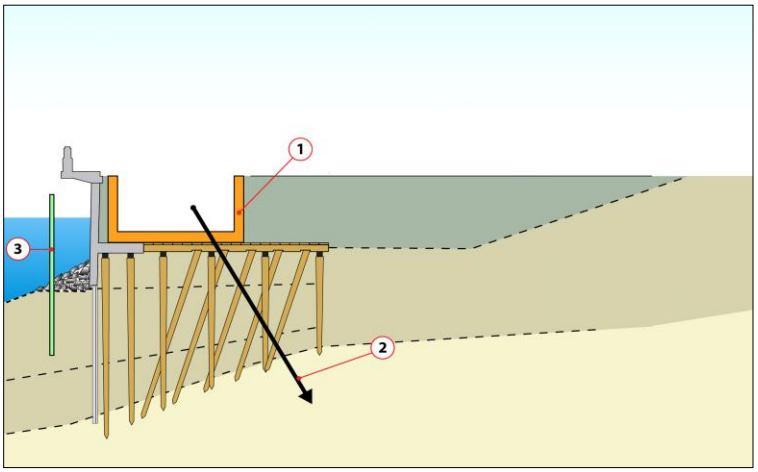
In Zone 4, the proposed seawall setback of 30 to 75 feet would provide two types of opportunities: a water plaza (Option 1) or a land plaza (Option 2). In Option 1, openings in the expansive plaza and walk would allow users to view tide pools and aquatic life below. In Option 2, raised planters would be filled with riparian plants, logs, and stones that would be reminiscent of Puget Sound shorelines.

1.7.2.5 Construction and Schedule

Under Alternative B, the design option proposed for the primary structural element of the seawall is BSP installed by means of a drilled-shaft construction method. With this method, construction of the Central Seawall would require approximately five construction seasons with four summer shutdown periods. Construction of the North Seawall would require an additional four construction seasons, similar to Alternatives A and C, although the duration may be slightly longer.

Access during construction would be more difficult than for either Alternatives A or C because the eastward setback of the seawall would restrict the construction staging areas to the project ends (i.e., north and south extents), instead of alongside the construction work zone. Under Alternative B, it would not be possible to maintain a continuous construction haul road because of the seawall setback in Zones 3 and 4. The construction of a land plaza or water plaza in Zone 4 would increase the duration of construction.

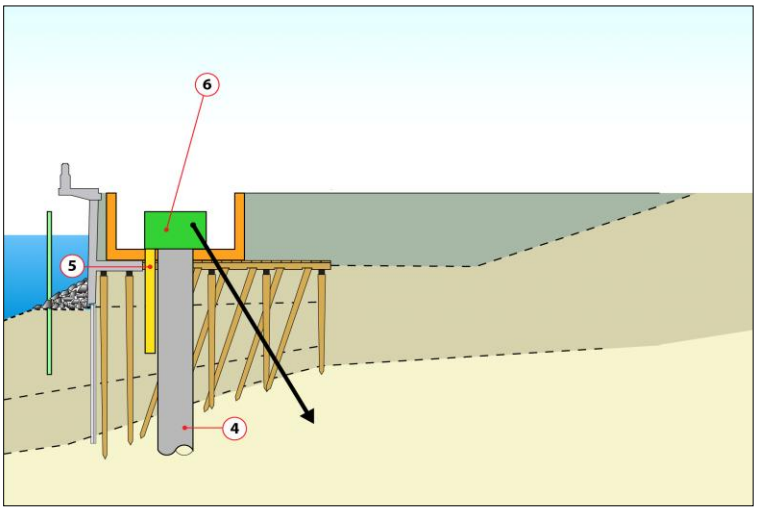
Construction of the Central Seawall would begin in Zone 4, move southward to Zone 3, and then progress to Zones 2 and 1. The Central Seawall construction would be followed by the North Seawall construction in Zones 6 and 5. The anticipated construction stages for Alternative B (assuming a Type A existing seawall) are shown in Figures 1-10 through 1-13.



Alternative B, Stage 1

1. Excavate to top of relieving platform, relocate utilities, and install shoring
2. Install soil anchors
3. Remove existing riprap and install temporary containment wall

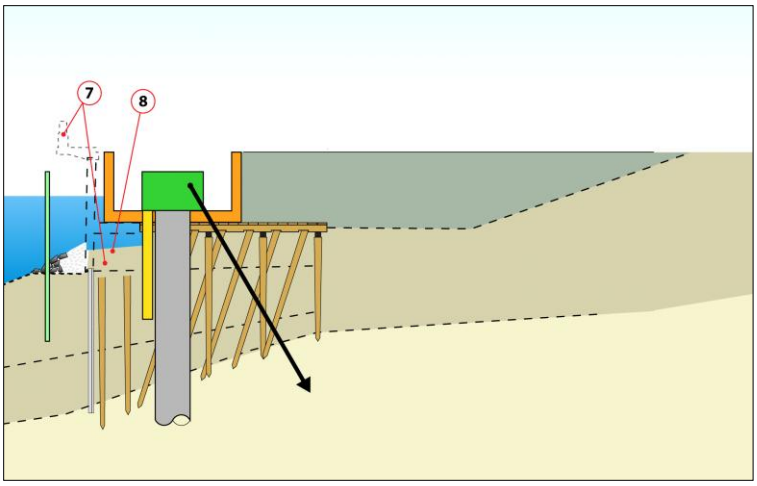
Figure 1-10. Alternative B, Stage 1



Alternative B, Stage 2

4. Drill shaft
5. Install concrete face panel
6. Cast concrete anchor cap

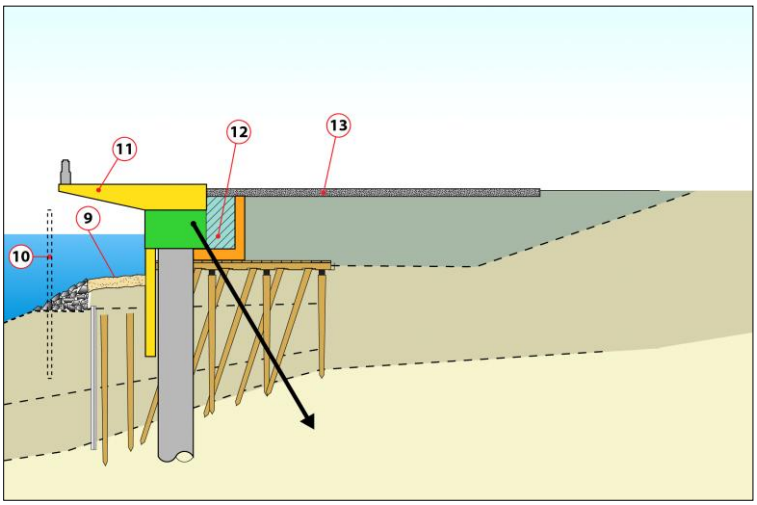
Figure 1-11. Alternative B, Stage 2



Alternative B, Stage 3

7. Remove existing cantilever sidewalk
8. Remove portion of existing wall

Figure 1-12. Alternative B, Stage 3



Alternative B, Stage 4

9. Place substrate
10. Remove temporary containment wall
11. Install sidewall
12. Restore utilities and backfill
13. Complete restored roadway

Figure 1-13. Alternative B, Stage 4

1.7.3 Alternative C

Alternative C would move the seawall up to 15 feet landward of its current location and would use soil improvements (likely including both jet grouting and deep soil mixing) to provide structural support. Alternative C would also provide a continuous habitat bench and continuous LPS in addition to shoreline enhancements. Figures 1-23 and 1-24 at the end of this chapter depict Alternative C.

1.7.3.1 Seawall

Under Alternative C, the seawall would be constructed approximately 10 to 15 feet landward of the existing seawall alignment along its entire length. The setback proposed for Alternative C would allow soil improvements to proceed without first removing the existing seawall. The approximate proposed location of the seawall face for Alternative C relative to the existing seawall face would be:

- Zones 1 and 2 – 15 feet landward,
- Zone 3 – 10 to 15 feet landward, and
- Zones 4, 5, and 6 – 10 feet landward.

1.7.3.2 Roadway

The existing roadway is generally four lanes (two lanes in each direction), except in the vicinity of Colman Dock (Yesler Way to Spring Street), where it consists of one northbound lane and two southbound lanes. Alternative C would add a permanent northbound lane between S. Washington and Madison Streets[2] to support traffic bound for Colman Dock and other destinations. A temporary second northbound lane (constructed by WSDOT) is currently in place and could be used during seawall construction. Parking and loading zones would be similar to those present today.

A sidewalk of approximately the same width as the existing sidewalk (15 to 20 feet) would be provided on the west side of the street after construction. The sidewalk alignment would be cantilevered or pile supported and would extend back to the piers in all zones. The mixed-use trail on the east side of Alaskan Way would be extended north from its existing terminus to Clay Street, where it would cross Alaskan Way and continue on the west side of the street to Olympic Sculpture Park and Myrtle Edwards Park.

1.7.3.3 Habitat Improvements

Like Alternatives A and B, Alternative C would include a number of habitat improvements. These improvements would extend 10 to 45 feet from the face of the new seawall. An intertidal bench would be installed at the base of the seawall to form a shallow angle to the seafloor and provide shallower water for juvenile salmon migration. Installation of a textured seawall face panel would support the

[2] The Elliott Bay Seawall Project would build the additional lane from S. Washington Street to Madison Street. The portion between S. King Street and S. Washington Street would be constructed as part of the Alaskan Way Viaduct Replacement Project.

development of marine nearshore habitat. Restoration of riparian areas along the back beach area in Zone 1 would include species of riparian and beach shrubs native to Puget Sound.

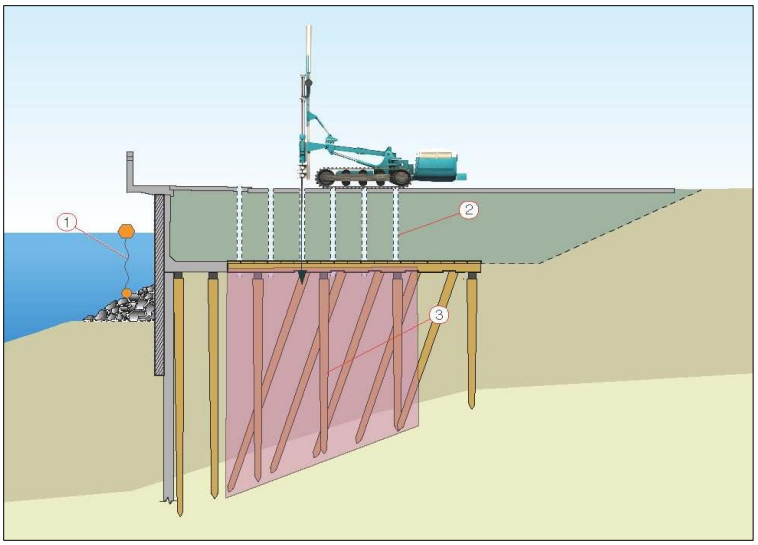
1.7.3.4 Upland Improvements

Under Alternative C, the restored sidewalk space would be enhanced with LPS and include new or upgraded railings, historic elements, wayfinding features, and lighting. Water-viewing opportunities would be preserved or enhanced at various locations, and additional viewing opportunities would be included at Spring and University Streets in Zone 3. In Zone 1, the Washington Street Boat Landing would be restored and reinstalled within the S. Washington Street right-of-way.

1.7.3.5 Construction and Schedule

For Alternative C, the construction method proposed for the primary structural element of the seawall is soil improvement. Alternative C assumes that the soil improvement would be accomplished from street level, without excavating the soils over the relieving platform. After seawall stabilization, the area above the relieving platform would be excavated to allow for installation of the new seawall face and sidewalk. With this method, construction of the Central Seawall would require approximately three construction seasons with two summer shutdown periods. Subsequent construction of the North Seawall would require an additional four construction seasons.

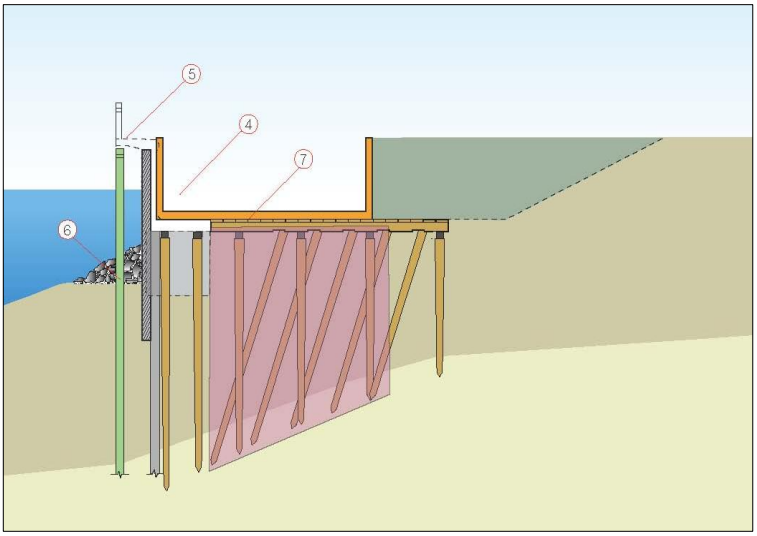
The anticipated construction activities and probable sequence for Alternative C, using soil improvement, are depicted below. The figures describe four primary stages of work that would occur along the waterfront. The activities within each zone would vary depending on the type of existing seawall present. Figures 1-14 through 1-17 are representative of the expected Alternative C construction sequence and depict the Type A seawall.



Alternative C, Stage 1

1. Place in-water containment curtain
2. Pre-drill and fill existing voids beneath timber relieving platform
3. Install soil improvement (jet grout)

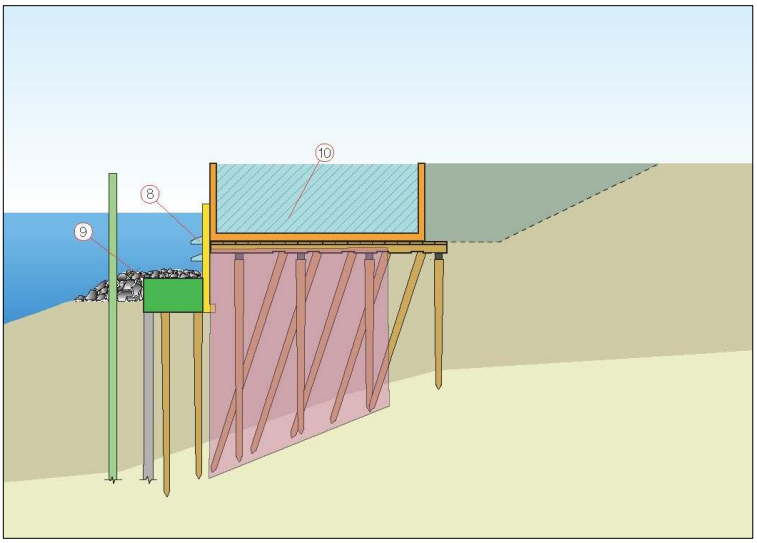
Figure 1-14. Alternative C, Stage 1



Alternative C, Stage 2

4. Relocate utilities
5. Remove existing sidewalk and pavement
6. Install temporary containment wall
7. Excavate to timber relieving platform

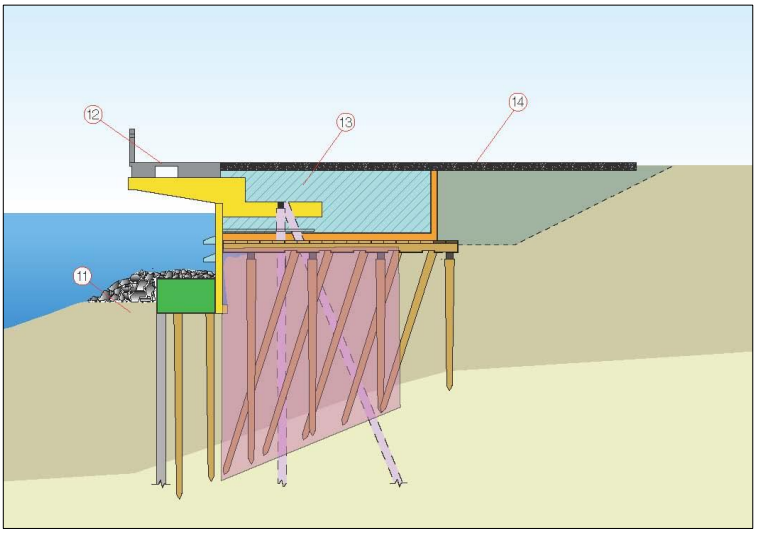
Figure 1-15. Alternative C, Stage 2



Alternative C, Stage 3

8. Remove portion of existing wall and install new face panels and habitat shelves
9. Place habitat bench

Figure 1-16. Alternative C, Stage 3



Alternative C, Stage 4

11. Remove temporary containment wall
12. Install cantilevered sidewalk with light penetrating surface
13. Restore utilities
14. Restore roadway for local traffic

Figure 1-17. Alternative C, Stage 4

TABLE 1-1. COMPARISON OF FEATURES OF THE THREE ELLIOTT BAY SEAWALL PROJECT BUILD ALTERNATIVES

Project Feature	Alternative A	Alternative B	Alternative C
Construction Method	Soil improvement	Braced soldier piles	Soil improvement
Central Seawall Construction Duration	3 construction seasons	5 construction seasons	3 construction seasons
North Seawall Construction Duration	4 construction seasons	4 construction seasons	4 construction seasons
Zone 1			
Face of Seawall Location	Existing location	0 to 15 feet landward	15 feet landward
Habitat Improvements	• Riparian plantings • Substrate enhancement • Cobble reef • Textured seawall face	• Riparian plantings • Substrate enhancement • Cobble reef • Expanded habitat bench and backshore	• Riparian plantings • Substrate enhancement • Expanded habitat bench and backshore
Upland Improvements	• Washington Street Boat Landing restoration • New or restored railings	• Washington Street Boat Landing restoration (up to 15 feet waterward of existing location) • Steps, boardwalk, and overlook (Option 1) • Short-stay boat moorage • New or restored railings	• Washington Street Boat Landing restoration (up to 15 feet waterward of existing location) • New or restored railings
Transportation Features	• Restored sidewalk • Restored multi-use trail • Restored roadway with additional northbound lane from S. Washington to Madison Street	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway with additional northbound lane from S. Washington to Madison Street
Zone 2			
Face of Seawall Location	15 feet landward	15 feet landward	15 feet landward
Habitat Improvements	• Confined substrate habitat bench • Textured seawall face • Intermittent LPS	• Confined substrate habitat bench • Textured seawall face • Continuous LPS	• Confined substrate habitat bench • Textured seawall face • Continuous LPS
Upland Improvements	• Same as existing	• Same as existing	• Same as existing
Transportation Features	• Restored sidewalk • Restored multi-use trail • Restored roadway with additional northbound lane from S. Washington to Madison Street	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway with additional northbound lane from S. Washington to Madison Street

Project Feature	Alternative A	Alternative B	Alternative C
Zone 3			
Face of Seawall Location	3 feet waterward	30 feet landward	10 to 15 feet landward
Habitat Improvements	• Confined substrate habitat bench and expanded habitat bench • Textured seawall face • Intermittent LPS at piers • Riparian plantings	• Confined substrate habitat bench and expanded habitat bench • Textured seawall face • Continuous LPS • Riparian plantings	• Confined substrate habitat bench and expanded habitat bench • Textured seawall face • Continuous LPS
Upland Improvements	• New or restored railings • Street plantings • Viewing area	• New or restored railings • Street plantings • Enhanced viewpoints with seating	• New or restored railings • Street plantings • Enhanced viewpoints
Transportation Features	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway
Zone 4			
Face of Seawall Location	10 feet landward	30 to 75 feet landward	10 feet landward
Habitat Improvements	• Confined substrate habitat bench and expanded habitat bench • Substrate enhancements • Textured seawall face • Intermittent LPS at piers • Cobble reefs • Riparian plantings	• Confined substrate habitat bench and expanded habitat bench • Substrate enhancements • Textured seawall face • Continuous LPS • Cobble reefs • Riparian plantings • Daylighting of water plaza	• Confined substrate habitat bench and expanded habitat bench • Substrate enhancements • Textured seawall face • Continuous LPS • Daylighting of portions of cantilevered sidewalk
Upland Improvements	• New or restored railings • Street plantings • Viewing area	• New or restored railings • Street plantings • Creation of a land or water plaza • Enhanced viewpoints	• New or restored railings • Street plantings
Transportation Features	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway

Project Feature	Alternative A	Alternative B	Alternative C
Zone 5			
Face of Seawall Location	10 feet landward	10 feet landward	10 feet landward
Habitat Improvements	• Confined substrate habitat bench • Riparian plantings • Textured seawall face	• Confined substrate habitat bench • Riparian plantings • Textured seawall face	• Confined substrate habitat bench • Riparian plantings • Textured seawall face • Continuous LPS
Upland Improvements	• New or restored railings • Street plantings • Viewing area	• New or restored railings • Street plantings • Expanded viewpoints	• New or restored railings • Street plantings • Enhanced viewpoints
Transportation Features	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway	• Restored sidewalk • Restored multi-use trail • Restored roadway
Zone 6			
Face of Seawall Location	10 feet landward	10 feet landward	10 feet landward
Habitat Improvements	• Confined substrate habitat bench and expanded habitat bench • Substrate enhancement • Textured seawall face • Riparian plantings • Intermittent LPS at piers • Cobble reefs	• Confined substrate habitat bench and expanded habitat bench • Substrate enhancement • Textured seawall face • Riparian plantings • Intermittent LPS at piers • Cobble reefs	• Confined substrate habitat bench and expanded habitat bench • Substrate enhancement • Textured seawall face • Riparian plantings • Continuous LPS
Upland Improvements	• Restored or new railings • Viewing area	• Restored or new railings • Enhanced viewpoints	• Restored or new railings • Enhanced viewpoints
Transportation Features	• Restored sidewalk • Extended multi-use trail • Restored roadway	• Restored sidewalk • Extended multi-use trail • Restored roadway	• Restored sidewalk • Extended multi-use trail • Restored roadway

Note: LPS – light-penetrating surfaces

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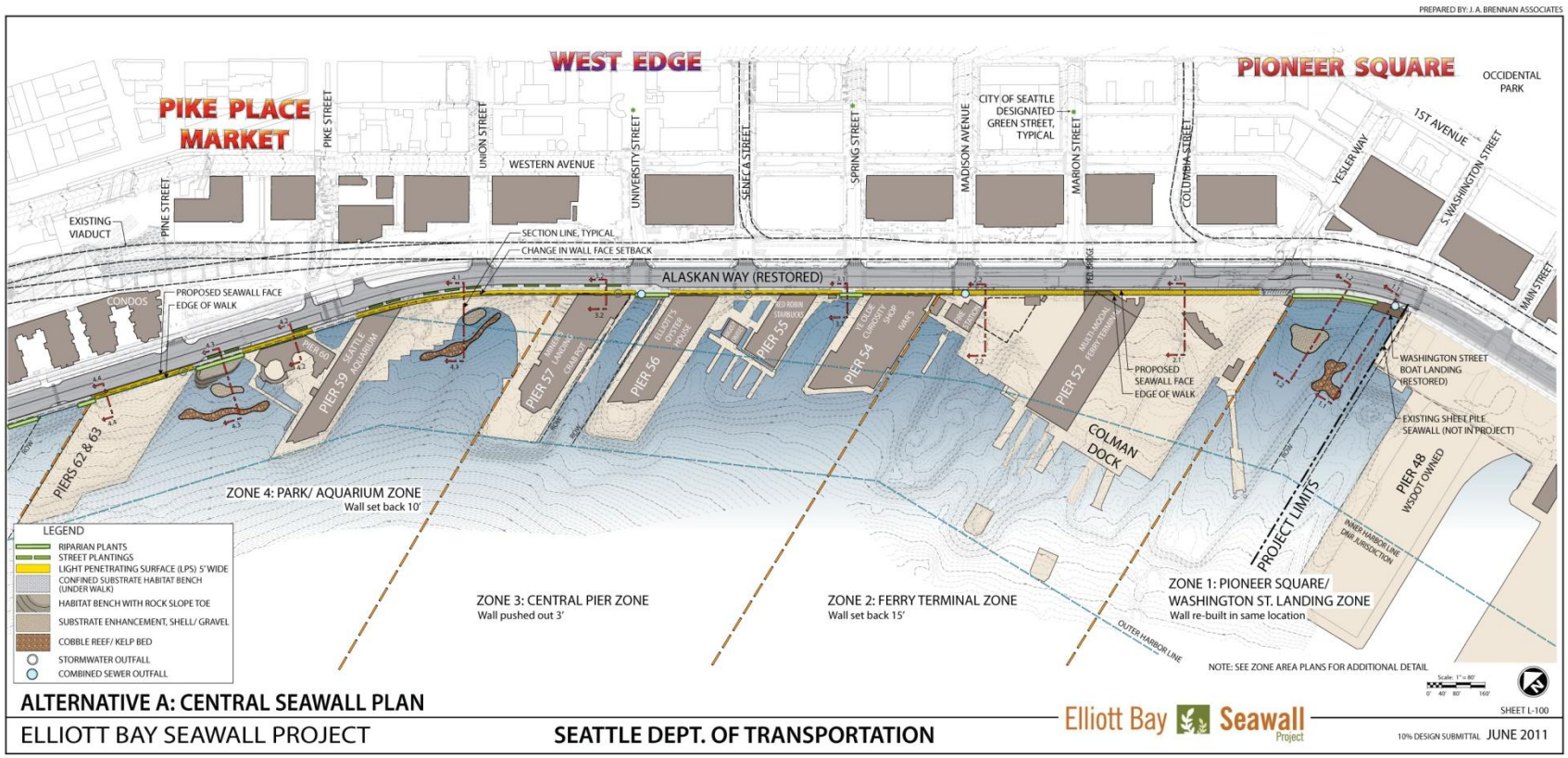

Figure 1-18. Alternative A: Central Seawall Plan

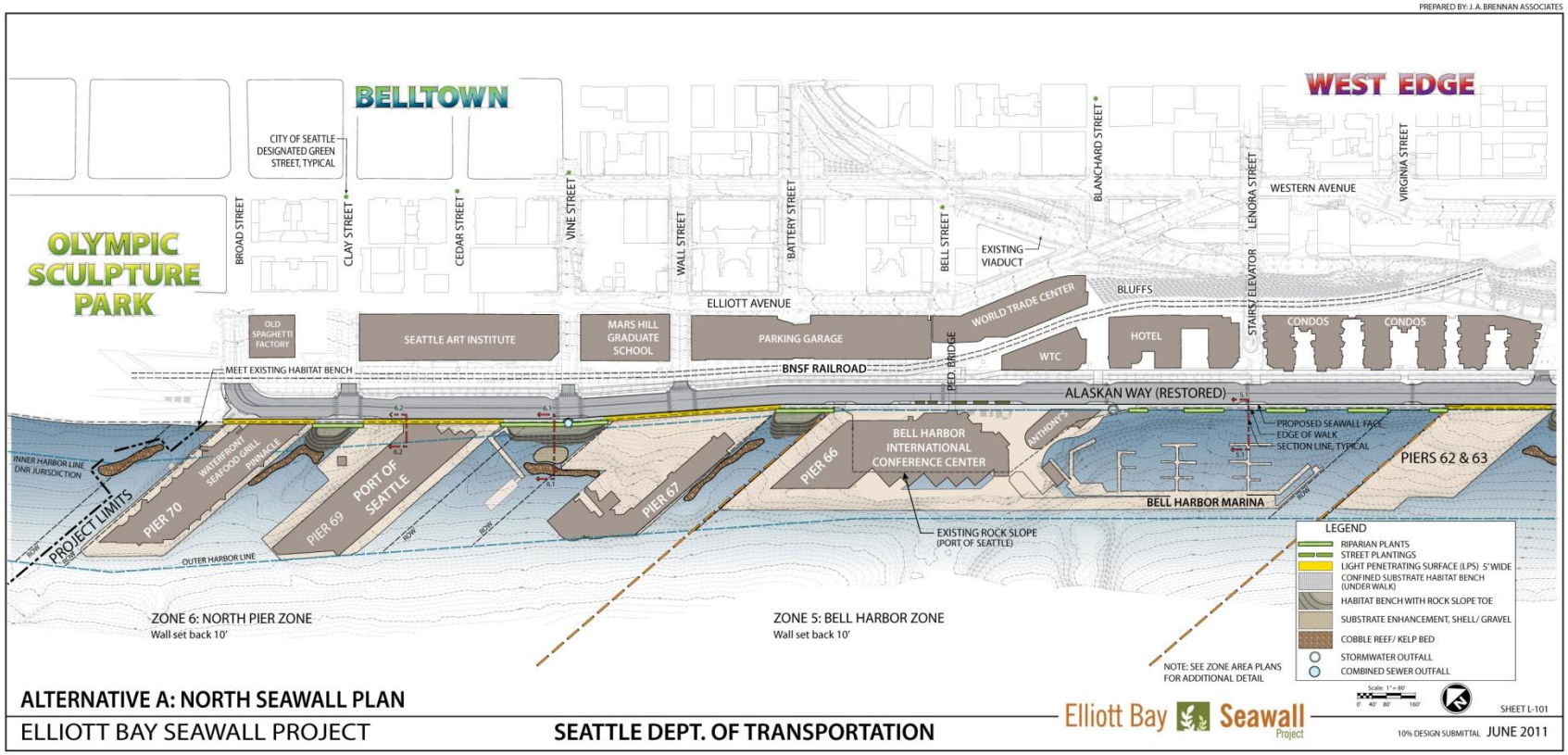

Figure 1-19. Alternative A: North Seawall Plan

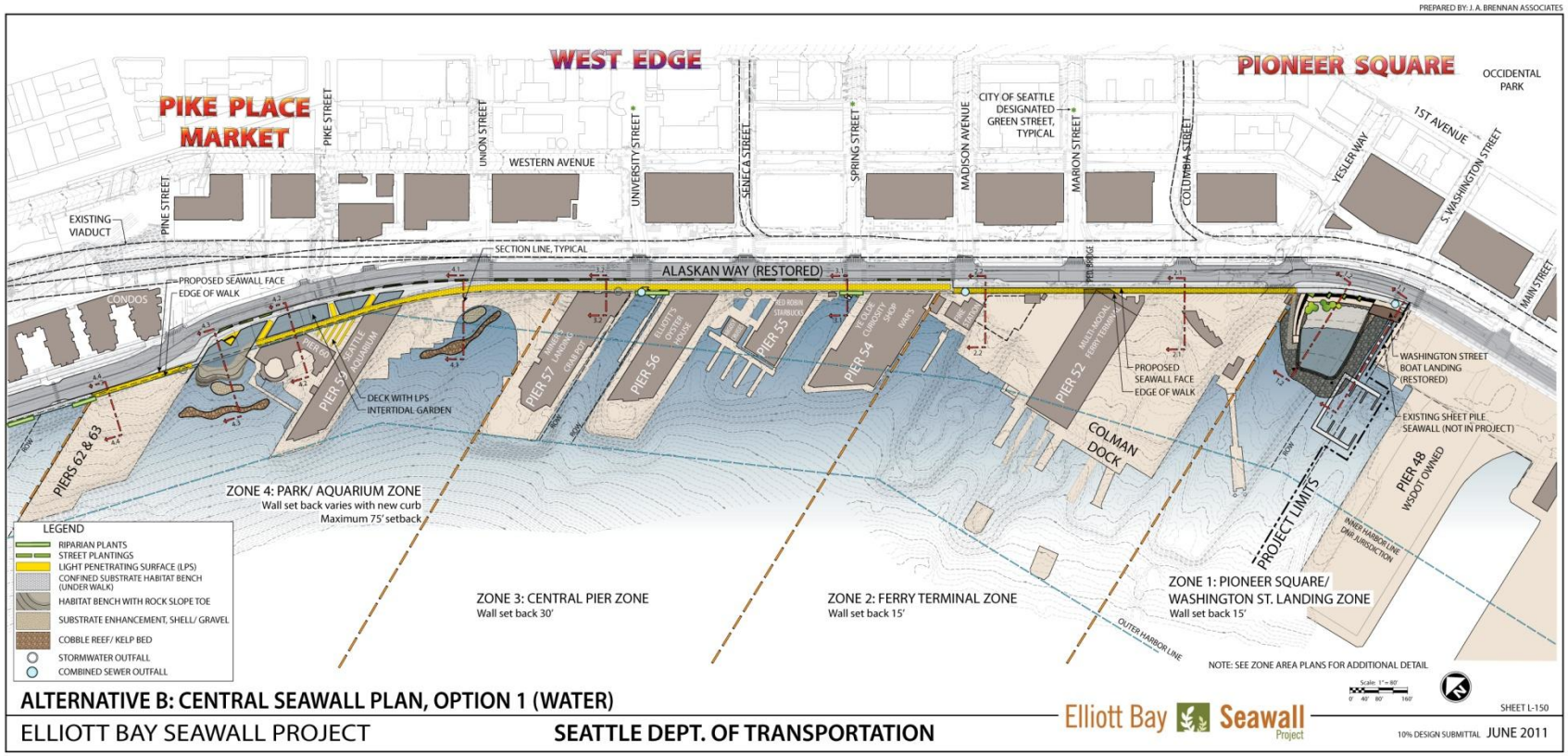

Figure 1-20. Alternative B: Central Seawall Plan, Option 1

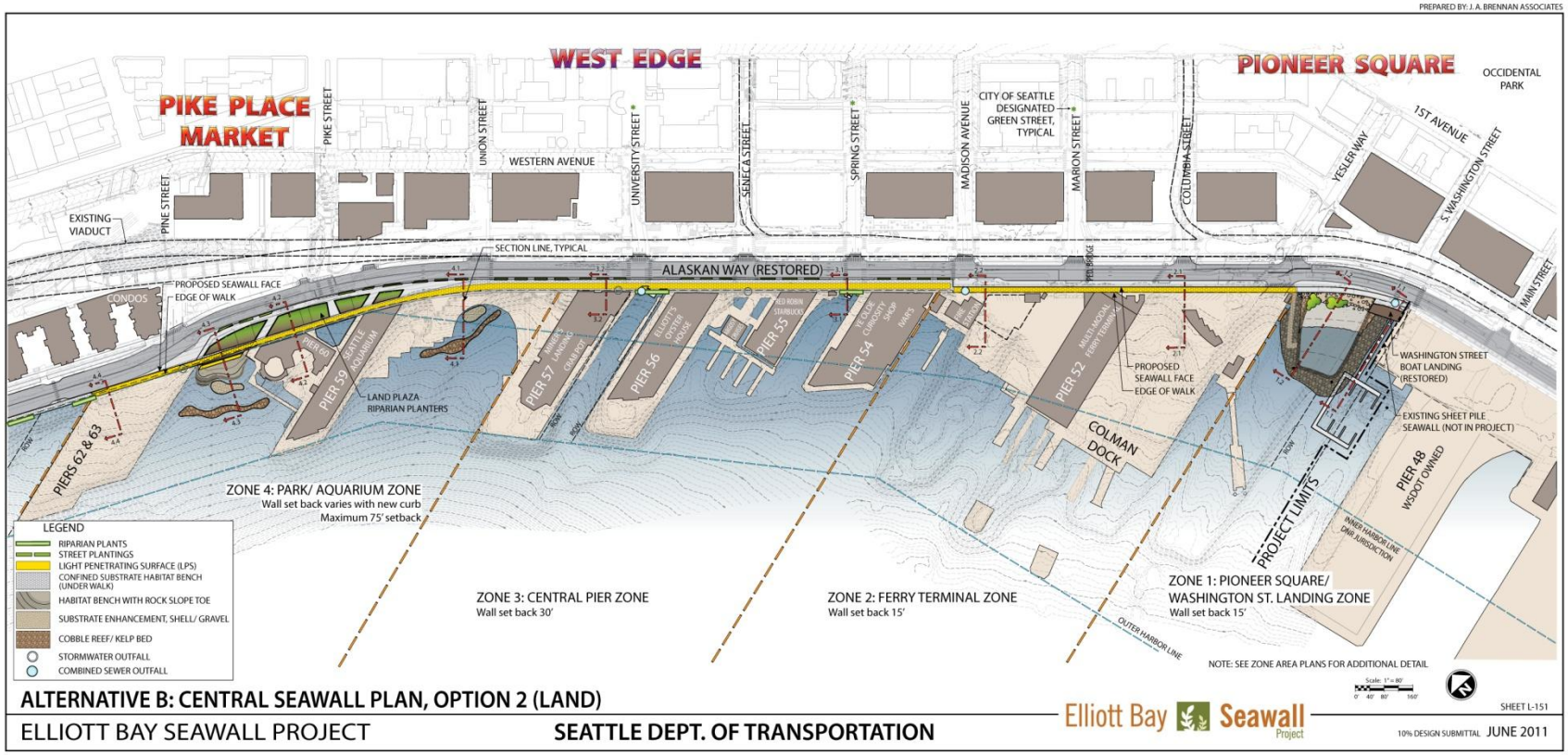

Figure 1-21. Alternative B: Central Seawall Plan, Option 2

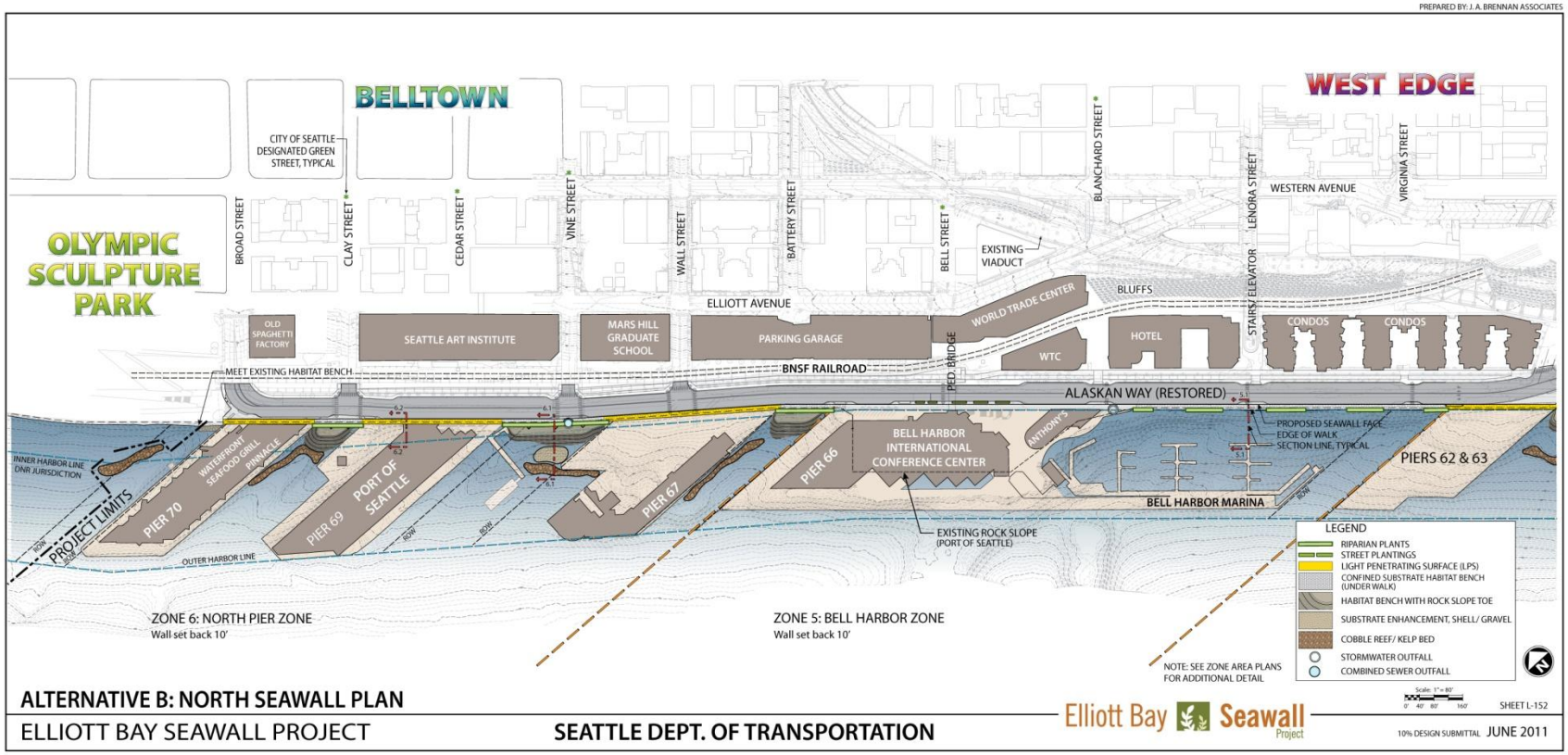

Figure 1-22. Alternative B: North Seawall Plan

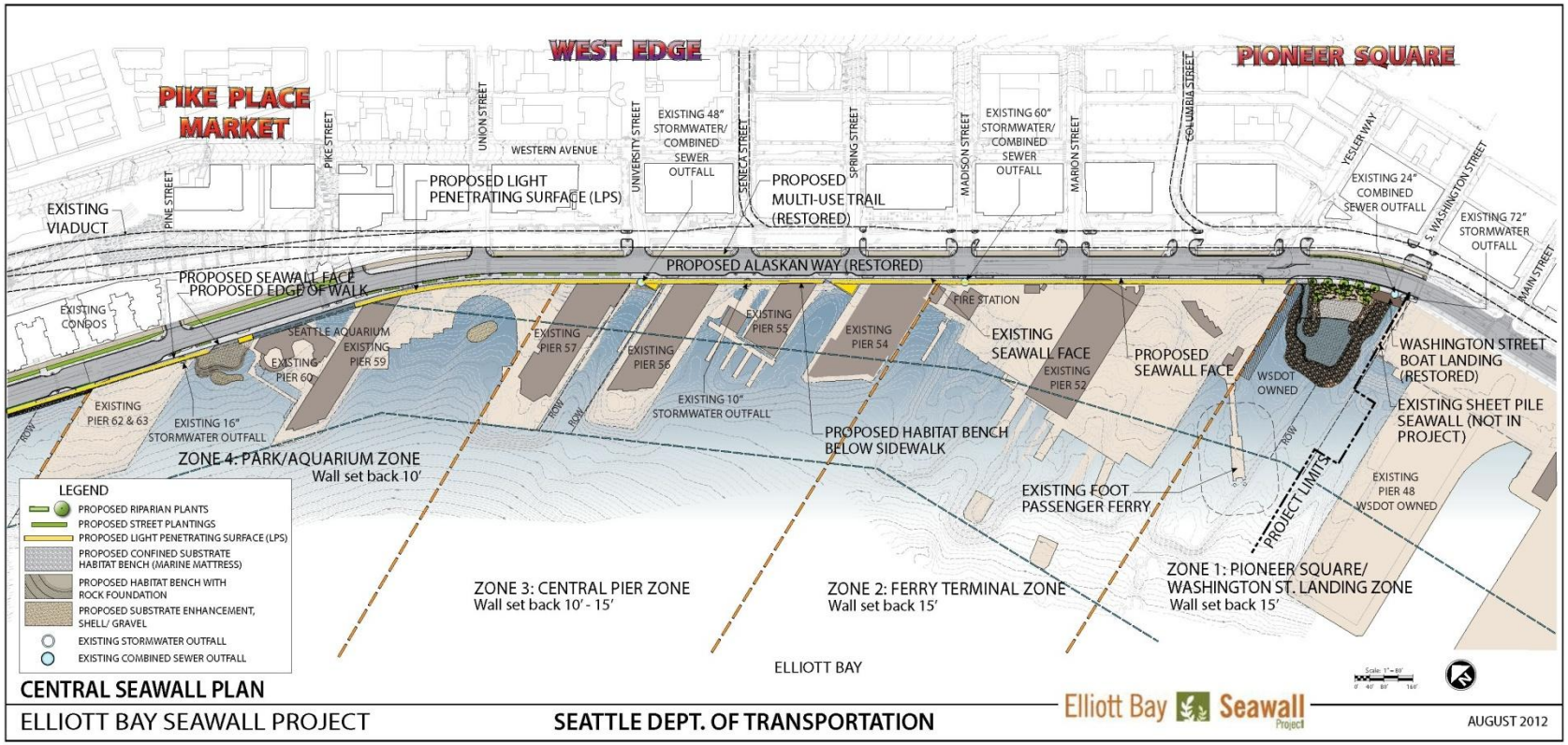

Figure 1-23. Alternative C: Central Seawall Plan

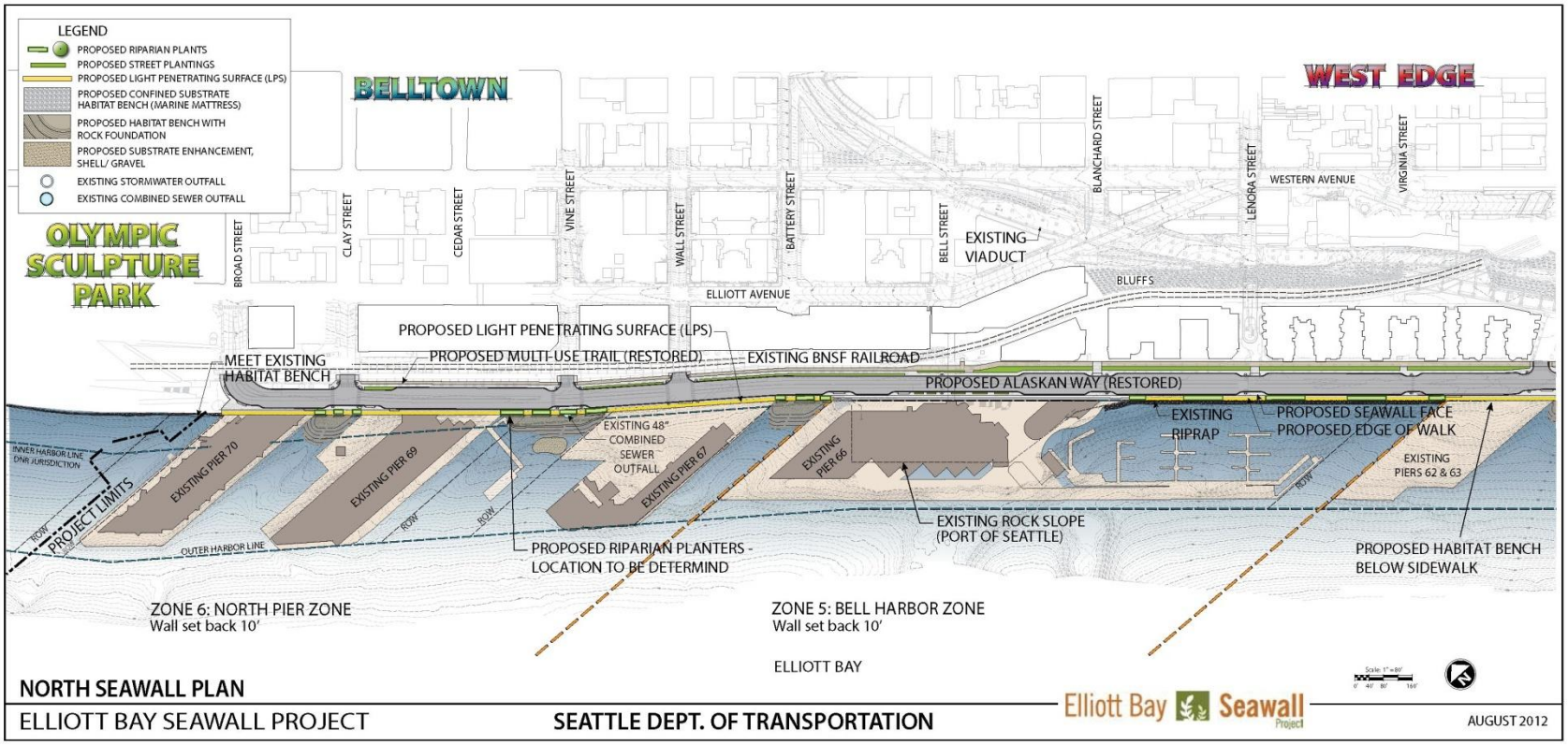

Figure 1-24. Alternative C: North Seawall Plan

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CHAPTER 2. METHODOLOGY

The final *Elliott Bay Seawall Project Economics Methodology Technical Memorandum* (SDOT 2011a) contains a detailed description of the methodology used for this Discipline Report. The following sections summarize the methodology used to assess direct project effects on employment, tax and other local governmental revenue, local businesses, construction spending and the regional economy, as well as the secondary (indirect) effects of other projects on those resources.

2.1 STUDY AREA

For the purposes of the Economics Discipline Report, the direct economic impact study area is delineated based on neighborhood planning areas and census tracts, but will generally be focused between S. Jackson Street on the south, Broad Street on the north, First Avenue on the east, and Elliott Bay on the west. Indirect effects are described for a broader regional economic impact area that includes the City of Seattle and the surrounding Central Puget Sound Region (King, Snohomish, Pierce, and Kitsap counties).

2.2 METHODOLOGY

Existing socioeconomic conditions and conditions with each alternative were evaluated based upon data from the City, Puget Sound Regional Council (PSRC), and the United States Census. A regional economic analysis was conducted to evaluate the effects of the alternatives on the distribution of regional economic activity in the area where the alternative will have significant income and employment effects. Regional economic effects considered in this analysis are quantified using the IMPLAN (IMpact Analysis for PLANning) model, a regional economic model that is based on the principles of input-output (I-O) analysis. The IMPLAN analysis uses four main metrics to measure economic impacts: industry output, value added, labor income and employment. Industry output refers to the value of goods and services produced in a region. Value added consists of four components: employee compensation, proprietor income, other property income, and indirect business tax. Labor income represents the sum of employee compensation and proprietor income. Lastly, employment is measured by the number of full- and part time jobs combined, or full-time equivalents (FTEs).

Positional impacts to waterfront businesses were determined by coordinating with the City and other public agencies. In addition, existing data sources have been supplemented by conducting a survey of waterfront businesses that was conducted in the fall of 2010.

For the purposes of this analysis, the focus is on value added, which represents regional income and employment. The primary input variable for I-O analysis is the dollar change in purchases of products or services for final use, the "final demand." The primary output variables are predicted changes in direct, indirect, and induced economic output, employment, and income for the affected industries within a study area. This analysis will present total effect (sum of direct, indirect, and induced). See Appendix A for a more detailed definition of direct, indirect, and induced effects.

Economic modeling of impacts during construction included a construction schedule assumption where an additional construction season was assumed for each alternative. Therefore, reported impacts

represent an upper bound, and would not be expected to exceed the modeled estimates under the current construction schedule.

2.2.1 Employment Impacts

The affected environment discussion is based on an update of material initially prepared for the *Existing Conditions Report, Alaskan Way Seawall Replacement Project Feasibility Study* (USACE 2008). The updating process included collecting current employment and personal income data from the United States Census, PSRC and other data sources. The local economy was characterized using PSRC Forecast Analysis Zones data, 2010 United States Census Bureau data, and United States Bureau of Labor Statistics (BLS) data. Employment levels and earnings are a measure of the local economy as a whole and can be a good indicator of the economic stability of the project area and region. Both temporary and permanent employment impacts that result from the construction and operation of the project are discussed and quantified estimates are presented as modeled using IMPLAN.

2.2.2 Tax and Other Local Government Revenue Impacts

Revenues that may be affected include sales and use taxes generated as a result of construction, local business and occupation taxes. Additionally, parking revenue generated during and after project construction is discussed. The IMPLAN model was applied to develop estimate of impacts to employee, household, and business taxes. Effects of the alternatives on parking revenue were developed external to the IMPLAN model.

2.2.3 Adverse Impacts during Construction

Effects on businesses are evaluated within the four-county regional economic impact area. There are a number of factors that can affect the revenue of local businesses. These factors include both construction impacts (e.g., noise, traffic, detour routes, freight movements both local and through, temporary impacts to business access, both vehicular and non-motorized) and operational impacts (e.g., congestion and permanent changes to business access) of the proposed project. These potential project impacts are evaluated using both a qualitative assessment of the study area (including input from the businesses in the study area) with and without the project, as well as a quantitative assessment using IMPLAN economic modeling and the detailed traffic modeling scenarios provided by the traffic team's engineers. Individual losses to the directly impacted businesses in the study area may exceed the regional average, especially during peak construction periods. However, because some of this localized effect may be absorbed by transfers to other businesses within the regional economy, the analysis is concerned with the total effect on the four-county regional economy.

2.2.4 Beneficial Impacts from Construction Expenditures

The analysis measures net impacts that are the result of new money entering the four-county regional economy. The proportion of new money to total construction cost is assumed to be fixed (equal percentage across all alternatives). The amount of new money spent locally in the four-county regional economic impact area was determined using default IMPLAN adjustments. The net influx of new money into the regional economy thus depends on the total cost of each Build Alternative. All other funding

sources are coming from within either the state or the Puget Sound Region and would likely be spent in the local economy, even in the absence of this project.

Construction spending expenditures can have a very beneficial effect on the regional economy. These beneficial impacts can come in the form of spending by construction workers during construction itself, the purchase of goods by the construction companies and by the increased purchasing power of those that are employed because of the construction of the project. The benefits and effects on regional activity are estimated using the IMPLAN I-O model. Input-Output analyses use four main metrics to measure economic impacts: industry output, value added, labor income, and employment. Industry output refers to the value of goods and services produced in a region.

2.2.5 Indirect Impacts

Indirect or secondary impacts are based on an analysis of changes in the local and regional economy that may occur later in time or further removed in distance as a result of this project. Elements considered include employment, tax revenues, localized business impacts including loss of revenue to businesses during construction, construction spending, and regional economic development. Temporary jobs created during construction based upon estimates from the IMPLAN model are discussed.

2.2.6 Mitigation Measures

Mitigation measures are proposed for unavoidable direct and indirect adverse economic impacts related to the project, including disturbances during construction (e.g., traffic impacts on local businesses that may affect revenues and/or employment). The goal of this mitigation is to sustain local businesses to the extent possible when access to businesses in the study areas is affected by construction activities. Mitigation for displacement and relocation will be consistent with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970, as amended. Best Management Practices (BMPs) are among the mitigation measures that are considered for potential economic impacts to businesses adjacent to the project caused by construction.

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CHAPTER 3. COORDINATION AND INFORMATION SOURCES

3.1 COORDINATION

Ongoing coordination with the City and USACE occurred during preparation of this discipline report. Additionally, a review of the Alaskan Way Viaduct Project Supplemental Draft EIS (FHWA et al. 2010) was conducted to determine the types of issues of concern related to local and regional economies. Field visits were conducted to confirm existing economic conditions and the team also obtained the latest information for incorporation into the discipline report from a wide variety of sources.

3.2 INFORMATION SOURCES

Existing data sources have been supplemented by conducting a survey of waterfront businesses. In general, existing information and data were collected from a variety of federal, state, and local sources, as follows:

- Alaskan Way Viaduct and Seawall Replacement Project Economics Technical Memoranda (2004, 2006, 2010);
- City of Seattle Office of Economic Development, Department of Licensing, Strategic Planning Office, and Department of Planning and Development;
- King County Assessor's Office;
- Port of Seattle;
- Puget Sound Regional Council;
- United States Army Corps of Engineers 2008 Existing Conditions Report and other Technical Memoranda;
- United States Bureau of Economic Analysis (BEA);
- United States Bureau of Labor Statistics (BLS);
- United States Census Bureau;
- Uniform Relocation Act as amended (Public Law 91-646 [if there are permanent or temporary relocations]);
- Washington State Department of Revenue;
- Washington State Employment Security Department, Labor Market and Economic Analysis Branch;
- Washington State Ferries (WSF); and
- Washington State Offices of Financial Management and Trade and Economic Development.

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CHAPTER 4. AFFECTED ENVIRONMENT

For the purposes of the Economics Discipline Report, the study area is delineated based on neighborhood planning areas and census tracts, but generally focused between S. Jackson Street on the south, Broad Street on the north, First Avenue on the east, and Elliott Bay on the west. Indirect effects are described for a broader area, such as the City of Seattle, King County, and the Central Puget Sound Region.

4.1 GENERAL ROLE OF THE LOCAL ECONOMY

The greater Seattle area and King County host a large and diverse economy. King County and its 39 cities are the center of the Puget Sound economy and home to 50 percent of the region's population, 60 percent of its workforce, and 70 percent of its economic output. King County plays a critical role in the future economic well-being of both the region and the State of Washington as the business and population center of the Pacific Northwest. King County is the epicenter for industry sectors that provide stability and improve job growth, such as information technology, clean technology, biotechnology (life sciences), logistics and international trade, aerospace, and services and tourism.

According to the 2010 United States Census, King County had the largest county population in the state (1,931,249 residents, an 11 percent increase from 2000), and it also had the largest number of businesses, with a total of 58,122 in 2009 (King County 2011). King County's population is increasing at a steady rate; its residents represent nearly 29 percent of Washington State's total population (U.S. Census Bureau 2011). The population of King County has increased substantially since 1990, especially in the mid-late 1990s. Despite the increasing cost of living in King County, the high-tech job boom has attracted a particularly well educated workforce into the area. Seattle has a higher percentage of residents with bachelor's degrees than anywhere else in the nation (Enterprise Seattle 2006).

While the County's economy thrived in the late 1990s, the start of the next decade saw significant job losses. The 2001 national recession affected King County more drastically than other regions of the country; the local economy lost jobs steadily from 2001 through 2003. The job market in King County began creating jobs again in 2004 but did not reach pre-recession employment levels until mid-2006. The recession in the late-2000s—or the "Great Recession"—was a severe global economic recession that began in December 2007 and ended in June 2009, and this affected the Puget Sound Region along with the rest of the country.

The Seattle/Tacoma/Bellevue mean annual wage for all occupations in May 2009 was $51,850, which was higher than the state mean annual wage of $47,770 (BLS 2011).

The largest employers in King County include Amazon, Boeing, University of Washington, Metro-King County Government, United States Postal Service, Microsoft, Group Health Cooperative, City of Seattle, Swedish Health Services, Providence Health System, Starbucks, and Seattle School District No. 1.

The Downtown Seattle Association highlights the following economic indicators for Seattle (2010):

- There were 244,759 employees in Center City Seattle in 2008, which represents 49 percent of all employees in Seattle and 21 percent of those in King County.
- In Center City Seattle, an estimated $1. 4 billion in development projects were completed in 2009 and as of 2010, another $1.9 billion were under construction.
- With 57,730 estimated residents in 2009, the Center City population has grown by 68 percent since 1990 compared to 17 percent growth citywide during the same period.
- Many of the region's largest public facilities are located in the city center area: CenturyLinkField, Safeco Field, Seattle Center, Key Arena, Seattle Art Museum, Olympic Sculpture Park, Experience Music Project and Science Fiction Museum, Benaroya Hall, 5th Avenue Theatre, Paramount Theatre, McCaw Hall, Washington State Convention and Trade Center, and the Seattle Central Public Library.
- The cruise industry was responsible for 3,781 jobs in the region, $312.5 million in business revenue, and $16.1 million in state and local taxes in 2009.
- In May of 2009, the Port of Seattle dedicated a new container facility at Terminal 30. Since 2005, cargo tonnage through the Port of Seattle has increased by more than 10 percent, with nearly 23 million metric tons of cargo passing through in 2010 (Port of Seattle 2011).

4.1.1 Employment

4.1.1.1 Employment by Industry

To characterize employment in the project area requires an examination of recent economic data (PSRC 2011) from the four-county project region (King, Pierce, Kitsap, and Snohomish counties), King County, the City of Seattle and the Seattle Commercial Core within which the study area is located. The regional economy is diverse with an emphasis on service industries, although employment derived from retail trade and government/education sectors also plays major role (FHWA et al. 2004). Relevant regional/local employment data from 2000 to 2040 (forecast) is presented in Table 4-1.

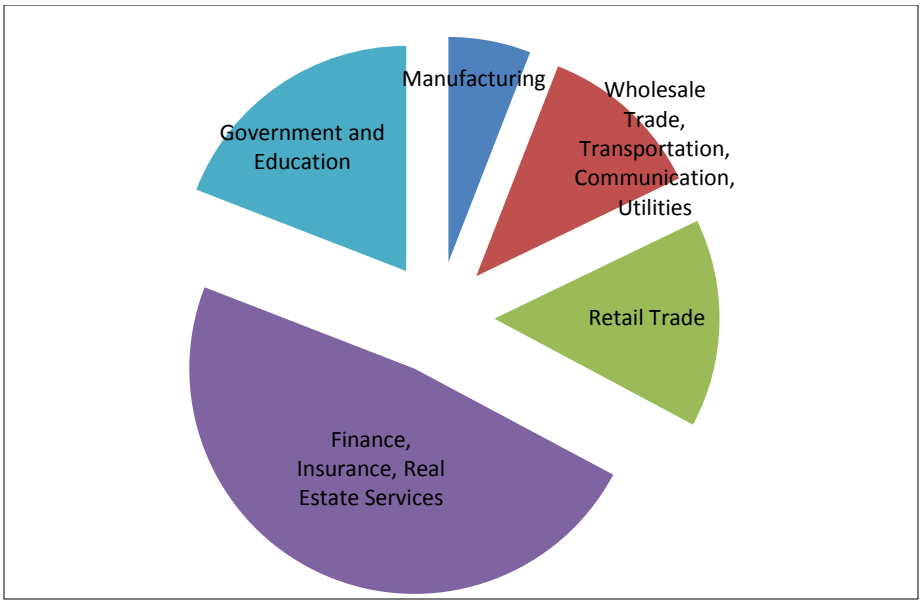
The Seattle metropolitan statistical area (MSA) accounts for 1.93 million jobs and has an estimated gross metropolitan product of $218.77 billion. The largest employer in the city proper is the University of Washington, with 28,188 faculty and staff and 43,504 students. The University has annual revenue of $3.7 billion and annual research funding of $1.2 billion (City of Seattle 2011a).

The number of jobs in the region has increased by 11 percent in the last decade to a total of 1.9 million in 2010. "Finance and Insurance and Real Estate Services" represents the largest share of employment for the City of Seattle, King County, and the region (48, 45, and 41 percent, respectively) and are expected to increase in the coming decades. "Wholesale Trade, Transportation, Communication, and Utilities" on the other hand are expected to decrease in the future. The breakdown of employment by industry in the Seattle area in 2010 is illustrated in Figure 4.1.

TABLE 4-1. ACTUAL AND FORECASTED EMPLOYMENT BY AREA

	2000 (actual)	2010 (actual)	2020 (estimated)	2030 (estimated)	2040 (estimated)
Total Employment					
Seattle	528,569	580,713	653,514	708,348	762,395
King County	1,188,760	1,311,186	1,498,043	1,664,780	1,830,535
Region	1,745,430	1,934,713	2,224,597	2,497,678	2,789,293
Manufacturing (%)					
Seattle	8	6	5	4	4
King County	13	10	8	7	6
Region	14	11	10	8	8
Wholesale Trade, Transportation, Communication, Utilities (%)					
Seattle	13	12	11	11	10
King County	15	14	13	13	12
Region	12	12	12	11	11
Retail Trade					
Seattle	16	15	15	15	15
King County	18	17	17	17	16
Region	19	18	18	18	17
Finance, Insurance, Real Estate Services (%)					
Seattle	46	48	50	52	54
King County	40	45	49	52	54
Region	37	41	44	47	49
Government and Education (%)					
Seattle	17	19	18	18	17
King County	14	14	13	12	11
Region	17	17	16	15	14

Note: Total employment does not include resources (agriculture, forestry, fishing, and mining) or construction employment.
Source: PSRC 2011.



Source: PSRC 2011.

Figure 4-1. 2010 Breakdown of Employment by Industry in the Seattle Area

4.1.1.2 Unemployment

Unemployment rates within King County have consistently been lower than the United States average since January 2003, as shown in Figure 4-2. The latest data available show that in January 2012, the unemployment rate was 7.5 percent in King County as compared to 9.0 percent in the State of Washington and 8.8 percent in the entire nation.

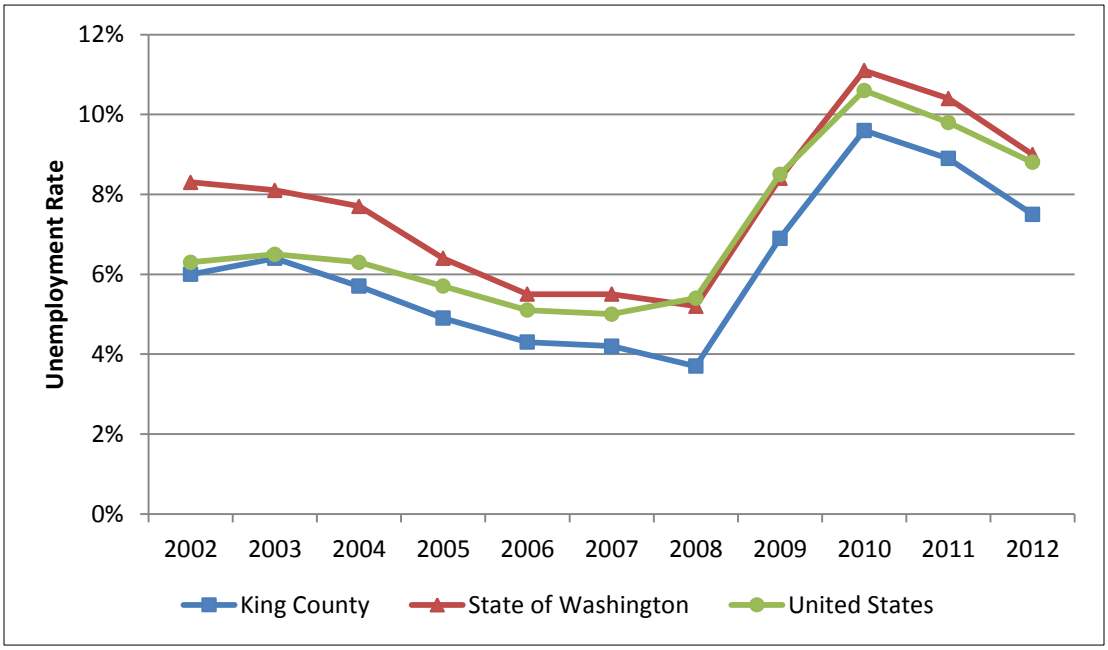


Figure 4-2. 2012 Unemployment Rates in Seattle, King County, and the United States

4.1.2 Local Government Revenues

Washington State and the City of Seattle rely on a variety of taxes to fund state and local government programs. These taxes include a combined state and local sales and use tax, a business and occupation tax, public utility tax, property tax, and several other excise, real estate, and estate taxes. Following are the four main sources of revenue supporting the services and programs provided by the City:

- Taxes, license fees, and fines support activities typically associated with City government, such as police and fire services, parks, and libraries;
- Fees for services, regulatory fees, or dedicated property tax levies partially or completely support certain City operations, including the Seattle Center, several parks and recreational facilities, and building inspections;
- Grant revenues from private, state, or federal agencies support a variety of City services, including social services, street and bridge repair, and targeted police services; and
- Charges to customers for utility services (e.g., electricity, water, drainage and wastewater, and solid waste).

Within King County, taxes account for the bulk of general fund revenues, supporting about two-thirds of general fund services. Sales tax is the second largest source of general fund tax revenue (behind property taxes). King County collects a one percent general local option sales tax in the unincorporated areas and a tax of 0.15 percent inside cities. The 0.10 percent criminal justice sales tax (expended only for criminal justice purposes as defined by Ch. 4.28.017 of King County Code) is also part of the General Fund. This revenue is shared with cities, allocated on the basis of population. The County also receives revenue from the cable franchise fee and gambling and liquor taxes. The King County Food and Beverage tax is collected in addition to the state and local retail sales tax at restaurants, taverns, and bars.

4.1.2.1 Sales and Use Tax

A combined state and local retail sales tax is collected on the selling price of tangible personal property. A use tax is assessed on the market value of using tangible personal property and services for which the sales tax does not apply. The retail sales and use tax applies to most items purchased by consumers but does not apply to food items or prescription drugs. Utility services and most personal services (e.g., medical, dental, legal, barber) and real estate are not subject to these taxes. However, construction services and building materials are subject to the retail sales tax.

The amount of retail sales and use tax varies by locality; the combined state and local tax rate for the project area is 9.5 percent. The combined sales tax is a total of local and state sales tax including the 6.5 percent state rate, the local rate, and Regional Transit Authority (RTA) rate. The rate was increased from 9.0 percent on April 1, 2009, following voter approval of a 0.5 percent rate increase to pay for an expansion of the region's Sound Transit light rail system. The vote increased the sales tax rate for Sound Transit from 0.4 percent to 0.9 percent. The basic sales tax rate of 9.5 percent is a composite of separate rates for several jurisdictions. The City of Seattle's portion of the overall rate is 0.85 percent. In addition, Seattle receives a share of the revenue collected by the King County Criminal Justice Levy.

4.1.2.2 Business and Occupation Tax and Public Utility Tax Revenues

Almost all businesses located or doing business in Washington are subject to the state Business and Occupation (B&O) tax, including:

- Corporations,
- Limited liability companies (LLCs),
- Partnerships,
- Sole proprietors, and
- Nonprofit organizations.

The City levies the gross receipts portion of the B&O tax at different rates on different types of business activity. Most business activity, including manufacturing, retailing, wholesaling, and printing and publishing, is subject to a tax of 0.215 percent on gross receipts. Services and transporting freight for hire are taxed at a rate of 0.415 percent. The square footage business tax also has two tax rates. For 2012, the rate for business floor space, which includes office, retail, and production space, was 42 cents per square foot per quarter. Other floor space, which includes warehouse, dining, and exercise space, is taxed at a rate of 14 cents per square foot per quarter. The floor area tax rates are adjusted annually for inflation.

Prior to January 1, 2008, the B&O tax was levied by the City on the gross receipts of most business activity occurring in Seattle. Under some conditions, gross receipts of Seattle businesses were excluded from the tax if the receipts were earned from providing products or services outside of Seattle. On January 1, 2008, new state mandated procedures for the allocation and apportionment of B&O income took effect. The City also implemented a square footage business tax that taxed a portion of the floor area of businesses that received a tax reduction as a result of the new allocation and apportionment procedures. The new tax was structured so that no business would pay more under the new combined gross receipts and square footage business tax than it did under the pre-2008 gross receipts B&O tax. B&O revenue grew rapidly from 2005 to 2007, and then succumbed to the recession in 2008. The recession began in December 2007 and ended June 28, 2009, and it affected the Puget Sound Region along with the rest of the country.

4.1.2.3 Property Tax Revenues

Real and personal property is subject to property tax. Real property includes land and any improvements, such as buildings, attached to the land. The primary characteristic of personal property is mobility. Examples of personal property are machinery, equipment, supplies, and furniture. Personal property tax typically applies to personal property used when conducting business (FHWA et al. 2010).

Total property tax collections increased countywide by 6.16 percent in 2009 and by 1.18 percent in 2010. In 2010, the total property tax rate from all jurisdictions paid by Seattle property owners increased to $9.04 per thousand dollars of Assessed Value (AV). In 2011, the rate increased to $9.65 per thousand dollars of AV. For an owner of a home with an AV of $453,300 (the average AV for residences in Seattle), the 2011 tax obligation was approximately $4,380. The City of Seattle's total 2011 tax rate

was roughly one-third of the total rate at $3.06, which equals an annual tax obligation of approximately $1,387 for the average valued home (City of Seattle 2011b).

The total value of property in King County continued to decline for the 2012 tax roll. The total assessed value of property in King County is $319.5 billion for 2012 taxing purposes (2011 assessment), down from the $330.4 billion for 2011 taxing purposes (2010 assessment) (King County 2012). Total aggregate property tax collections in King County are up 1.71 percent in 2012, primarily driven by voter-approved levies. Total property tax collections for all purposes in King County will total $3.6 billion in 2012.

4.1.2.4 Other Taxes and User Fees

Various other taxes are assessed at the state and local levels, including excise taxes on hotels and motels, admission to entertainment and recreation events, food and beverages, fuel, cigarettes, tobacco products, liquor, timber, rental cars, and other products and services. In Seattle, a Convention and Trade Center tax (seven percent) is levied on all lodging establishments with 60 or more rooms/spaces. This tax is also levied in Bellevue and elsewhere in King County with varying tax rates.

Other local excise taxes include municipal business taxes and licenses. The sale of most real property is subject to a real estate tax that is paid by the seller. Other taxes levied by the state or local municipalities include an estate and transfer tax, vehicle licensing fee, and watercraft excise tax. No personal income tax is levied in the State of Washington.

4.1.2.5 Revenues from On-Street Parking and Public Garages

Revenues from on-street parking are deposited into the City's General Fund. These revenues are designated as "fees to cover the cost of installation, inspection, supervision, regulation, and maintenance involved in the control of traffic and parking upon the streets" (SMC 11.16.480). SMC 11.16.300 also grants authority to the City's Traffic Engineer to "Establish areas where parking is regulated by parking payment devices, and the time limit for parking therein; order installation or removal of parking payment devices where it is determined upon the basis of an engineering and traffic investigation that the installation or removal of such devices is necessary to aid in the regulation, control, and inspection of the parking of vehicles; and designate the parking space or spaces for which a parking payment device is to be used by signs or appropriate markings upon the pavement and/or the curb." The code was updated in January 2004 to accommodate parking pay stations and to allow for their installation and maintenance.

Beginning in April 2004, the City began replacing approximately 9,000 single-space parking meters with multi-space parking pay stations. By the end of 2007, approximately 1,900 pay stations controlling 13,500 paid parking spaces were installed (FHWA et al. 2010). One or two pay stations are intended to replace a block's worth of single-space parking meters. The pay stations allow users to pay with currency, credit card, or debit card. In addition, as part of the City's 2004 budget, the City Council approved a meter rate increase from $1.00 to $1.50 per hour for pay stations and electronic meters. This was the first increase in on-street parking rates in more than 10 years (FHWA et al. 2010).

Because of the increase in hourly rates, as well as changes in the behavior of motorists, the City has realized a substantial increase in revenue per parking space per year. Based on the pay stations

currently in operation along the waterfront, each parking space generates approximately $2,574 per year ($8.58 per day; estimated 300 days per year) in revenue for the City's general fund.

Paid parking within the Seattle Commercial Core accounts for 30 percent of the City's total annual parking revenue. Paid parking in the Center City (downtown, Uptown, South Lake Union, Capitol Hill, and First Hill) represents 48 percent of the City's total parking revenue (FHWA et al. 2010). The percentages have dropped over the years as the City has added paid parking in neighborhoods outside of downtown, including South Lake Union and the University District.

The 2011 SDOT Adopted Budget made two significant policy and budget changes to the original, proposed budget. The changes are based on a premise that the City should implement a parking-meter rate structure that provides variable rates informed by observed occupancy rates to achieve one or two open parking spaces per block face throughout the day. The rate for parking downtown would increase from $2.50 per hour to $4.00 per hour, while the rate in other parts of the City would increase by $0.50 per hour. The maximum rate is $4.00 per hour with a minimum charge of $0.75 per hour. Revenue from on-street parking is projected to increase as the City embarks on a program to set the price of parking more flexibly across different parts of the city to help achieve parking management goals (City of Seattle 2011b).

The City collects an annual license fee from operators of public garages. Public garages include both buildings and surface lots (SMC 6.48). The annual license fee is $90 per 1,000 square feet of floor or ground space contained in a parking garage or lot and used for parking or storage purposes (FHWA et al. 2010). However, per recently passed City Ordinance #122192 (see below), the annual license fee has become $6.00 per 1,000 square feet of floor or ground space contained in a parking garage or lot and used for parking or storage purposes, effective July 1, 2007.

In August 2006, the City passed an ordinance that amended the municipal code (SMC 5.35.030) to impose "a tax for the act or privilege of parking a motor vehicle in a commercial lot within the City that is operated by a commercial parking business" (FHWA et al. 2010). The purpose of this tax is to "provide an equitable means of generating revenue to support the City's transportation system, and to reduce the existing Public Garage and Parking Lot License Fee (see above) that is currently imposed by SMC Chapter 6.48" (FHWA et al. 2010). Effective July 1, 2009, the tax rate was 10 percent (SMC 5.35.030). These taxes are collected by commercial parking businesses from the parking customer at the time payment is made. The City also receives sales and B&O tax revenue from off-street parking. The sales tax rate is 9.5 percent and the B&O rate for parking is 0.215 percent (City of Seattle 2011b).

4.1.3 Parking Inventory

The study area contains a variety of different types of parking supply, which include on-street spaces, private off-street surface lots, structured parking, and a linear lot running under the Alaskan Way Viaduct (AWV). On-street parking time limits vary from loading spaces with 3-, 15-, and 30-minute limits to longer term spaces with two-hour limits. South of Jackson Street, there are parking spaces with no time limits. All parking spaces under the AWV are short-term parking using pay stations. The users of off-street surface lots are required to pay. The hourly rates and time limits are posted at these lots.

In August 2010, the project team conducted an inventory of parking supply and utilization in the study area. This inventory occurred on both a Thursday and a Saturday and covered an area bounded by Broad Street (north), Alaskan Way (west), First Avenue/Occidental Avenue (east), and S. King Street (south). In total, the team counted 2,557 spaces in this area, which included all types of parking inventory, except for those in private parking structures.

The on-street parking inventory includes 215 spaces on Alaskan Way, 429 spaces on other north/south streets, and 213 spaces on east/west cross streets. Off-street parking includes 377 parking spaces under the viaduct, and 1,323 in private surface lots. It should be noted that construction of the south portal of the Alaskan Way Viaduct bored tunnel has resulted in a temporary reduction of on-street parking spaces along Alaskan Way and under the viaduct. For purposes of the economic analysis, this temporary reduction due to this other project is not reflected as an "existing condition." Thus, temporary parking losses due to the EBSP are based on the 2010 inventory and represent a worst case scenario.

As directed by City Council, SDOT completed a citywide data collection effort in November 2010 encompassing all neighborhoods with paid parking. Out of the approximately 13,500 paid parking spaces in the city, almost 60 percent, or 7,800 spaces, were included in the study. Results provide a reasonably accurate representation of how on-street paid parking is currently being utilized.

Recent studies in other cities have found that vehicles circling for low-priced on-street parking in areas of high parking demand can account for up to 30 percent of all traffic. This limits access to businesses, affects mobility, and increases vehicle emissions. Parking that is more effectively priced is still well-utilized yet allows customers and visitors to find a space near their destination (SDOT 2011b).

As a result of this study, SDOT changed neighborhood parking rates starting in February 2011. The new rates align with policy direction provided during the 2011 budget process, which is to use a data driven process to set rates in a way that makes an average of one to two spaces available per block.

Seattle's center city and many neighborhood business districts are active destinations for customers and visitors well into the evening. Charging in the evening is anticipated to enhance parking turnover and access in areas with an active nightlife and other evening businesses. Extended paid parking until 8:00 p.m. has been implemented in the Commercial Core, Belltown, Pioneer Square, Chinatown/International District, Broadway, Pike-Pine, Uptown and the University District (SDOT 2011c).

4.1.4 Ferry and Cruise Ship Facilities

Ferry and cruise ship activity at the Port of Seattle contributes to the regional economy by generating business revenue to companies providing vessel and passenger services. These companies, in turn, provide employment and income to individuals and pay taxes to state and local governments. Port-of-call passengers support the local Seattle economy by visiting local attractions.

Five different locations within the project area are used for ferry and cruise ship operations:

- Pier 50. The passenger-only ferry operation at Pier 50 is served by the King County Water Taxi (year-round service to Vashon Island and seasonal service to West Seattle) and the SoundRunner to Kingston. The pier is owned by Washington State Ferries; ferry service is operated by King County and the Port of Kingston.
- Pier 52 Colman Dock Ferry Terminal (801 Alaskan Way). This terminal is owned by the Washington State Department of Transportation and is located in the southern portion of the project area. It provides ferry service to and from the Seattle CBD to Bainbridge Island and Bremerton. Vehicles queue up for ferries, load on, and disembark on Pier 52. Space for vehicles waiting to board the ferry and parking for WSF employees is currently provided at the terminal.
- Pier 55. Access to Blake Island State Park is provided by regular boat services from Pier 55. Blake Island is located in Puget Sound about five miles from the Seattle waterfront. Blake Island State Park is 475 acres in size, with five miles of saltwater beach shoreline. It provides 15 miles of day use trails, 51 individual campsites, and a group camping area in addition to Tillicum Village. The park is reachable only by tour boat or private boat. Most members of the public access the island by regular boat service from Pier 55 to Tillicum Village provided by Argosy Cruise Line.
- Pier 66/Bell Street Cruise Terminal (2225 Alaskan Way). This facility is owned by the Port of Seattle and operated by Cruise Terminals of America. It provides berths for Norwegian Cruise Line and Celebrity Cruises. On-pier parking is not available for users of the facility; parking is currently available across from the terminal at the Bell Street Pier Garage, between Alaskan Way and Western Avenue. At the Bell Street Cruise Terminal, the covered parking garage is located directly across the street from the cruise terminal. The garage offers 1700 secure spaces linked to the terminal by a pedestrian bridge. In 2011, the Port of Seattle hosted a total of 885,949 cruise ship passengers and 196 cruise ship vessel calls and they estimate they will host approximately 864,330 passengers and 202 vessels in 2012, with the cruise terminal at Pier 66 scheduled for 58 vessel calls from May through September (Port of Seattle 2012).
- Pier 69 (2700 Alaskan Way). This facility, located at the north end of the study area, is owned by the Port of Seattle and is home to the Victoria Clipper, a high-speed, passenger-only ferry service operating between Seattle and Victoria, B.C. The facility also provides berthing to several small cruise vessels specializing in local sightseeing and expeditions to Alaska. Pier 69 is also the headquarters for the Port of Seattle.

4.2 INVENTORY OF EXISTING BUSINESSES

In 2005–2006, the Alaskan Way Viaduct and Seawall Replacement Program (AWVSRP; led by WSDOT) conducted interviews with a subset of business owners along the waterfront to gather information about their operations. In order to update this information for the EBSP, a business and recreation operations survey was conducted by the project's public outreach staff in 2010. The 2005–2006 information (not updated) is presented first, followed by findings from the recently completed 2010 study conducted as part of the EBSP (see the *Elliott Bay Seawall Project Summary of Business and Recreation Survey* [SDOT 2011d] for more detailed results).

4.2.1 2005–2006 Study

In 2005—2006, the AWVSRP conducted interviews with a subset of business owners along the waterfront to gather information about their operations. Targeted outreach involved three areas in the program vicinity:

- Waterfront Piers (approximately 195 businesses, interviewed 12);
- East side of Alaskan Way (approximately 250 total businesses, interviewed 28); and
- Colman Dock (all four businesses were interviewed).

These surveys identified that businesses want to retain their appeal as waterfront destinations for customers, especially during the busiest summer months. Overall themes heard from businesses during the 2006 outreach were:

- Knowledge of the project: business owners did not feel well-informed;
- Operation and deliveries: the location of the businesses is an integral part to their success. Most of the business is seasonal, with deliveries increasing during the summer months; and
- Employees and customers: another seasonal aspect of the businesses is the number of employees and customers.

4.2.2 2010 Study Highlights

It had been several years since the businesses near the water had been specifically engaged in the project to replace the seawall or waterfront construction, and the survey presented a unique opportunity to update the City's understanding about the unique needs and interests of this community. The survey built upon previous interactions, outlined in the previous section, and targeted businesses within the specific project boundaries.

The Seattle waterfront is an eclectic mix of operations: tourist, traditional office, residential, restaurant, retail, transportation hubs, and shipping, to name a few. Keeping this variety of business and residential activities vibrant during construction is an overall goal for the EBSP. To that end, understanding existing operations of these properties will help establish potential construction techniques and systems. To gather this information, a business and recreation operations survey was conducted by the project's public outreach staff. Some 480 locations, from King Street to Broad Street, on Alaskan Way and Western and Elliott Avenues were contacted for participation from September through November 2010. The study involved meeting with people face to face at their place of business if possible. The following themes summarize some of the pertinent 2010 survey results.

4.2.2.1 Concern for Construction Timing

Over 50 percent of respondents asked about the timeline for construction. People want to know when construction activity will start and what to expect. They also want to know during what seasons construction will occur. Businesses along the waterfront thrive during the summer season, and they make most of their profits during a few months of the year. On average, those months are May – September. For locations that are not on the waterfront, the busy season varies throughout the year;

they would be impacted by construction at any time. There are also many 24-hour businesses throughout the project area where the timing of construction could affect their operations. The highest density of 24-hour locations is in Zones 5 and 6.

As expected, a majority of the waterfront businesses are busiest between May and September. Business owners asked the project team to try and keep any impacts to the waterfront minimal during this time. Although the details of specific construction activities will not be determined until a later date, businesses are very interested in this information and would like to know as soon as possible.

4.2.2.2 Business Disruption Lead Time

Similar to the construction timeline, businesses want to know specifically when there will be construction nearby so they can alert customers, employees, and delivery truck drivers. Providing this information in advance will help businesses prepare for construction

Utility interruption was also a concern expressed by businesses. Many locations surveyed have essential utilities that need to run all the time. The mix of businesses and residential units makes any utility interruption difficult. Businesses requested that they be notified in advance of any utility interruption. Sudden interruptions at some locations could force offices and businesses to temporarily or permanently close. Electricity was the most important utility service that residents and businesses discussed in the interviews. Due to boat moorage needs, aquatic infrastructure, and the high percentage of restaurants, locations along Alaskan Way noted different essential utility needs than the locations along Western and Elliott Avenues.

Over 90 percent of respondents indicated general concerns about construction, and specifically impacts to business. Business owners expressed concern that construction will lead to fewer customers and less revenue. Noise, vibration, light, dust, and other construction impacts are of concern to business owners.

4.2.2.3 Relocation Concerns

Similar to construction impacts, there are some businesses that said they were moving soon because of all the activity they foresee from the multiple projects happening on the waterfront. Business owners either anticipate not being able to pay their rent, or they have a low number of customers already and would like to move to a different location. Most the businesses that noted issues with renewing leases were located away from the waterfront along Western and Elliott Avenues.

4.2.2.4 Maintain Access to Waterfront Businesses

Another issue that came up for many of the businesses interviewed was access. Responders said customers and tenants need to be able to access businesses, offices, and homes at all times. Most businesses in the area survive off of foot traffic in front of their stores.

Access to parking was a major concern to over 90 percent of businesses. Parking was also a concern to over 50 percent of respondents that were not located on the waterfront. Most of the businesses along Alaskan Way say their customers use the on-street parking under the viaduct, and if that parking is removed businesses owners believe that they will lose customers. Businesses noted that they perceive that customers are usually not from the area so trying to find alternate parking can be difficult.

Businesses reported that many of their customers are older than 65 years old and come down to the waterfront to shop. Businesses along the waterfront expressed concern for how the elderly and people with disabilities will be able to maneuver in the area during construction. This concern was specific to the waterfront piers and cruise ship terminals.

Most of the businesses also voiced concerns about issues with public transportation. If the parking is removed underneath the existing viaduct, business owners felt that an alternative is needed so people do not have to drive to shops, restaurants, and offices located near the waterfront. Respondents also were concerned that the spatial disconnect between downtown and the waterfront will be a greater challenge than it already is once construction of the seawall begins.

Similar to customer access, access for employees and deliveries is of similar concern. Maintaining areas for entrance to buildings, residential spaces, and offices are important. Maintaining enough space for deliveries and large trucks was another concern shared by all respondents.

4.2.2.5 Let People Know Businesses Are Open

An overwhelming amount of respondents said that it is very important to market the waterfront as a place to visit and shop during construction. Many places said it is important to tell the "right story" about the project while also keeping the waterfront as an inviting place where people can still visit.

Businesses offered a variety of possible tools for reaching out to the public and customers during construction. Suggestions included advertising in local media and on the web, while others suggested tapping into the resources at the Seattle Chamber of Commerce and the Downtown Seattle Association.

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CHAPTER 5. CONSTRUCTION EFFECTS AND MITIGATION

5.1 DIRECT EFFECTS

Significant beneficial and adverse regional and state economic impacts will result from the construction of Build Alternatives A, B, or C. This analysis assesses the likely overall economic impacts that would be attributed to construction, as measured by increases in employment, taxes and other revenues, localized business impacts, and overall regional economic development associated with construction.

During construction of the Central Seawall, a vehicular detour would be provided east of the existing surface street, with three lanes (one northbound, one southbound, and one emergency/turn lane) under the existing viaduct, and a fourth lane just west of the viaduct structure for ferry access. During this period, parking would be removed from under the viaduct and would not return until completion of the Central Seawall. The existing Waterfront Streetcar tracks would be removed. Pedestrian access to the waterfront piers would be provided throughout the construction period. When work is occurring directly in front of a given pier, there may be temporary access restrictions.

Construction of the North Seawall is constrained by a narrower ROW than the Central Seawall, resulting in a slower construction process in order keep three lanes of traffic moving. The existing Waterfront Streetcar tracks would be removed in order to provide sufficient ROW for the three lanes, the waterfront multi-use trail and a sidewalk on the west side. Preliminary schedules and sequencing assume construction beginning at Broad Street and moving south toward Virginia. The option remains that construction could begin at Virginia Street and move north, taking approximately the same amount of time.

The impacts of construction of all build alternatives are similar except that Alternative B has a longer construction period. The total construction duration for Alternatives A and C is expected to be four construction seasons for the North Seawall and three construction seasons for the Central Seawall. For Alternative B, the North Seawall is expected to take slightly longer than four construction seasons and the Central Seawall is expected to take five construction seasons. These timelines assume summer construction shutdown periods. There will be adverse impacts during construction, but they will be temporary in nature and are unlikely to affect the regional economy in the long term.

Economic modeling of impacts during construction included a construction schedule assumption where an additional construction season was assumed for each alternative. Therefore, reported impacts represent an upper bound, and would not be expected to exceed the modeled estimates under the current construction schedule.

5.1.1 No Action Alternative

No construction is proposed for the No Action Alternative, thus there are no anticipated effects. Refer to Section 6.1 for a discussion of operational effects and continued maintenance likely to occur for the No Action Alternative.

5.1.2 Build Alternatives

The build alternatives are discussed together because of the similar nature of the effects. The text and tables will clearly illustrate where the effects for Alternative A, B, and C differ.

5.1.2.1 Impact Categories and Periods

The IMPLAN model will output an estimate of impacts for a single year under the conditions modeled. In order to account for the temporal nature of construction and project operation, the Elliott Bay Seawall Damage Assessment Model (EBSDAM) is used to annualize damages over the period of analysis. Two impact categories were defined for analyzing construction impacts from a temporal perspective:

- Adverse Impacts during Construction: This includes adverse impacts due to fewer visitors/patrons along the waterfront during the construction period and associated decrease in local business revenue, parking revenue, tax revenue, etc. along the waterfront. This period varies in length depending on the alternative being evaluated.
- Beneficial Impacts during Construction: This includes beneficial impacts due to an influx of money into the regional economy because of construction spending and associated increases in jobs, wages, business activity, tax revenue, etc. across the four-county area. This period varies in length depending on the alternative being evaluated.

5.1.2.2 Employment

Increased employment and economic stimulation for the local economy from construction activities and supplies would be the primary economic benefit from implementing any of the three build alternatives. The employment associated with construction of any of the build alternatives will result in additional (gross) employment throughout many economic sectors within the Puget Sound Region and the State of Washington. This gross employment is derived from the multiplication effects on the capital expenditures for the project. Capital expenditures include the direct hiring of temporary construction workers, the purchase of construction materials and equipment, and the expenditure of capital funds to acquire temporary and permanent easements. Alternative B will generate the most direct, indirect, and induced jobs within the Puget Sound Region. The alternative with the lower estimated capital cost (Alternative A) will generate the fewest direct, indirect and induced jobs within the Puget Sound Region. Alternative C will fall between A and B.

Employment impacts in terms of FTEs are presented according to impact category and alternative in Table 5-1. Note that the FTEs presented in the table are the total number of FTEs gained or lost over the construction period noted in the right-hand column of the table. See Appendix A, Section A1.1.4 for more information.

For Alternative A, it was estimated that a loss of 1,104 FTEs due to adverse business impacts during construction would be offset by a gain of 5,103 FTEs due to construction spending during the construction period, for a net FTE gain of 3,999 for the period.

For Alternative B, it was estimated that a loss of 1,380 FTEs due to adverse business impacts during construction would be offset by a gain of 7,140 FTEs due to construction spending during the construction period, for a net FTE gain of 5,760 for the period.

For Alternative C, it was estimated that a loss of 1,104 FTEs due to adverse business impacts during construction would be offset by a gain of 5,386 FTEs due to construction spending during the construction period, for a net FTE gain of 4,282 for the period.

TABLE 5-1. EMPLOYMENT IMPACTS SUMMARY

Impact Category	Scenario	Employment Impact (FTEs)
Adverse Impacts During Construction	No Action	0
	Alternative A	-1,104
	Alternative B	-1,380
	Alternative C	-1,104
Beneficial Impacts During Construction	No Action	0
	Alternative A	5,103
	Alternative B	7,140
	Alternative C	5,386

5.1.2.3 State and Local Taxes

Sales taxes will be generated through the purchase of goods and materials related to construction (see Appendix A, Section A1.1.4.2 for detailed information on the estimated benefits using the IMPLAN I-O model). The project sales tax estimates are based on the construction cost estimates, which were input into IMPLAN to yield estimates of sales tax impacts. These estimates will be refined once a Preferred Alternative is selected and additional information is known regarding project design and funding. These sales tax estimates are only related to direct construction expenditures. This analysis does not include an evaluation of the change in sales tax revenue collected by businesses in the project area that potentially would be adversely affected by construction activities. The sales tax revenue will be greatest with Alternative B because it has the highest cost and will therefore generate a larger stream of sales tax revenue. Table 5-2 presents State and Local tax impacts by alternative.

TABLE 5-2. ADVERSE AND BENEFICIAL STATE AND LOCAL TAX IMPACTS DURING CONSTRUCTION

Impact Category	Scenario	State and Local Taxes ($)	
		Net Present Value	Annual
Adverse Impacts During Construction	No Action	0	0
	Alternative A	-7,508,000	-357,000
	Alternative B	-9,035,000	-430,000
	Alternative C	-7,508,000	-357,000
Beneficial Impacts During Construction	No Action	0	0
	Alternative A	13,619,000	648,000
	Alternative B	20,096,000	956,000
	Alternative C	14,365,000	-683,000

5.1.2.4 Parking Revenue

Construction will temporarily adversely affect parking supply in the study area. Effects on parking vary by alternative and are further presented for the Central Seawall and the North Seawall. Prior to the start of construction on the Alaskan Way Viaduct Replacement Project, there were 2,557 surface parking spaces in the area bounded by Broad Street (north), Alaskan Way (west), First Avenue/Occidental Avenue S. (east), and S. King Street (south). This total includes approximately 215 on-street parking spaces on Alaskan Way and 377 parking spaces under the AWV. The bulk of parking losses will occur during the construction period where parking supply will be reduced due to required staging, detours, and construction areas. The temporary roadway will remain in place during the summer construction shutdown, but parking along Alaskan Way may be restored where possible. The following estimates of parking loss do not account for the possibility of restoring some parking on Alaskan Way during summer.

Table 5-3 presents the estimated present value and annualized impact on parking revenue for each alternative.

TABLE 5-3. SUMMARY OF PARKING REVENUE IMPACTS DURING CONSTRUCTION

Impact Category	Scenario	Parking Revenue ($)	
		Net Present Value	Annual
Adverse Impacts During Construction	No Action	0	0
	Alternative A	-16,151,000	-768,000
	Alternative B	-23,114,000	-1,099,000
	Alternative C	-16,151,000	-768,000
Beneficial Impacts During Construction	No Action	0	0
	Alternative A	0	0
	Alternative B	0	0
	Alternative C	0	0

5.1.2.5 Adverse Impacts during Construction

A number of factors could have adverse impacts on local businesses. These factors include both construction impacts (e.g., noise, traffic, detour routes, freight movements both local and through, temporary impacts to business access, both vehicular and non-motorized) and operational impacts (e.g., congestion and permanent changes to business access) of the proposed project. There would significant impacts on local businesses with Build Alternative A, B, or C, but the impacts would be greater for Alternative B because the construction period is expected to be longer.

Any major construction project, public or private, has the potential of disturbing the residents, businesses, and business customers adjacent to the construction. As a result of the inventory of existing businesses within one block of the existing alignment and proposed detour route, the design team has identified 480 businesses adjacent to the construction project that could be disrupted. These temporary effects include:

- Presence of construction workers and materials;
- Temporary road closures, traffic diversions, and alterations to property access (see Transportation Discipline Report [SDOT 2012a]);
- Loss of parking, especially on-street short term parking;
- Airborne dust (see Air Quality Discipline Report [SDOT 2012b]);
- Noise and vibrations from construction equipment and vehicles (see Noise and Vibration Discipline Report [SDOT 2012c]); and
- Loss of visibility of businesses to their customers.

People traveling to and from ferries may experience delays if they are driving due to reduced lanes. Pedestrian access to Alaskan Way and the piers may be rerouted at times; however, pedestrian access to and from the Colman Dock Ferry Terminal will always be maintained throughout construction. When construction work is occurring immediately adjacent to a specific pier, there may be temporary access restrictions during construction, but pedestrian access to the waterfront piers would be provided throughout the construction period.

The existing sidewalks along the west side of Alaskan Way would be replaced. The multi-use trail would be extended two blocks to Broad Street, connecting to the trail in the Olympic Sculpture Park and then on to Myrtle Edwards Park, providing continuous pedestrian and bicycle access along the waterfront to mitigate impacts to local businesses by keeping access available.

As construction progresses, parking spaces will be lost, but others may be recovered where possible.

The project is being designed to allow unfettered access to docks and piers by ferries, boats and other water-borne vehicles, both during construction and upon project completion. Without proper planning and implementation of controls, these construction-related effects could adversely affect the flow of customers, employees, and materials and supplies to and from businesses. Construction impact controls will be integrated into the Project Management Plan and the project's contract specifications.

The RED analysis assumes a net loss to the four-county regional economic impact area of 15 percent over the life of the project to retail businesses. Individual losses to the directly impacted businesses in the study area may exceed this percentage, especially during peak construction periods. However, because some of this localized effect may be absorbed by transfers to other businesses within the regional economy, the analysis is concerned with the total effect on the four-county regional economy. For example, if a restaurant directly impacted by construction has its customer spending transferred to other restaurants within the four-county impact area the impact of construction is negated by this transfer within the region. Table 5-4 presents the adverse effects on the regional resulting from a 15 percent loss of revenue at the business inventory along the waterfront directly affected by construction.

TABLE 5-4. SUMMARY OF ADVERSE IMPACTS DURING CONSTRUCTION

Impact Category	Scenario	Value Added ($)	
		Net Present Value	Annual
Adverse Impacts During Construction	No Action	0	0
	Alternative A	-79,358,000	-3,774,000
	Alternative B	-95,501,000	-4,541,000
	Alternative C	-79,358,000	-3,774,000

Adverse impacts during construction for Alternative A have a net present value of -$79.4 million, an annualized value of -$3.8 million. Adverse impacts during construction for Alternative B have a net present value of -$95.5 million, or -$4.5 million in annualized impact. Adverse impacts during construction for Alternative C are the same as Alternative A (same construction period) and have a net present value of -$79.4 million, or -$3.8 million in annualized impact.

5.1.2.6 Beneficial Impacts of Construction Expenditures

Construction expenditures will occur over a number of years, directly creating new demand for construction materials and labor inputs. Both the direct and indirect impacts of construction expenditures cause firms in all industries to employ more workers to meet increases in demand; this leads to induced impacts as the additional wages paid to workers lead to higher consumer spending.

The economic impacts at the regional and state levels due to influx of capital construction funds are quantified as direct and indirect impacts. The impacts are calculated using multipliers using the IMPLAN model. The study region is defined as the Central Puget Sound Region of King, Pierce, Snohomish, and Kitsap counties.

This discussion of benefits only includes benefits directly associated with the expenditure of construction and ROW funds during the construction period and does not include secondary economic benefits after construction is completed. The cost associated with construction of any of the Build Alternatives will result in additional (gross) activity throughout all economic sectors within the Puget Sound Region and the State of Washington. A multiplier is a single number that quantifies the total economic effect resulting from direct effects; the gross economic activity is derived from the multiplier effects on the capital expenditures for the project.

Examples of capital expenditures include the direct hiring of temporary construction workers, the purchase of construction materials and equipment, and the expenditure of capital funds to acquire new ROW. The alternative with the highest estimated capital cost (Alternative B) will generate the greatest amount of economic activity within the region. The alternative with the lowest estimated capital cost (Alternative A) will generate the least amount of economic activity within the region. The activity generated by Alternative C will fall between A and B.

The proportion of new money to total construction cost is assumed to be fixed (equal percentage across all alternatives). The amount of new money spent locally in the four-county regional economic impact

area was determined using default IMPLAN adjustments. The net influx of new money into the regional economy thus depends on the total cost of each build alternative (see Appendix A, Section A1.1.4.2 for detailed IMPLAN estimates). All other funding sources are coming from within either the state or the Puget Sound Region and would likely be spent in the local economy, even in the absence of this project. These estimates can be refined once additional information is known regarding design and funding.

IMPLAN was run to estimate beneficial impacts during construction, as shown in Table 5-5. Results from the model run were annualized to yield an impact estimate each for the No Action Alternative, Alternative A, Alternative B, and Alternative C. Table 5-5 presents results for the Value Added metric, which includes employee compensation, indirect business taxes, and profit.

TABLE 5-5. SUMMARY OF BENEFICIAL IMPACTS DURING CONSTRUCTION

Impact Category	Scenario	Value Added ($)	
		Net Present Value	Annual
Beneficial Impacts During Construction	No Action	0	0
	Alternative A	240,631,000	11,442,000
	Alternative B	354,765,000	16,869,000
	Alternative C	253,524,000	12,055,000

5.1.2.7 Access Impacts during Construction

A number of factors could result in adverse effects on local businesses, including construction noise, traffic, detour routes, freight movements (both local and through), parking losses, and reduced business access (both vehicular and non-motorized). There would be significant impacts on local businesses with any of the build alternatives, but the impacts would be greatest for Alternative B because of the longer construction period.

Access to several businesses with a single entrance located in immediate proximity to seawall construction may be cutoff for a period time ranging from several weeks to a full construction season. Businesses potentially affected by this include The Frankfurter (Pier 54½), Simply Sweets (Pier 55) and Starbucks (Pier 55). Three kiosks associated with the ferry terminal (World Wraps, Subway, and Cafe Appassionato) would lose street-side business access for a period of time, although they could maintain access from the ferry holding area. Access to McDonalds at Colman Dock may also be limited to the ferry holding area, unless access through the outdoor patio area can be provided to Alaskan Way.

Any major construction project, public or private, has the potential of disturbing the residents, businesses, and business customers adjacent to the construction. Within 1 block of the existing seawall alignment and proposed detour route, 480 businesses have been identified. These businesses are those most likely to experience construction disruption. Temporary construction effects include the following:

- Presence of construction workers and materials;
- Temporary road closures, traffic diversions, and alterations to property access (see the Transportation Discipline Report [SDOT 2012a]);

- Loss of parking, especially on-street, short-term parking (see the Transportation Discipline Report [SDOT 2012a]);
- Airborne dust (see the Air Quality Discipline Report [SDOT 2012b]);
- Noise and vibrations from construction equipment and vehicles (see the Noise and Vibration Discipline Report [SDOT 2012c]); and
- Loss of visibility of businesses to their customers.

5.2 INDIRECT EFFECTS

No indirect economic effects have been identified.

5.3 MITIGATION

Local businesses within the project area would be adversely affected by the duration of construction activities, the physical extent of the project area, and the amount of noise, dust, congestion, and access disruption.

The City plans to shut down construction during the peak summer months to minimize impacts on visitor-oriented businesses and eliminate construction noise during the period when businesses and residences are most likely to have windows open. Minor preparation work or work-zone maintenance could occur as necessary during the summer shutdown periods to minimize public safety concerns and fix minor problems between construction seasons.

The City would provide timely communications with business owners as construction activities proceed. Details on detours, utility disruptions and other critical activities would be provided. The City would work with local business owners concerning access issues during both design and construction phases. Public information campaigns to encourage patronage of businesses during construction could also be implemented. Pedestrian access would be maintained and roadway access on the Alaskan Way surface street would always be provided with 1 lane in each direction. The locations for pedestrian access and bus and taxi loading likely would move around throughout construction because of construction activities.

In the situation where access to a business with a single entrance is located in immediate proximity to seawall construction, access may not be possible for a period of time ranging from several weeks to a full construction season. The City would work with building owners and tenants in these instances to determine appropriate compensation or to provide relocation assistance under the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

The Uniform Relocation Assistance and Real Property Acquisition Policies Act's objectives are to:

- Provide uniform, fair and equitable treatment of persons whose real property is acquired or who are displaced in connection with federally funded projects;
- Ensure relocation assistance is provided to displaced persons to lessen the emotional and financial impact of displacement;
- Ensure that no individual or family is displaced unless decent, safe, and sanitary (DSS) housing is available within the displaced person's financial means;

- Help improve the housing conditions of displaced persons living in substandard housing; and
- To encourage and expedite acquisition by agreement and without coercion.

Other mitigation to reduce adverse effects would include maintaining optimal access for all transportation modes (pedestrian, bicycle, transit, passenger vehicle, freight, ferry, cruise, and marine cargo) to the project area where possible and implementing noise, dust, and vibration mitigation during construction. Construction mitigation measures proposed for other disciplines, such as Transportation (parking and access), Public Services and Utilities, Air Quality, and Noise and Vibration would also minimize effects on local businesses (see SDOT 2012a, 2012d, 2012b, and 2012c, respectively).

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CHAPTER 6. OPERATIONAL EFFECTS AND MITIGATION

Potential impacts and benefits associated with the long-term operation and maintenance of each proposed alternative are identified and discussed below. For each alternative, the following issues are evaluated for long-term economic impacts: employment, government revenues, and parking. Operational impacts include adverse regional economic impacts that would occur during the 50-year period of analysis for both the No Action Alternative and the three build alternatives. Operational impacts under the No Action Alternative may occur anytime during the period depending on when seawall failure occurs, as simulated in the EBSDAM developed for the USACE and City joint Elliott Bay Seawall Feasibility Study. Permanent impacts from the build alternatives occur annually over the period.

6.1 DIRECT EFFECTS

6.1.1 No Action Alternative

Three scenarios are evaluated as part of the No Action Alternative. These scenarios include:

1. Minimal Damage: This scenario would require a significant repair of the seawall, but those repairs could be undertaken by the City of Seattle.
2. Loss of Functionality: This scenario would result in sustained Seawall damage to the point that it would no longer be considered safe for public access and as such could no longer perform the majority of its essential functions.
3. Collapse of the Seawall: This scenario occurs only due to seismic damage; however, collapse resulting from seismic events could trigger tidal erosion. This scenario could result in severe effects.

The No Action Alternative involves maintaining the existing seawall. Given the age and condition of the seawall, it is likely that it will continue to deteriorate and that damage will likely occur during this timeframe. Under the No Action Alternative, the project area will not change as a result of the project but there would be a significant risk of impact to the local and regional economy.

6.1.1.1 Minimal Damage Scenario

Employment

There would be minimal impacts to employment under the Minimal Damage scenario. Businesses would continue operation as-is, and employment would not change as a result of the project. There could be minimal impact to business, and therefore employment, if there is a temporary loss of access to businesses on a pier during repair.

Taxes and Other Local Government Revenues

There would be minimal impacts to taxes (state, use, hotel, B&O) and other government revenue under this scenario. The parking inventory would remain the same and businesses would continue operation. If repair was to occur adjacent to one or more businesses, it might have a temporary or minimal negative

effect on business revenues, which could in turn lead to less business and sales taxes and less parking revenue.

Adverse Operational Impacts with No Action (Minimal Damage Scenario)

There would be minimal localized business impacts under the Minimal Damage scenario. Continued maintenance and minor repairs of the seawall would result in minor and temporary adverse employment and income effects offset positive impacts of the infusion of some additional spending during repairs and/or maintenance, but the impacts would be minimal.

6.1.1.2 Loss of Functionality and Collapse of the Seawall Scenarios

Employment

There would be significant adverse impacts to employment under the Loss of Functionality and Collapse of the Seawall scenarios. Following loss of functionality or collapse, the seawall would not be considered safe for public access, so people would not be able to visit many of the local businesses along the waterfront. Businesses could close temporarily or permanently, which would reduce employment in the study area. There could be impacts to business and therefore employment if there is loss of access to the piers, waterfront, and waterfront businesses. IMPLAN modeling outputs were integrated to assess the impacts of wall failure over the 50-year period of analysis. Table 6-1 summarizes employment impacts.

TABLE 6-1. EMPLOYMENT IMPACTS WITH NO ACTION (LOSS OF FUNCTIONALITY OR COLLAPSE OF THE SEAWALL SCENARIOS)

Scenario	Employment Impact (Full-Time Equivalents)	Time Period
No Action	-4,793	3 years

Following failure of the seawall under the No Action Alternative, subsequent business losses would result in a loss of 4,793 FTEs over a three-year period. Over the three-year period it is assumed that displaced employees would proportionally find new jobs elsewhere in regional economy.

Taxes and Other Local Government Revenues

There would be adverse impacts to taxes (state, use, hotel, B&O) and local government revenues under either the Loss of Functionality or Collapse of the Seawall scenarios. The seawall would not be considered safe for public access, so people would not be able to visit many of the local businesses along the waterfront. Businesses could close temporarily or permanently, which would reduce the local taxes and other government revues generated from these businesses. Parking would also be affected if Alaskan Way was not safe for vehicular access, in turn reducing parking revenue. Table 6-2 summarizes these impacts.

TABLE 6-2. TAX AND GOVERNMENT REVENUE IMPACTS WITH NO ACTION (LOSS OF FUNCTIONALITY OR COLLAPSE OF THE SEAWALL SCENARIOS)

Scenario	State and Local Taxes ($)		Parking Revenue ($)	
	Net Present Value	Annual	Net Present Value	Annual
No Action	-1,254,000	-60,000	-15,288,000	-727,000

Adverse Impacts with No Action (Loss of Functionality or Collapse of the Seawall Scenarios)

There would be adverse impacts to regional economic development under either the Loss of Functionality or Seawall Collapse scenarios. The area would not be considered safe for public access, so people would not be able to visit many of the local businesses along the waterfront. Businesses would be closed, which would negatively impact the local economy. In addition, tourism would be adversely impacted in general if people are unable to access and visit the waterfront. IMPLAN output for the value added metric is summarized in Table 6-3.

TABLE 6-3. LOCAL/REGIONAL OPERATIONAL IMPACTS WITH NO ACTION (LOSS OF FUNCTIONALITY OR COLLAPSE OF THE SEAWALL SCENARIOS)

Scenario	Value Added ($)	
	Net Present Value	Annualized
No Action	-202,627,000	-10,463,000

Table 6-3 shows that for the No Action Alternative, adverse impacts occur during the operational period of analysis. Adverse value added impacts during this period amount to about -$203 million in net present value, or about -$10.5 million in annualized impact.

6.1.2 Build Alternatives

The intent with all three build alternatives is to restore the roadway, sidewalks, trails, and parking to their original functionality. The existing roadway is generally four lanes (two lanes in each direction), except in the vicinity of Colman Dock where there is one northbound lane, a dedicated left-turn lane into the ferry terminal, and two southbound lanes.

Under Alternative A, a second northbound lane would be added between S. Washington and Madison Streets to handle expected traffic volumes in this segment. The face of the seawall would remain in its current location in Zone 1, move 15 feet landward in Zone 2, three feet waterward in Zone 3, 10 feet landward in Zone 4, and 10 feet landward in Zones 5 and 6.

Under Alternative B, additional and enhanced gathering and overlook spaces would be created. Zone 1 may include the Washington Street Boat Landing which would be restored and reinstalled 15 feet waterward of its existing location with a new plaza along the Washington Street ROW; a new gangway and short-stay boat moorage; steps and a boardwalk (Option 1) or boulders (Option 2) for seating and viewing of the new intertidal habitat beach. Zones 3, 5, and 6 would include viewpoints between the piers that create more opportunities for public gathering, seating, and water viewing. The viewpoints would include seating steps and stairs to bring the public in closer proximity to the water. The proposed wall setbacks in Zones 3 and 4 (30 feet and 30 to 75 feet, respectively) would provide opportunities for

increased public space around the Seattle Aquarium. Two options for this area include a "Water Plaza" (Option 1) and a "Land Plaza" (Option 2). Walks surrounding the Seattle Aquarium, many with LPS, would surround the planters with gathering spaces.

The feature of Alternative C that differs from both Alternatives A and B is the wall-setback distance in Zone 3: 0 to 15 feet landward for Alternative C versus three feet waterward for Alternative A and 30 feet landward for Alternative B.

6.1.2.1 Employment

There would be no adverse impacts to employment with Alternative A, B, or C. The study area would look very similar to what it looks like today and businesses are expected to operate as usual. Once construction is complete, no appreciable change in traffic or parking would be noticeable. The main impacts associated with this project are construction impacts, so once the project is complete, very few impacts are expected. However, there could be some beneficial impacts to employment with Alternative B. Some of the improved public amenities under Alternatives B and C may increase the attractiveness of the waterfront to residents and visitors, which could increase business and therefore employment on the waterfront. These potential benefits are not quantifiable at this time.

6.1.2.2 Taxes and other Local Government Revenues

There would be minimal beneficial impacts with Alternatives A, B, and C on taxes (state, use, hotel, B&O) and local revenues (i.e., parking). The study area will look very similar to what it looks like today and businesses are expected to ultimately operate as usual. However, because of the public amenities associated with Alternatives B and C, the waterfront may be more attractive to residents and visitors. Therefore, parking revenues and sale tax revenues are expected to slightly increase as a result of the project.

A permanent loss of parking spaces is equivalent to the permanent loss of seven spaces worth of revenue under Alternatives A and C. Using the same general methodology as in the parking loss estimate during construction, the annual value of forgone parking revenue following construction was estimated. The permanent loss of seven on-street parking spots along the Central Seawall amounts to a net present value of $1.7 million over the period of analysis (see Table 6-4).

TABLE 6-4. SUMMARY OF ALTERNATIVE B PERMANENT PARKING LOSS

Scenario	Parking Revenue ($)	
	Net Present Value	Annual
Alternative A	-1,727,000	-82,000
Alternative B	0	0
Alternative C	-1,727,000	-82,000

6.1.2.3 Other Effects of Operational Period

There would minimal other localized or regional business impacts with Alternative A, B, or C. The study area will look very similar to what it looks like today and businesses are expected to operate as usual.

Once construction is complete, no appreciable change in traffic or parking will be noticeable. Because of this, minimal beneficial localized business impacts are expected as a result of the project. Some of the improved public amenities with Alternatives B and C may increase the attractiveness of the waterfront to residents and visitors.

Some beneficial indirect effects on economic resources are expected. Property or tenant improvements that may have been in the planning stages for some time could be viewed as more timely by individual property owners after the necessary seawall safety improvements and disruptions associated with construction are in the past. Revitalization and reinvestment could increase property values, stimulate economic activity, enable opportunities for new or expanded business and employment, and generate more tax revenues. These potential public and private investments, along with the additional public amenities associated with any of the three action alternatives, also could prompt increased public use and visitation to the area, resulting in a beneficial indirect effect on economic activity.

6.2 INDIRECT EFFECTS

Some beneficial indirect effects on economic resources are expected under all of the build alternatives. Property or tenant improvements that may have been in the planning stages for some time could be viewed as more timely by individual property owners after the necessary seawall improvements and disruptions associated with construction are in the past. Revitalization and reinvestment could increase property values, stimulate economic activity, enable opportunities for new or expanded business and employment, and generate more tax revenues. These potential public and private investments, along with the additional public amenities associated with any of the build alternatives, could also prompt increased public use and visitation to the area, thus resulting in a beneficial indirect effect on economic activity.

6.3 MITIGATION

The intent in all three build alternatives is to restore the roadway, sidewalks, trails, and parking to their original functionality. Therefore, there will be no permanent effects as a result of project operations, so no mitigation is necessary or recommended.

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City of Seattle

Elliott Bay Seawall Project Economics Discipline Report

APPENDIX A.
IMPLAN ANALYSIS AND RESULTS

October 2012

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City of Seattle

Economics Discipline Report
Appendix A. IMPLAN Analysis and Results

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This appendix provides an overview of the regional economic analysis conducted for the Elliott Bay Seawall Project (EBSP) to support environmental impact analysis. Details are provided to document the regional economic impact model applied and results.

A1.1 REGIONAL ECONOMIC ANALYSIS

A regional economic analysis shows the effects of alternatives on the distribution of regional economic activity in the area where the alternative will have significant income and employment effects. Regional economic impacts were estimated for the Central Puget Sound Region, defined by the Puget Sound Regional Council as King, Snohomish, Kitsap, and Pierce counties, Washington. The Seattle waterfront is a regional economic hub, supporting waterborne, road, and rail transportation infrastructure essential to the Port of Seattle and the downtown Seattle core. The waterfront itself provides regional recreation experiences, including the Seattle Aquarium.

Regional economic effects considered in this analysis are quantified using a regional economic model that is based on the principles of input-output (I-O) analysis. I-O analysis represents a means of measuring the flow of commodities and services among industries, institutions, and final consumers within an economy (or study area). I-O models capture all monetary market transactions in an economy, accounting for inter-industry linkages and availability of regionally-produced goods and services. The resulting mathematical formulae allow I-O models to simulate or predict the economic impacts of a change in one, or several, economic activities on an entire economic region.

A1.1.1 Impact Metrics

I-O analyses use four main metrics to measure economic impacts: industry output, value added, labor income, and employment. Industry output refers to the value of goods and services produced in a region. Value added consists of four components: employee compensation, proprietor income, other property income, and indirect business tax. Labor income represents the sum of employee compensation and proprietor income. Lastly, employment is measured by the number of full- and part time jobs.

For the purposes of this analysis, the focus is on value added, which represents regional income, and employment.

The primary input variable for I-O analysis is the dollar change in purchases of products or services for final use, the "final demand." Final demand changes drive I-O models. Industries respond to meet demands directly or indirectly by supplying goods and services to industries responding directly to final demand changes. The primary output variables are predicted changes in direct, indirect, and induced economic output, employment, and income for the affected industries within a study area.

Direct economic effects refer to the response of a given industry (i.e., changes in output, income, and employment) based on final demand for that industry.

Indirect effects refer to changes in output, income, and employment resulting from the iterations of industries purchasing from other industries caused by the direct economic effects.

Induced economic effects refer to changes in output, income, and employment caused by the expenditures associated with new household income generated by direct and indirect economic effects.

A1.1.2 Multipliers

The measurement of direct, indirect, and induced linkages within a regional economy is based on the concept of a multiplier. A multiplier is a single number that quantifies the total economic effect resulting from direct effects. For example, an output multiplier of 1.7 for the "widget" production sector indicates that every $100,000 of widgets produced (the direct output of this industry) supports a total of $170,000 in business sales throughout the economy (total output of all industries), including the initial $100,000 in widget output. Several types of multipliers are incorporated into an I-O model, including output, employment, and income multipliers.

A1.1.3 Elliott Bay Seawall Project Impact Analysis IMPLAN Model

For the EBSP analysis, the IMPLAN (IMpact Analysis for PLANning) model was used to estimate regional economic effects of the build alternatives and the No Action Alternative. IMPLAN is a computer-driven system of software and data commonly used to perform economic impact analysis. It was originally developed by the USDA Forest Service (USFS) to assist in land and resource management planning and has been in use since 1979. It is a widely used for economic analyses by clients in federal, state and local governments, universities, as well as the private sector. The system is now maintained and marketed by the Minnesota IMPLAN Group, Inc. (MIG), which updates the data annually, using information collected at the national, state, county, and local level. IMPLAN is a "non-survey," or secondary, I-O system as it does not require primary survey-based data which is often difficult and expensive to obtain. National technical relationships among industries form the basis for the model, but are adjustable to account for unique regional conditions. Information on regional economic activity is also incorporated into the model. Changes can be made to data elements to account for regional conditions when better information, such as from primary surveys, is available. The 2009 IMPLAN dataset was used in the analysis, and no adjustments were made to the regional data.

The IMPLAN model was applied to estimate regional economic impacts during construction and operation of any of the three build alternatives. Impacts from construction may be both positive and negative from a regional perspective. For example, it is likely that a large infrastructure project impacts regional employment positively due to infusion of new money into the regional economy and demand for construction labor and materials. However, there may be localized negative revenue impacts to business owners directly affected by construction noise, accessibility, or traffic congestion. In order to examine the impacts of construction spending on the regional economy, 10-percent-design-level construction cost estimates were used to estimate the total new money spending that would occur in the regional economy for each build alternative.

In order to examine the impacts on businesses during construction, an inventory database of affected structures was created. The IMPLAN model generally operates on a change in sales or employment in one or more defined sectors of the model. Therefore, affected businesses along the seawall were classified according to IMPLAN's sectors and an estimate or change in sales or employment was made.

Estimates were based on average sales data by business type. Several sources were researched to obtain sales data on a square foot basis for various retail businesses (HdL 2007 and Brandow Company 2011). The average square foot sales data were then combined with assessor's data on each structure's square footage to produce estimates of annual sales volumes.

A1.1.3.1 Data Collection

Development of the inventory database required a field survey of the affected businesses along the waterfront. The items inventoried include:

- Reach identification,
- Business location (assessor database/PIN),
- Business description - square footage, retail sales multiplier category, and
- Gross square footage estimate of the business space (i.e., several businesses in one building).

The structure inventory was divided into two IMPLAN zones consistent with the without project condition damage analysis, a primary and a secondary IMPLAN zone, as indicated in Figure A-1. The primary zone consists of the piers along the Seattle waterfront, a total of 15 parcels and over 50 businesses. The secondary zone consists of an additional 12 parcels and nearly 80 businesses. The assessment of impacts from a reduction of revenue is assessed using only the primary zone for consistency with the without project analysis and because these parcels are likely to experience the most direct effects from construction.

In most cases, the assessor's database (King County) provided a starting point for collecting data on individual business, often reporting aggregate retail square footage for parcels containing multiple businesses. Field survey verified and expanded on this data. Sources were updated to Fiscal Year 2009 price level to be consistent with the current without project economic damage model developed for the United States Army Corps of Engineers (USACE) planning process.

In some cases, office space was not easily accessible for classification during the field survey and estimation of revenue for these spaces required an alternate methodology. IMPLAN has a built-in functionality that estimates revenue per employee for various business sectors. Research by the International Facilities Management Association across 1,422 facilities indicated that U.S. commercial offices typically have about 400 square feet of office space per employee (International Facility Management Association 2009). This value was generally consistent with the number of employees and business square footages reported by respondents to the business survey from 2010. This alternate method allowed these businesses to be included in IMPLAN.

Figure A-1. Primary and Secondary IMPLAN Zones

A1.1.4 IMPLAN Analysis and Results

In order to analyze regional economic impacts for the EIS, three impact categories were defined from a temporal perspective:

- Adverse Impacts During Construction,
- Beneficial Impacts During Construction, and
- Operational Impacts (50-year period of analysis).

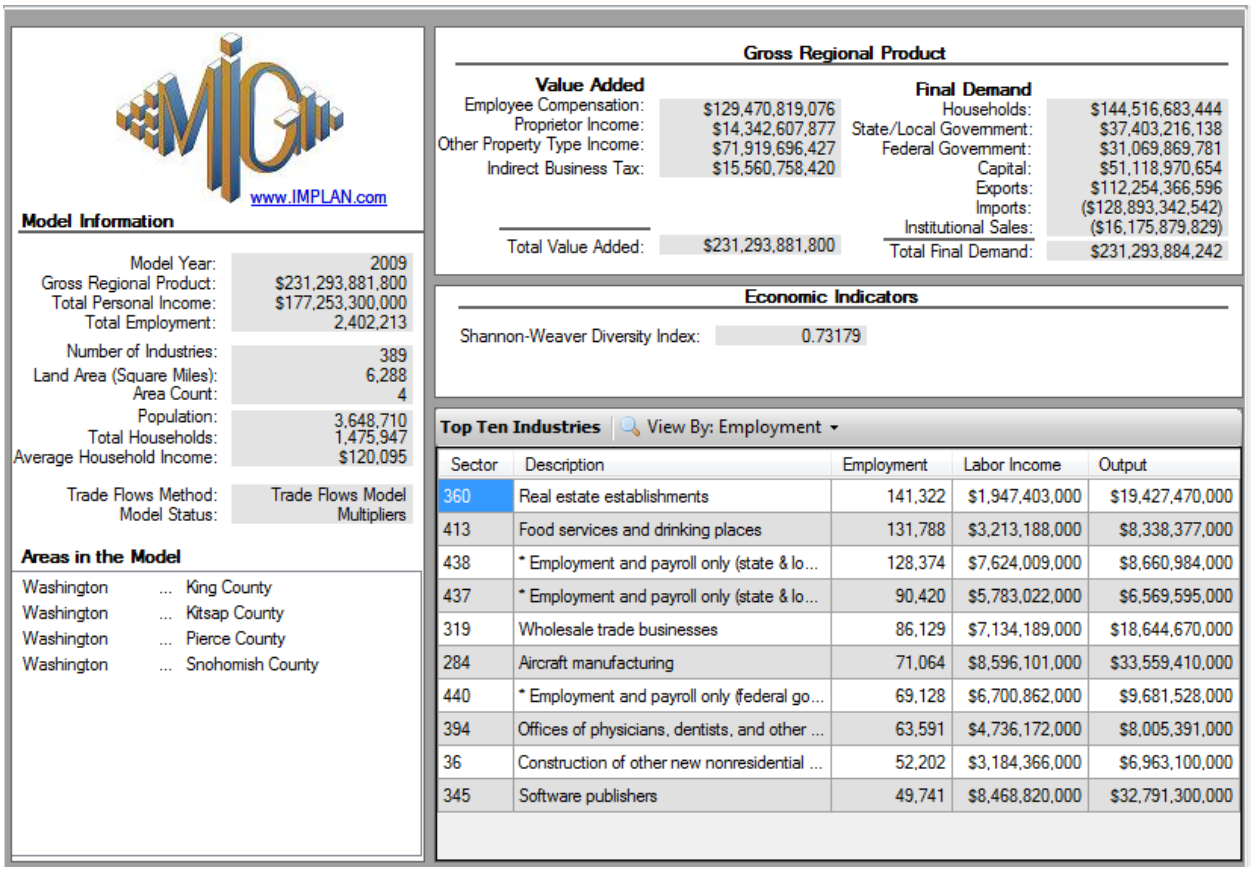
For each of these categories, impacts were evaluated for the No Action Alternative and the three build alternatives.

The following sections describe IMPLAN analysis and results for the study area. Businesses in the primary impact area were incorporated into IMPLAN. Construction spending was tabulated and incorporated as well. The IMPLAN model for this analysis has been constructed to include the four counties of King, Kitsap, Pierce, and Snohomish. Area details are shown below. Impacts to the local businesses in the primary IMPLAN zone are discussed first, followed by presentation of impacts from construction spending on the region.

IMPLAN outputs impacts for a single year for the given scenario/model run. The main report annualized these single year values as follows:

- For impacts during construction (adverse or beneficial), IMPLAN produces a single year estimate of impact during construction, not over the whole construction period. The NPV and annualized impact values are calculated by plotting the single-year IMPLAN outputs over the construction period.
- For operational impacts, IMPLAN outputs correspond to a single year's impact following loss of functionality or collapse of the seawall. This single year value is integrated into the Elliott Bay Seawall Damage Assessment Model (EBSDAM) to be initiated over a three-year failure period when the wall failure occurs. EBSDAM assumes a declining impact function over the three-year period. EBSDAM then calculates the NPV and annualized impact over the 50-year period of analysis.

The following tables of results are for a single year of IMPLAN output. See the main report for NPV and annualized values.



www.IMPLAN.com

Model Information

Model Year:	2009
Gross Regional Product:	$231,293,881,800
Total Personal Income:	$177,253,300,000
Total Employment:	2,402,213
Number of Industries:	389
Land Area (Square Miles):	6,288
Area Count:	4
Population:	3,648,710
Total Households:	1,475,947
Average Household Income:	$120,095
Trade Flows Method:	Trade Flows Model
Model Status:	Multipliers

Areas in the Model

Washington	...	King County
Washington	...	Kitsap County
Washington	...	Pierce County
Washington	...	Snohomish County

Gross Regional Product

Value Added		Final Demand	
Employee Compensation:	$129,470,819,076	Households:	$144,516,683,444
Proprietor Income:	$14,342,607,877	State/Local Government:	$37,403,216,138
Other Property Type Income:	$71,919,696,427	Federal Government:	$31,069,869,781
Indirect Business Tax:	$15,560,758,420	Capital:	$51,118,970,654
		Exports:	$112,254,366,596
		Imports:	($128,893,342,542)
		Institutional Sales:	($16,175,879,829)
Total Value Added:	$231,293,881,800	Total Final Demand:	$231,293,884,242

Economic Indicators

Shannon-Weaver Diversity Index: 0.73179

Top Ten Industries View By: Employment

Sector	Description	Employment	Labor Income	Output
360	Real estate establishments	141,322	$1,947,403,000	$19,427,470,000
413	Food services and drinking places	131,788	$3,213,188,000	$8,338,377,000
438	* Employment and payroll only (state & lo...	128,374	$7,624,009,000	$8,660,984,000
437	* Employment and payroll only (state & lo...	90,420	$5,783,022,000	$6,569,595,000
319	Wholesale trade businesses	86,129	$7,134,189,000	$18,644,670,000
284	Aircraft manufacturing	71,064	$8,596,101,000	$33,559,410,000
440	* Employment and payroll only (federal go...	69,128	$6,700,862,000	$9,681,528,000
394	Offices of physicians, dentists, and other ...	63,591	$4,736,172,000	$8,005,391,000
36	Construction of other new nonresidential ...	52,202	$3,184,366,000	$6,963,100,000
345	Software publishers	49,741	$8,468,820,000	$32,791,300,000

Figure A-2. IMPLAN Four-County Regional Impact Area

A1.1.4.1 Adverse Impacts during construction.

In order to provide an estimate of the impacts to local businesses due to adjacent construction, the analysis assumed a 15 percent reduction in revenue to the primary zone businesses in the retail, hotel, museum, food, and travel services IMPLAN sectors. Individual losses to the impacted businesses may exceed this percentage; however, a RED analysis examines impacts net of transfers to other businesses within the study area. For example, if a restaurant directly impacted by construction has its customer spending transferred to other restaurants within the study area the impact of construction is negated by this transfer within the region. These sectors were chosen because businesses in these sectors rely on customers coming to their place of business and are most susceptible to construction conditions that may drive away customers (noise, traffic, etc.). Other businesses like offices or warehouses, which don't rely on curb appeal of the physical business location, are less likely to be impacted during construction.

Inputs to the IMPLAN model for these businesses included an estimate of retail sales revenue. This estimate is a multiplication of the total square footage of the business by the retail sales per square foot factor determined in the data collection phase. Hotel revenue is based on an assumption of a 60 percent capacity utilization and the average daily room rate. Each retail enterprise was identified according to Bizminer and HdL classifications. These classifications were transformed into the appropriate IMPLAN classifications. For example, a 7-Eleven is classified by HdL as a convenience food store and under IMPLAN it falls into sector 324 - Retail Stores - Food and beverage. An IMPLAN analysis was conducted

for these businesses where a 15 percent decrease in revenues was experienced. The model results for annual impacts are presented in the following tables.

The IMPLAN model was analyzed assuming a complete loss for the sectors in Table A-1. The results of the IMPLAN model are shown below.

TABLE A–1. PRIMARY ZONE PROPERTIES - IMPACT SUMMARY

Impact Type	Employment (No. of jobs)	Labor Income ($)	Total Value Added ($)	Output ($)
Direct Effect	-120	-4,073,000	-6,427,000	-10,743,000
Indirect Effect	-26	-1,382,000	-2,481,000	-4,223,000
Induced Effect	-33	-1,575,000	-2,869,000	-4,662,000
Total Effect	**-179**	**-7,029,000**	**-11,778,000**	**-19,628,000**

A1.1.4.1.1 Employment Impact

The direct employment effect to the businesses is estimated at a loss of 120 jobs. As the impact of the direct loss is filtered through the economy an additional 59 will be lost as their suppliers and others are impacted. Employment impacts to the top ten IMPLAN sectors are shown in Table A-2.

TABLE A-2. TOP TEN EMPLOYMENT IMPACTS - PRIMARY ZONE

Sector	Description	Total Employment (No. of jobs)	% of Total
413	Food services and drinking places	-66	37
411	Hotels and motels, including casino hotels	-15	8
406	Museums, historical sites, zoos, and parks	-14	8
383	Travel arrangement and reservation services	-12	7
330	Retail Stores - Miscellaneous	-10	6
360	Real estate establishments	-7	4
324	Retail Stores - Food and beverage	-5	3
327	Retail Stores - Clothing and clothing accessories	-4	2
319	Wholesale trade businesses	-2	1
394	Offices of physicians, dentists, and other health practitioners	-2	1
Total		**-138**	**77**

A1.1.4.1.2 Total Labor Income Impact

The top ten income losses (employee compensation and proprietary income) are estimated by sector as shown in Table A-3.

TABLE A-3. TOP TEN LABOR INCOME IMPACTS - PRIMARY ZONE

Sector	Description	Total Labor Income ($)	% of Total
413	Food services and drinking places	-1,686,000	24
383	Travel arrangement and reservation services	-846,000	12
411	Hotels and motels, including casino hotels	-595,000	8
406	Museums, historical sites, zoos, and parks	-593,000	8
330	Retail Stores - Miscellaneous	-232,000	3
324	Retail Stores - Food and beverage	-204,000	3
319	Wholesale trade businesses	-175,000	3
394	Offices of physicians, dentists, and other health practitioners	-154,000	2
360	Real estate establishments	-102,000	1
327	Retail Stores - Clothing and clothing accessories	-101,000	1
Total		**-4,689,000**	**67**

A1.1.4.1.3 Total Value Added Impact

IMPLAN estimates the value added (employee compensation, proprietary income, other property type income, and indirect business taxes) impacts as shown in Table A-4.

TABLE A-4. TOP TEN TOTAL VALUE ADDED IMPACTS - PRIMARY ZONE

Sector	Description	Total Employment (No. of jobs)	Total Value Added ($)	% of Total
413	Food services and drinking places	-66	-2,403,000	20
383	Travel arrangement and reservation services	-12	-1,284,000	11
406	Museums, historical sites, zoos, and parks	-14	-1,076,000	9
411	Hotels and motels, including casino hotels	-15	-1,062,000	9
360	Real estate establishments	-7	-768,000	7
330	Retail Stores - Miscellaneous	-10	-348,000	3
324	Retail Stores - Food and beverage	-5	-331,000	3
319	Wholesale trade businesses	-2	-303,000	3
327	Retail Stores - Clothing and clothing accessories	-4	-200,000	2
394	Offices of physicians, dentists, and other health practitioners	-2	-164,000	1
Total			**-7,938,000**	**67**

A1.1.4.1.4 Industry Output - Total Production

Industry output is a single number in dollars for each industry. The dollars represent the value of an industry's total production. The data is derived from a number of sources, including U.S. Census Bureau economic censuses, BEA output estimates, and the BLS employment projections. The breakdown by IMPLAN sectors by impact type for the losses of are as follows (Table A-5).

TABLE A-5. TOP TEN INDUSTRY OUTPUT IMPACTS - PRIMARY ZONE

Sector	Description	Total Employment (No. of jobs)	Total Output (S)	% of Total
413	Food services and drinking places	-66	-4,401,000	22
383	Travel arrangement and reservation services	-11	-2,080,000	11
411	Hotels and motels, including casino hotels	-15	-1,901,000	10
406	Museums, historical sites, zoos, and parks	-14	-1,797,000	9
360	Real estate establishments	-7	-1,047,000	5
319	Wholesale trade businesses	-2	-427,000	2
330	Retail Stores - Miscellaneous	-10	-409,000	2
324	Retail Stores - Food and beverage	-5	-382,000	2
394	Offices of physicians, dentists, and other health practitioners	-2	-268,000	1
327	Retail Stores - Clothing and clothing accessories	-4	-230,000	1
Total			**-12,942,000**	**66**

A1.1.4.1.5 State and Local Tax Impacts

State and local tax impact estimates within IMPLAN are based on the data underlying the region social accounting matrices data. Inter-industry transfers provide information on non-market financial flows. They capture payments of taxes by individuals and businesses, transfers of government funds to people and businesses, and transfer of funds from people to people. These values are based on the average for all industries within the model; the average taxes associated with each household income class; the average taxes and transfers associated with each of the government institutions defined by the model. The estimated tax impacts for the loss of businesses are shown in Table A-6.

TABLE A-6. STATE AND LOCAL TAX IMPACTS - PRIMARY ZONE

Description	Employee Compen-sation ($)	Proprietor Income ($)	Indirect Business Tax ($)	Households ($)	Corpor-ations ($)	Total ($)
Dividends	0	0	0	0	-65,000	-65,000
Social Insurance Tax-Employee Contribution	-1,400	0	0	0	0	-1,400
Social Insurance Tax-Employer Contribution	-3,500	0	0	0	0	-3,500
Indirect Business Tax: Sales Tax	0	0	-594,700	0	0	-594,700
Indirect Business Tax: Property Tax	0	0	-285,600	0	0	-285,600
Indirect Bus Tax: Motor Vehicle Licensing	0	0	-7,700	0	0	-7,700
Indirect Bus Tax: Severance Tax	0	0	-1,200	0	0	-1,200
Indirect Bus Tax: Other Taxes	0	0	-76,700	0	0	-76,700
Indirect Bus Tax: S/L Non-Taxes	0	0	-40,500	0	0	-40,500
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees)	0	0	0	-30,700	0	-30,700
Personal Tax: Motor Vehicle License	0	0	0	-8,200	0	-8,200
Personal Tax: Property Tax	0	0	0	-2,800	0	-2,800
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	-2,800	0	-2,800
Total State and Local Tax	**-4,900**	**0**	**-1,006,500**	**-44,500**	**-65,000**	**-1,120,900**

A1.1.4.1.6 Summary

Key impact categories include employment and value added. The results of the IMPLAN model indicate that on an annual basis, construction will cause a loss of approximately 120 direct jobs in the retail, hotel, museum, food, and travel services sectors. The loss would total 179 jobs including indirect and induced effects. Construction will also cause an estimated negative $6.4 million in direct value added impact, and a total of negative $11.8 million in value added impact including indirect and induced effects. Of this total, negative $7.9 million (67 percent) are attributable to the top ten affected sectors:

- Food services and drinking places,
- Travel arrangement and reservation services,
- Museums, historical sites, zoos, and parks,
- Hotels and motels, including casino hotels,
- Real estate establishments,
- Retail stores – miscellaneous,
- Retail stores - food and beverage,
- Wholesale trade businesses,
- Retail stores - clothing and clothing accessories, and
- Offices of physicians, dentists, and other health practitioners.

A1.1.4.2 Beneficial Impacts of Construction Spending

Of interest from a regional economic perspective is new money that is infused into the regional economy as a result of the project. New money is usually defined as funds that are uniquely available for expenditure on the subject project, and would not otherwise enter the regional economy. It was assumed that up to 65 percent of construction cost would be an infusion of new money into the economy that would not have been available for spending in the region if not for this project.

Ten percent design level cost estimates were used in the analysis. The cost estimate was distributed among six IMPLAN sectors to determine the distribution of spending that would occur in IMPLAN. Table A-7 summarizes the distribution and construction cost for each alternative, by North and Central Seawall segments.

TABLE A-7. CONSTRUCTION COST BY IMPLAN SECTOR AND NORTH/CENTRAL SEAWALL FOR EACH ALTERNATIVE

IMPLAN Sector	Alternative A		Alternative B		Alternative C	
	North ($)	Central ($)	North ($)	Central ($)	North ($)	Central ($)
36: Construction of other nonresidential structures	151,276,000	190,117,000	168,875,000	256,389,000	$153,011,315	$202,412,746
39: Maintenance & repair of other nonresidential structures	54,541,000	60,229,000	62,832,000	88,042,000	$55,096,315	$66,094,746
388: Service to buildings and dwellings	2,680,000	2,730,000	2,630,000	11,770,000	$2,687,991	$6,210,000
390: Waste management and remediation services	1,680,000	3,360,000	1,680,000	3,360,000	$1,680,000	$3,360,000
369: Architectural, engineering, and related services	28,136,000	34,184,000	31,596,000	47,995,000	$28,443,300	$37,215,900
405: Independent artists, writers, and performers	1,876,000	2,279,000	2,106,000	3,200,000	$1,896,220	$2,481,060
Total	**240,189,000**	**292,898,000**	**269,720,000**	**410,755,000**	**$242,815,141**	**$317,774,451**

In order to estimate the total new money entering the regional economy, each of the cost line items from the table above was reduced by 35 percent so that only 65 percent was remaining, as seen in Table A-8.

TABLE A-8. NEW MONEY PORTION COST ESTIMATE

IMPLAN Sector	Alternative A		Alternative B		Alternative C	
	North ($)	Central ($)	North ($)	Central ($)	North ($)	Central ($)
36: Construction of other nonresidential structures	98,330,000	123,576,000	109,769,000	166,653,000	$99,457,355	$131,568,285
39: Maintenance & repair of other nonresidential structures	35,452,000	39,149,000	40,841,000	57,227,000	$35,812,605	$42,961,585
388: Service to buildings and dwellings	1,742,000	1,775,000	1,710,000	7,651,000	$1,747,194	$4,036,500
390: Waste management and remediation services	1,092,000	2,184,000	1,092,000	2,184,000	$1,092,000	$2,184,000
369: Architectural, engineering, and related services	18,288,000	22,219,000	20,538,000	31,197,000	$18,488,145	$24,190,335
405: Independent artists, writers, and performers	1,219,000	1,481,000	1,369,000	2,080,000	$1,232,543	$1,612,689
Total	**156,123,000**	**190,384,000**	**175,318,000**	**266,991,000**	**$157,829,842**	**$206,553,393**

The last step in preparing the construction cost for IMPLAN is to determine how much of the spending in each sector would be spent in the regional economy. For example, steel girder purchases from a manufacturer in Pittsburg, while purchased with new money, should not be counted as new money *to the regional economy* because those funds never entered the study area. IMPLAN's built-in social account matrices were used to determine that about 87 percent of the new money would be spent in the regional economy, as shown in Table A-9.

TABLE A–9. CONSTRUCTION COST IMPLAN INPUTS

IMPLAN Sector	Alternative A		Alternative B		Alternative C	
	North ($)	Central ($)	North ($)	Central ($)	North ($)	Central ($)
36: Construction of other nonresidential structures	80,630,000	101,332,000	90,011,000	136,655,000	$81,555,031	$107,885,993
39: Maintenance & repair of other nonresidential structures	35,097,000	38,757,000	40,433,000	56,655,000	$35,454,479	$42,531,969
388: Service to buildings and dwellings	1,376,000	1,402,000	1,351,000	6,044,000	$1,380,283	$3,188,835
390: Waste management and remediation services	1,081,000	2,162,000	1,081,000	2,162,000	$1,081,080	$2,162,160
369: Architectural, engineering, and related services	17,922,000	21,775,000	20,127,000	30,573,000	$18,118,382	$23,706,528
405: Independent artists, writers, and performers	268,000	326,000	301,000	458,000	$271,159	$354,792
Total	**136,376,000**	**165,754,000**	**153,303,000**	**232,546,000**	**$137,860,415**	**$179,830,277**

Table A-10 through Table A-39 present IMPLAN for impacts from construction spending. The values represent an annual impact. IMPLAN results are presented for Alternatives A, B, and C, and by Central and North Seawall, resulting in six tables for each of the impact metrics.

A1.1.4.2.1 Employment Impact

The employment effect to the businesses varies by alternative and North/Central Seawall. The total effect for the top ten affected sectors under Alternative A Central is 464 jobs. Under Alternative A North, the total effect is 232 jobs for the top ten sectors. Under Alternative B Central, the total effect is 497 jobs, and under Alternative B North, the total effect is 217 jobs for the top ten sectors. Under Alternative C Central, the total effect is 381 jobs. Under Alternative C North, the effect is 293 jobs. Employment impacts to the top ten IMPLAN sectors are shown in Table A-10 through Table A-15.

TABLE A-10. ALTERNATIVE A CENTRAL SEAWALL EMPLOYMENT IMPACTS

Sector	Description	Total Employment (No. of jobs)	% of Total
36	Construction of other new nonresidential structures	143	29
39	Maintenance and repair construction of nonresidential structures	75	15
369	Architectural, engineering, and related services	62	13
413	Food services and drinking places	18	4
360	Real estate establishments	14	3
319	Wholesale trade businesses	9	2
388	Services to buildings and dwellings	8	2
394	Offices of physicians, dentists, and other health practitioners	8	2
329	Retail Stores - General merchandise	6	1
324	Retail Stores - Food and beverage	5	1
Total		**348**	**71**

TABLE A-11. ALTERNATIVE A NORTH SEAWALL EMPLOYMENT IMPACTS

Sector	Description	Total Employment (No. of jobs)	% of Total
36	Construction of other new nonresidential structures	114	28
39	Maintenance and repair construction of nonresidential structures	68	17
369	Architectural, engineering, and related services	51	13
413	Food services and drinking places	15	4
360	Real estate establishments	11	3
319	Wholesale trade businesses	7	2
388	Services to buildings and dwellings	7	2
394	Offices of physicians, dentists, and other health practitioners	7	2
329	Retail Stores - General merchandise	5	1
324	Retail Stores - Food and beverage	4	1
Total		**290**	**71**

TABLE A-12. ALTERNATIVE B CENTRAL SEAWALL EMPLOYMENT IMPACTS

Sector	Description	Total Employment (No. of jobs)	% of Total
36	Construction of other new nonresidential structures	193	28
39	Maintenance and repair construction of nonresidential structures	110	16
369	Architectural, engineering, and related services	87	13
413	Food services and drinking places	25	4
388	Services to buildings and dwellings	24	3
360	Real estate establishments	19	3
319	Wholesale trade businesses	13	2
394	Offices of physicians, dentists, and other health practitioners	11	2
329	Retail Stores - General merchandise	8	1
324	Retail Stores - Food and beverage	7	1
Total		**497**	**72**

TABLE A-13. ALTERNATIVE B NORTH SEAWALL EMPLOYMENT IMPACTS

Sector	Description	Total Employment (No. of jobs)	% of Total
36	Construction of other new nonresidential structures	85	28
39	Maintenance and repair construction of nonresidential structures	52	17
369	Architectural, engineering, and related services	39	13
413	Food services and drinking places	11	4
360	Real estate establishments	8	3
319	Wholesale trade businesses	6	2
388	Services to buildings and dwellings	5	2
394	Offices of physicians, dentists, and other health practitioners	5	2
329	Retail Stores - General merchandise	4	1
324	Retail Stores - Food and beverage	3	1
Total		**217**	**71**

TABLE A-14. ALTERNATIVE C CENTRAL SEAWALL EMPLOYMENT IMPACTS

Sector	Description	Total Employment (No. of jobs)	% of Total
36	Construction of other new nonresidential structures	153	29
39	Maintenance and repair construction of nonresidential structures	82	15
369	Architectural, engineering, and related services	68	13
413	Food services and drinking places	19	4
360	Real estate establishments	15	3
388	Services to buildings and dwellings	14	3
319	Wholesale trade businesses	10	2
394	Offices of physicians, dentists, and other health practitioners	9	2
329	Retail Stores - General merchandise	6	1
324	Retail Stores - Food and beverage	6	1
Total		**381**	**71**

TABLE A-15. ALTERNATIVE C NORTH SEAWALL EMPLOYMENT IMPACTS

Sector	Description	Total Employment (No. of jobs)	% of Total
36	Construction of other new nonresidential structures	115	28
39	Maintenance and repair construction of nonresidential structures	69	17
369	Architectural, engineering, and related services	52	13
413	Food services and drinking places	15	4
360	Real estate establishments	11	3
319	Wholesale trade businesses	8	2
388	Services to buildings and dwellings	7	2
394	Offices of physicians, dentists, and other health practitioners	7	2
329	Retail Stores - General merchandise	5	1
324	Retail Stores - Food and beverage	4	1
Total		**293**	**71**

A1.1.4.2.2 Total Labor Income Impact

The top ten beneficial labor income impacts (employee compensation and proprietary income) are estimated by sector as shown in Table A-16 through Table A-21.

TABLE A-16. ALTERNATIVE A CENTRAL SEAWALL LABOR INCOME IMPACTS

Sector	Description	Total Labor Income ($)	% of Total
36	Construction of other new nonresidential structures	9,102,000	32
39	Maintenance and repair construction of nonresidential structures	4,641,000	16
369	Architectural, engineering, and related services	4,320,000	15
319	Wholesale trade businesses	780,000	3
394	Offices of physicians, dentists, and other health practitioners	625,000	2
413	Food services and drinking places	450,000	2
397	Private hospitals	425,000	1
354	Monetary authorities and depository credit intermediation activities	313,000	1
367	Legal services	279,000	1
357	Insurance carriers	250,000	1
Total		**21,187,000**	**73**

TABLE A-17. ALTERNATIVE A NORTH SEAWALL LABOR INCOME IMPACTS

Sector	Description	Total Labor Income ($)	% of Total
36	Construction of other new nonresidential structures	7,243,000	31
39	Maintenance and repair construction of nonresidential structures	4,198,000	18
369	Architectural, engineering, and related services	3,552,000	15
319	Wholesale trade businesses	645,000	3
394	Offices of physicians, dentists, and other health practitioners	517,000	2
413	Food services and drinking places	371,000	2
397	Private hospitals	352,000	1
354	Monetary authorities and depository credit intermediation activities	258,000	1
367	Legal services	231,000	1
357	Insurance carriers	205,000	1
Total		**17,572,000**	**74**

TABLE A-18. ALTERNATIVE B CENTRAL SEAWALL LABOR INCOME IMPACTS

Sector	Description	Total Labor Income ($)	% of Total
36	Construction of other new nonresidential structures	12,275,000	31
39	Maintenance and repair construction of nonresidential structures	6,781,000	17
369	Architectural, engineering, and related services	6,031,000	15
319	Wholesale trade businesses	1,088,000	3
394	Offices of physicians, dentists, and other health practitioners	876,000	2
413	Food services and drinking places	631,000	2
388	Services to buildings and dwellings	615,000	2
324	Retail Stores - Food and beverage	291,000	1
329	Retail Stores - General merchandise	285,000	1
360	Real estate establishments	275,000	1
Total		**29,147,000**	**73**

TABLE A-19. ALTERNATIVE B NORTH SEAWALL LABOR INCOME IMPACTS

Sector	Description	Total Labor Income ($)	% of Total
36	Construction of other new nonresidential structures	5,390,000	30
39	Maintenance and repair construction of nonresidential structures	3,223,000	18
369	Architectural, engineering, and related services	2,661,000	15
319	Wholesale trade businesses	484,000	3
394	Offices of physicians, dentists, and other health practitioners	388,000	2
413	Food services and drinking places	279,000	2
388	Services to buildings and dwellings	134,000	1
324	Retail Stores - Food and beverage	130,000	1
329	Retail Stores - General merchandise	127,000	1
360	Real estate establishments	121,000	1
Total		**12,937,000**	**73**

TABLE A-20. ALTERNATIVE C CENTRAL SEAWALL LABOR INCOME IMPACTS

Sector	Description	Total Labor Income ($)	% of Total
36	Construction of other new nonresidential structures	9,691,000	31
39	Maintenance and repair construction of nonresidential structures	5,093,000	16
369	Architectural, engineering, and related services	4,684,000	15
319	Wholesale trade businesses	843,000	3
394	Offices of physicians, dentists, and other health practitioners	677,000	2
413	Food services and drinking places	488,000	2
397	Private hospitals	461,000	1
388	Services to buildings and dwellings	361,000	1
354	Monetary authorities and depository credit intermediation activities	339,000	1
367	Legal services	303,000	1
Total		**22,941,000**	**74**

TABLE A-21. ALTERNATIVE C NORTH SEAWALL LABOR INCOME IMPACTS

Sector	Description	Total Labor Income ($)	% of Total
36	Construction of other new nonresidential structures	7,326,000	31
39	Maintenance and repair construction of nonresidential structures	4,241,000	18
369	Architectural, engineering, and related services	3,591,000	15
319	Wholesale trade businesses	652,000	3
394	Offices of physicians, dentists, and other health practitioners	522,000	2
413	Food services and drinking places	375,000	2
397	Private hospitals	356,000	1
354	Monetary authorities and depository credit intermediation activities	261,000	1
367	Legal services	233,000	1
357	Insurance carriers	207,000	1
Total		**17,765,000**	**74**

A1.1.4.2.3 Total Value-Added Impact

IMPLAN estimates the value added (employee compensation, proprietary income, other property type income, and indirect business taxes) impacts for the regional economy as follows (Table A-22 through Table A-27).

TABLE A-22. ALTERNATIVE A CENTRAL SEAWALL VALUE ADDED IMPACTS

Sector	Description	Total Value Added ($)	% of Total
36	Construction of other new nonresidential structures	10,341,000	26
39	Maintenance and repair construction of nonresidential structures	5,475,000	14
369	Architectural, engineering, and related services	4,564,000	12
361	Imputed rental activity for owner-occupied dwellings	1,636,000	4
360	Real estate establishments	1,463,000	4
319	Wholesale trade businesses	1,347,000	3
394	Offices of physicians, dentists, and other health practitioners	667,000	2
357	Insurance carriers	666,000	2
354	Monetary authorities and depository credit intermediation activities	660,000	2
413	Food services and drinking places	642,000	2
Total		**27,459,000**	**70**

TABLE A-23. ALTERNATIVE A NORTH SEAWALL VALUE ADDED IMPACTS

Sector	Description	Total Value Added ($)	% of Total
36	Construction of other new nonresidential structures	8,228,000	25
39	Maintenance and repair construction of nonresidential structures	4,952,000	15
369	Architectural, engineering, and related services	3,752,000	12
361	Imputed rental activity for owner-occupied dwellings	1,352,000	4
360	Real estate establishments	1,207,000	4
319	Wholesale trade businesses	1,112,000	3
394	Offices of physicians, dentists, and other health practitioners	551,000	2
357	Insurance carriers	547,000	2
354	Monetary authorities and depository credit intermediation activities	545,000	2
413	Food services and drinking places	529,000	2
Total		**22,777,000**	**70**

TABLE A-24. ALTERNATIVE B CENTRAL SEAWALL VALUE ADDED IMPACTS

Sector	Description	Total Value Added ($)	% of Total
36	Construction of other new nonresidential structures	13,945,000	25
39	Maintenance and repair construction of nonresidential structures	7,999,000	15
369	Architectural, engineering, and related services	6,371,000	12
360	Real estate establishments	2,059,000	4
319	Wholesale trade businesses	1,878,000	3
394	Offices of physicians, dentists, and other health practitioners	935,000	2
413	Food services and drinking places	899,000	2
388	Services to buildings and dwellings	843,000	2
324	Retail Stores - Food and beverage	472,000	1
329	Retail Stores - General merchandise	464,000	1
Total		**35,865,000**	**65**

TABLE A-25. ALTERNATIVE B NORTH SEAWALL VALUE ADDED IMPACTS

Sector	Description	Total Value Added ($)	% of Total
36	Construction of other new nonresidential structures	6,123,000	25
39	Maintenance and repair construction of nonresidential structures	3,802,000	16
369	Architectural, engineering, and related services	2,811,000	12
360	Real estate establishments	905,000	4
319	Wholesale trade businesses	835,000	3
394	Offices of physicians, dentists, and other health practitioners	414,000	2
413	Food services and drinking places	397,000	2
324	Retail Stores - Food and beverage	211,000	1
329	Retail Stores - General merchandise	207,000	1
388	Services to buildings and dwellings	184,000	1
Total		**15,890,000**	**66**

TABLE A-26. ALTERNATIVE C CENTRAL SEAWALL VALUE ADDED IMPACTS

Sector	Description	Total Value Added ($)	% of Total
36	Construction of other new nonresidential structures	11,009,000	26
39	Maintenance and repair construction of nonresidential structures	6,007,000	14
369	Architectural, engineering, and related services	4,948,000	12
361	Imputed rental activity for owner-occupied dwellings	1,773,000	4
360	Real estate establishments	1,590,000	4
319	Wholesale trade businesses	1,455,000	3
357	Insurance carriers	724,000	2
394	Offices of physicians, dentists, and other health practitioners	723,000	2
354	Monetary authorities and depository credit intermediation activities	715,000	2
413	Food services and drinking places	696,000	2
Total		**29,641,000**	**70**

TABLE A-27. ALTERNATIVE C NORTH SEAWALL VALUE ADDED IMPACTS

Sector	Description	Total Value Added ($)	% of Total
36	Construction of other new nonresidential structures	8,322,000	26
39	Maintenance and repair construction of nonresidential structures	5,003,000	15
369	Architectural, engineering, and related services	3,794,000	12
361	Imputed rental activity for owner-occupied dwellings	1,367,000	4
360	Real estate establishments	1,220,000	4
319	Wholesale trade businesses	1,125,000	3
394	Offices of physicians, dentists, and other health practitioners	557,000	2
357	Insurance carriers	553,000	2
354	Monetary authorities and depository credit intermediation activities	551,000	2
413	Food services and drinking places	535,000	2
Total		**23,026,000**	**71**

A1.1.4.2.4 Industry Output – Total Production

Industry output impacts by IMPLAN sector are shown in Table A-28 through Table A-33.

TABLE A-28. ALTERNATIVE A CENTRAL SEAWALL INDUSTRY OUTPUT IMPACTS

Sector	Description	Total Industry Output ($)	% of Total
36	Construction of other new nonresidential structures	20,796,000	30
39	Maintenance and repair construction of nonresidential structures	9,820,000	14
369	Architectural, engineering, and related services	7,868,000	11
361	Imputed rental activity for owner-occupied dwellings	2,239,000	3
360	Real estate establishments	1,994,000	3
319	Wholesale trade businesses	1,897,000	3
413	Food services and drinking places	1,175,000	2
354	Monetary authorities and depository credit intermediation activities	1,144,000	2
394	Offices of physicians, dentists, and other health practitioners	1,090,000	2
357	Insurance carriers	1,084,000	2
Total		**49,108,000**	**70**

TABLE A-29. ALTERNATIVE A NORTH SEAWALL INDUSTRY OUTPUT IMPACTS

Sector	Description	Total Industry Output ($)	% of Total
36	Construction of other new nonresidential structures	16,547,000	29
39	Maintenance and repair construction of nonresidential structures	8,882,000	15
369	Architectural, engineering, and related services	6,469,000	11
361	Imputed rental activity for owner-occupied dwellings	1,851,000	3
360	Real estate establishments	1,646,000	3
319	Wholesale trade businesses	1,567,000	3
413	Food services and drinking places	969,000	2
354	Monetary authorities and depository credit intermediation activities	944,000	2
394	Offices of physicians, dentists, and other health practitioners	901,000	2
357	Insurance carriers	890,000	2
Total		**40,668,000**	**70**

TABLE A-30. ALTERNATIVE B CENTRAL SEAWALL INDUSTRY OUTPUT IMPACTS

Sector	Description	Total Industry Output ($)	% of Total
36	Construction of other new nonresidential structures	28,045,000	29
39	Maintenance and repair construction of nonresidential structures	14,346,000	15
369	Architectural, engineering, and related services	10,984,000	11
360	Real estate establishments	2,807,000	3
319	Wholesale trade businesses	2,645,000	3
413	Food services and drinking places	1,647,000	2
388	Services to buildings and dwellings	1,565,000	2
394	Offices of physicians, dentists, and other health practitioners	1,528,000	2
324	Retail Stores - Food and beverage	546,000	1
329	Retail Stores - General merchandise	533,000	1
Total		**64,647,000**	**66**

TABLE A-31. ALTERNATIVE B NORTH SEAWALL INDUSTRY OUTPUT IMPACTS

Sector	Description	Total Industry Output ($)	% of Total
36	Construction of other new nonresidential structures	12,315,000	28
39	Maintenance and repair construction of nonresidential structures	6,819,000	16
369	Architectural, engineering, and related services	4,846,000	11
360	Real estate establishments	1,234,000	3
319	Wholesale trade businesses	1,177,000	3
413	Food services and drinking places	727,000	2
394	Offices of physicians, dentists, and other health practitioners	677,000	2
388	Services to buildings and dwellings	342,000	1
324	Retail Stores - Food and beverage	244,000	1
329	Retail Stores - General merchandise	238,000	1
Total		**28,619,000**	**66**

TABLE A-32. ALTERNATIVE C CENTRAL SEAWALL INDUSTRY OUTPUT IMPACTS

Sector	Description	Total Industry Output ($)	% of Total
36	Construction of other new nonresidential structures	22,141,000	29
39	Maintenance and repair construction of nonresidential structures	10,775,000	14
369	Architectural, engineering, and related services	8,531,000	11
361	Imputed rental activity for owner-occupied dwellings	2,427,000	3
360	Real estate establishments	2,168,000	3
319	Wholesale trade businesses	2,050,000	3
413	Food services and drinking places	1,274,000	2
354	Monetary authorities and depository credit intermediation activities	1,240,000	2
394	Offices of physicians, dentists, and other health practitioners	1,182,000	2
357	Insurance carriers	1,179,000	2
Total		**52,966,000**	**70**

TABLE A-33. ALTERNATIVE C NORTH SEAWALL INDUSTRY OUTPUT IMPACTS

Sector	Description	Total Industry Output ($)	% of Total
36	Construction of other new nonresidential structures	16,737,000	29
39	Maintenance and repair construction of nonresidential structures	8,972,000	15
369	Architectural, engineering, and related services	6,540,000	11
361	Imputed rental activity for owner-occupied dwellings	1,871,000	3
360	Real estate establishments	1,664,000	3
319	Wholesale trade businesses	1,584,000	3
413	Food services and drinking places	980,000	2
354	Monetary authorities and depository credit intermediation activities	954,000	2
394	Offices of physicians, dentists, and other health practitioners	911,000	2
357	Insurance carriers	900,000	2
Total		**41,115,000**	**70**

A1.1.4.2.5 State and Local Tax Impacts

The estimated tax impacts from construction spending are shown in Table A-34 through Table A-39.

TABLE A-34. ALTERNATIVE A CENTRAL STATE AND LOCAL TAX IMPACTS

Description	Employee Compensation ($)	Proprietor Income ($)	Indirect Business Tax ($)	House-holds ($)	Corporations ($)	Total ($)
Dividends	0	0	0	0	150,000	150,000
Social Insurance Tax-Employee Contribution	5,000	0	0	0	0	5,000
Social Insurance Tax-Employer Contribution	13,000	0	0	0	0	13,000
Indirect Business Tax: Sales Tax	0	0	1,099,000	0	0	1,099,000
Indirect Business Tax: Property Tax	0	0	528,000	0	0	528,000
Indirect Business Tax: Motor Vehicle Licensing	0	0	14,000	0	0	14,000
Indirect Business Tax: Severance Tax	0	0	2,000	0	0	2,000
Indirect Business Tax: Other	0	0	142,000	0	0	142,000
Indirect Business Tax: S/L Non-Taxes	0	0	75,000	0	0	75,000
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees)	0	0	0	126,000	0	126,000
Personal Tax: Motor Vehicle License	0	0	0	33,000	0	33,000
Personal Tax: Property Tax	0	0	0	12,000	0	12,000
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	12,000	0	12,000
Total State and Local Tax	**19,000**	**0**	**1,861,000**	**182,000**	**150,000**	**2,212,000**

TABLE A-35. ALTERNATIVE A NORTH STATE AND LOCAL TAX IMPACTS

Description	Employee Compensation ($)	Proprietor Income ($)	Indirect Business Tax ($)	House-holds ($)	Corporations ($)	Total ($)
Dividends	0	0	0	0	123,000	123,000
Social Ins Tax- Employee Contribution	4,000	0	0	0	0	4,000
Social Ins Tax- Employer Contribution	11,000	0	0	0	0	11,000
Indirect Bus Tax: Sales Tax	0	0	906,000	0	0	906,000
Indirect Bus Tax: Property Tax	0	0	435,000	0	0	435,000
Indirect Bus Tax: Motor Vehicle License	0	0	12,000	0	0	12,000
Indirect Bus Tax: Severance Tax	0	0	2,000	0	0	2,000
Indirect Bus Tax: Other Taxes	0	0	117,000	0	0	117,000
Indirect Bus Tax: S/L Non-Taxes	0	0	62,000	0	0	62,000
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees	0	0	0	104,000	0	104,000
Personal Tax: Motor Vehicle License	0	0	0	28,000	0	28,000
Personal Tax: Property Taxes	0	0	0	10,000	0	10,000
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	10,000	0	10,000
Total State and Local Tax	**16,000**	**0**	**1,534,000**	**151,000**	**123,000**	**1,823,000**

TABLE A-36. ALTERNATIVE B CENTRAL STATE AND LOCAL TAX IMPACTS

Description	Employee Compensation ($)	Proprietor Income ($)	Indirect Business Tax ($)	House-holds ($)	Corporations ($)	Total ($)
Dividends	0	0	0	0	210,000	210,000
Social Ins Tax- Employee Contribution	8,000	0	0	0	0	8,000
Social Ins Tax- Employer Contribution	19,000	0	0	0	0	19,000
Indirect Bus Tax: Sales Tax	0	0	1,544,000	0	0	1,544,000
Indirect Bus Tax: Property Tax	0	0	742,000	0	0	742,000
Indirect Bus Tax: Motor Vehicle License	0	0	20,000	0	0	20,000
Indirect Bus Tax: Severance Tax	0	0	3,000	0	0	3,000
Indirect Bus Tax: Other Taxes	0	0	199,000	0	0	199,000
Indirect Bus Tax: S/L Non-Taxes	0	0	105,000	0	0	105,000
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees	0	0	0	176,000	0	176,000
Personal Tax: Motor Vehicle License	0	0	0	47,000	0	47,000
Personal Tax: Property Taxes	0	0	0	16,000	0	16,000
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	16,000	0	16,000
Total State and Local Tax	**26,000**	**0**	**2,613,000**	**256,000**	**210,000**	**3,106,000**

TABLE A-37. ALTERNATIVE B NORTH STATE AND LOCAL TAX IMPACTS

Description	Employee Compensation ($)	Proprietor Income ($)	Indirect Business Tax ($)	House-holds ($)	Corporations ($)	Total ($)
Dividends	0	0	0	0	93,000	93,000
Social Ins Tax- Employee Contribution	3,000	0	0	0	0	3,000
Social Ins Tax- Employer Contribution	8,000	0	0	0	0	8,000
Indirect Bus Tax: Sales Tax	0	0	680,000	0	0	680,000
Indirect Bus Tax: Property Tax	0	0	326,000	0	0	326,000
Indirect Bus Tax: Motor Vehicle License	0	0	9,000	0	0	9,000
Indirect Bus Tax: Severance Tax	0	0	1,000	0	0	1,000
Indirect Bus Tax: Other Taxes	0	0	88,000	0	0	88,000
Indirect Bus Tax: S/L Non-Taxes	0	0	46,000	0	0	46,000
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees	0	0	0	78,000	0	78,000
Personal Tax: Motor Vehicle License	0	0	0	21,000	0	21,000
Personal Tax: Property Taxes	0	0	0	7,000	0	7,000
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	7,000	0	7,000
Total State and Local Tax	**12,000**	**0**	**1,150,000**	**113,000**	**93,000**	**1,368,000**

TABLE A-38. ALTERNATIVE C CENTRAL STATE AND LOCAL TAX IMPACTS

Description	Employee Compensation ($)	Proprietor Income ($)	Indirect Business Tax ($)	House-holds ($)	Corporations ($)	Total ($)
Dividends	0	0	0	0	163,000	163,000
Social Ins Tax- Employee Contribution	6,000	0	0	0	0	6,000
Social Ins Tax- Employer Contribution	15,000	0	0	0	0	15,000
Indirect Bus Tax: Sales Tax	0	0	1,194,000	0	0	1,194,000
Indirect Bus Tax: Property Tax	0	0	573,000	0	0	573,000
Indirect Bus Tax: Motor Vehicle License	0	0	15,000	0	0	15,000
Indirect Bus Tax: Severance Tax	0	0	3,000	0	0	3,000
Indirect Bus Tax: Other Taxes	0	0	154,000	0	0	154,000
Indirect Bus Tax: S/L Non-Taxes	0	0	81,000	0	0	81,000
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees	0	0	0	136,000	0	136,000
Personal Tax: Motor Vehicle License	0	0	0	36,000	0	36,000
Personal Tax: Property Taxes	0	0	0	13,000	0	13,000
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	12,000	0	12,000
Total State and Local Tax	**20,000**	**0**	**2,020,000**	**198,000**	**163,000**	**2,401,000**

TABLE A-39. ALTERNATIVE C NORTH STATE AND LOCAL TAX IMPACTS

Description	Employee Compensation ($)	Proprietor Income ($)	Indirect Business Tax ($)	House-holds ($)	Corporations ($)	Total ($)
Dividends	0	0	0	0	125,000	125,000
Social Ins Tax- Employee Contribution	5,000	0	0	0	0	5,000
Social Ins Tax- Employer Contribution	11,000	0	0	0	0	11,000
Indirect Bus Tax: Sales Tax	0	0	916,000	0	0	916,000
Indirect Bus Tax: Property Tax	0	0	440,000	0	0	440,000
Indirect Bus Tax: Motor Vehicle License	0	0	12,000	0	0	12,000
Indirect Bus Tax: Severance Tax	0	0	2,000	0	0	2,000
Indirect Bus Tax: Other Taxes	0	0	118,000	0	0	118,000
Indirect Bus Tax: S/L Non-Taxes	0	0	62,000	0	0	62,000
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees	0	0	0	105,000	0	105,000
Personal Tax: Motor Vehicle License	0	0	0	28,000	0	28,000
Personal Tax: Property Taxes	0	0	0	10,000	0	10,000
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	10,000	0	10,000
Total State and Local Tax	**16,000**	**0**	**1,550,000**	**152,000**	**125,000**	**1,843,000**

A1.1.5 Summary

A1.1.5.1 Adverse Impacts during Construction Results

The following list summarizes adverse impacts during construction:

- For a single year, construction will cause a loss of approximately 120 direct jobs in the retail, hotel, museum, food, and travel services sectors. The loss would total 179 jobs including indirect and induced effects across all sectors.
- For a single year of the construction period, construction will also cause an estimated $6.4 million in direct value added adverse impact, and a total of $11.8 million in value added adverse impact including indirect and induced effects.

- Labor income effect amounts to an adverse effect of -$7.02 million for a single year.
- Industry output effect amounts to an adverse effect of -$19.6 million for a single year.

These results are for a single year. For a summary of net present value and annualized values over the period of analysis, see Chapter 5 in main report.

A1.1.5.2 Beneficial Impacts during Construction Results

The following list summarizes beneficial impacts during construction:

- For any single year of the construction period, construction will support between 305 and 653 direct, indirect, and induced FTEs, depending on alternative selected and the location of seawall construction (North or Central Seawall).
- For a single year of the construction period, construction will also result in a beneficial total value added impact of between $24.1 and $55.1 million, depending on alternative and the location of seawall construction (North or Central Seawall).
- Labor income effect amounts to a beneficial effect of between $17.7 and $39.9 million for a single year, depending on alternative and the location of seawall construction (North or Central Seawall).
- Industry output effect amounts to a beneficial effect of between $43.4 and $98.0 million for a single year, depending on alternative and the location of seawall construction (North or Central Seawall).

These results are for a single year. For a summary of net present value and annualized values over the period of analysis, see Chapter 5 in main report.

A1.2 OPERATIONAL EFFECTS

Potential impacts and benefits associated with the long-term operation and maintenance of each proposed alternative are identified and discussed below. For each alternative (including the No Action Alternative), EBSDAM was applied to evaluated regional economic impacts. Operational impacts under the No Action alternative may occur anytime during the period depending on when seawall failure occurs, as simulated in the EBSDAM developed for USACE and City of Seattle (City) joint Elliott Bay Seawall Feasibility Study. Permanent impacts from the build alternatives occur annually over the period.

A1.2.1 No Action Alternative

Three scenarios are evaluated as part of the No Action Alternative. These scenarios include:

1. Minimal Damage: This scenario would require a significant repair of the seawall, but those repairs could be undertaken by the City.
2. Loss of Functionality: This scenario would result in sustained seawall damage to the point that it would no longer be considered safe for public access and as such could no longer perform the majority of its essential functions.
3. Collapse of the Seawall: This scenario occurs only due to seismic damage; however, collapse resulting from seismic events could trigger tidal erosion. This scenario could result in severe effects.

The No Action Alternative involves maintaining the existing seawall. Given the age and condition of the Seawall, it is likely that the seawall will continue to deteriorate and that damage will likely occur during this timeframe. Under the No Action Alternative, the project area will not change as a result of the project but there would be significant risk of impact to the local and regional economy.

A1.2.1.1 Minimal Damage

A1.2.1.1.1 Employment

There would be minimal impacts to employment under this scenario. The businesses would continue operation as-is, and employment would not change as a result of the project. There could be minimal impact to business, and therefore employment, if there is a temporary loss of access to businesses on a pier during repair.

A1.2.1.1.2 Taxes and other Local Government Revenues

There would be minimal impacts to taxes (state, use, hotel, B&O) and other government revenue under this scenario. The parking inventory would remain the same and businesses would continue operation. If a repair was to occur adjacent to one or more businesses, it might have a temporary/minimal negative effect on business revenues, which could in turn lead to less business and sales taxes and less parking revenue.

A1.2.1.1.3 Adverse Operational Impacts with No Action (Minimal Damage)

There would be minimal localized business impacts under this scenario. Continued maintenance and minor repairs of the seawall would result in minor and temporary adverse employment and income effects offset positive impacts of the infusion of some additional spending during repairs/maintenance, but the impacts would be minimal.

A1.2.1.2 Loss of Functionality and Collapse of the Seawall Scenarios

A1.2.1.2.1 Employment

There would be significant adverse impacts to employment under either the Loss of Functionality or Collapse of the Seawall scenarios. Following loss of functionality or collapse, the seawall would not be considered safe for public access, so people would not be able to visit many of the local businesses along the waterfront. Businesses could close temporarily or permanently, which would reduce the employment in the study area. There could be impacts to business and therefore employment if there is loss of access to the piers, waterfront, and waterfront businesses. Employment impact for the top ten affected IMPLAN sectors is shown in Table A-40.

TABLE A-40. EMPLOYMENT IMPACTS WITH NO ACTION (LOSS OF FUNCTIONALITY OR COLLAPSE OF THE SEAWALL SCENARIOS)

Sector	Description	Total Employment (No. of jobs)	% of Total
413	Food services and drinking places	-66	37
411	Hotels and motels, including casino hotels	-15	8
406	Museums, historical sites, zoos, and parks	-14	8
383	Travel arrangement and reservation services	-12	7
330	Retail Stores - Miscellaneous	-10	6
360	Real estate establishments	-7	4
324	Retail Stores - Food and beverage	-5	3
327	Retail Stores - Clothing and clothing accessories	-4	2
319	Wholesale trade businesses	-2	1
394	Offices of physicians, dentists, and other health practitioners	-2	1
Total		**-138**	**77**

A1.2.1.2.2 Taxes and other Local Government Revenues

There would be adverse impacts to taxes (state, use, hotel, B&O) and local government revenues under this scenario. Following loss of functionality or collapse, the seawall would not be considered safe for public access, so people would not be able to visit many of the local businesses along the waterfront. Businesses may then close temporarily or permanently would which reduce the local taxes and other government revues generated from these businesses. Table A-41 summarizes IMPLAN outputs for state and local tax impacts.

TABLE A-41. TAX AND GOVERNMENT REVENUE IMPACTS WITH NO ACTION (LOSS OF FUNCTIONALITY OR COLLAPSE OF THE SEAWALL SCENARIOS)

Description	Employee Compensation ($)	Proprietor Income ($)	Indirect Business Tax ($)	Households ($)	Corporations ($)	Total ($)
Dividends	0	0	0	0	-65,000	-65,000
Social Insurance Tax-Employee Contribution	-1,400	0	0	0	0	-1,400
Social Insurance Tax-Employer Contribution	-3,500	0	0	0	0	-3,500
Indirect Business Tax: Sales Tax	0	0	-594,700	0	0	-594,700
Indirect Business Tax: Property Tax	0	0	-285,600	0	0	-285,600
Indirect Bus Tax: Motor Vehicle Licensing	0	0	-7,700	0	0	-7,700
Indirect Bus Tax: Severance Tax	0	0	-1,200	0	0	-1,200
Indirect Bus Tax: Other Taxes	0	0	-76,700	0	0	-76,700
Indirect Bus Tax: S/L Non-Taxes	0	0	-40,500	0	0	-40,500
Corporate Profits Tax	0	0	0	0	0	0
Personal Tax: Income Tax	0	0	0	0	0	0
Personal Tax: Non-Taxes (Fines- Fees)	0	0	0	-30,700	0	-30,700
Personal Tax: Motor Vehicle License	0	0	0	-8,200	0	-8,200
Personal Tax: Property Tax	0	0	0	-2,800	0	-2,800
Personal Tax: Other Tax (Fish/Hunt)	0	0	0	-2,800	0	-2,800
Total State and Local Tax	**-4,900**	**0**	**-1,006,500**	**-44,500**	**-65,000**	**-1,120,900**

A1.2.1.2.3 Adverse Impacts with No Action (Loss of Functionality or Collapse of the Seawall Scenarios)

There would be adverse impacts to the regional economic development under the Loss of Functionality or Collapse of the Seawall scenarios. The area would not be considered safe for public access, so people would not be able to visit many of the local businesses along the waterfront. Businesses would be closed which would negatively impact the local economy. In addition, tourism would be adversely impacted in

general if people are unable to access and visit the waterfront. IMPLAN Value Added impacts for the top ten affected sectors are shown in Table A-42.

TABLE A–42. NO ACTION LOCAL/REGIONAL OPERATIONAL IMPACTS

Sector	Description	Total Employment (No. of jobs)	Total Value Added ($)	% of Total
413	Food services and drinking places	-66	-2,403,000	20
383	Travel arrangement and reservation services	-12	-1,284,000	11
406	Museums, historical sites, zoos, and parks	-14	-1,076,000	9
411	Hotels and motels, including casino hotels	-15	-1,062,000	9
360	Real estate establishments	-7	-768,000	7
330	Retail Stores - Miscellaneous	-10	-348,000	3
324	Retail Stores - Food and beverage	-5	-331,000	3
319	Wholesale trade businesses	-2	-303,000	3
327	Retail Stores - Clothing and clothing accessories	-4	-200,000	2
394	Offices of physicians, dentists, and other health practitioners	-2	-164,000	1
Total			**-7,938,000**	**67**

APPENDIX B.
COST ESTIMATE SUMMARY OF ALTERNATIVES A, B, AND C[3]

October 2012

[3] Sources: SDOT 2011e, 2011f

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Elliott Bay Seawall Project

10% CONSTRUCTION COSTS - ZONES 1 TO 6

CONCEPT PLAN	ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	ZONE 6: NORTH PIER	ZONE 5: BELL HARBOR	SUBTOTAL NORTH SEAWALL	ZONE 4: PARK / AQUARIUM	ZONE 3: CENTRAL PIER	ZONE 2: FERRY TERMINAL	ZONE 1: PIONEER SQ / SOUTH WASHINGTON	SUBTOTAL CENTRAL SEAWALL	NORTH + CENTRAL SEAWALL TOTAL
					~ 1695 ft	~ 1730 ft	~ 3425 ft	~ 1370 ft	~ 1097 ft	~ 953 ft	~ 321 ft	~ 3741 ft	~ 7166 ft
ALTERNATIVE A - ANCHORED SOIL IMPROVEMENT SEAWALL	**COST ELEMENT 1 - BEACHES, BENCHES & CORRIDORS, & MITIGATION SUBTOTAL**				**$2,880,000**	**$1,480,000**	**$4,360,000**	**$1,950,000**	**$1,560,000**	**$1,550,000**	**$1,030,000**	**$6,090,000**	**$10,450,000**
	1.01	BEACHES AND ACCESS	1	LS	$100,000	$0	$100,000	$60,000	$0	$0	$40,000	$100,000	$200,000
	1.02	HABITAT IMPROVEMENTS	1	LS	$1,830,000	$410,000	$2,240,000	$830,000	$590,000	$640,000	$100,000	$2,160,000	$4,400,000
	1.03	MISCELLANEOUS LANDSCAPING	1	LS	$110,000	$230,000	$340,000	$220,000	$130,000	$70,000	$50,000	$470,000	$810,000
	1.04	ENVIRONMENTAL MITIGATION	1	LS	$840,000	$840,000	$1,680,000	$840,000	$840,000	$840,000	$840,000	$3,360,000	$5,040,000
	COST ELEMENT 2 - SEAWALL STRUCTURES SUBTOTAL				**$44,350,000**	**$45,840,000**	**$90,190,000**	**$47,520,000**	**$36,150,000**	**$32,270,000**	**$10,660,000**	**$126,600,000**	**$216,790,000**
	2.01	PLATFORM DEMO & EXCAVATION	1	LS	$1,980,000	$1,780,000	$3,760,000	$1,790,000	$1,550,000	$1,250,000	$1,200,000	$5,790,000	$9,550,000
	2.02	OVERWATER STRUCTURES	1	LS	$6,360,000	$6,490,000	$12,850,000	$5,140,000	$1,380,000	$3,580,000	$0	$10,100,000	$22,950,000
	2.03	CONTRACTOR TEMPORARY STRUCTURES	1	LS	$3,090,000	$3,150,000	$6,240,000	$2,690,000	$2,160,000	$1,880,000	$1,440,000	$8,170,000	$14,410,000
	2.04	TEMPORARY PEDESTRIAN AND VEHICLE ACCESS	1	LS	$4,200,000	$2,790,000	$6,990,000	$7,690,000	$6,160,000	$5,350,000	$1,130,000	$20,330,000	$27,320,000
	2.05	ANCHORED SOIL IMPROVEMENT SEAWALL	1	LS	$27,920,000	$31,630,000	$59,550,000	$29,410,000	$24,900,000	$19,410,000	$5,290,000	$79,010,000	$138,560,000
	2.06	BRACED SOLDIER PILE SEAWALL	1	LS	$0	$0	$0	$0	$0	$0	$0	$0	$0
	2.07	TRANSITIONS / TERMINATIONS	1	LS	$800,000	$0	$800,000	$800,000	$0	$800,000	$1,600,000	$3,200,000	$4,000,000
	COST ELEMENT 3 - CIVIL & ROADWAY SUBTOTAL				**$6,975,000**	**$7,090,000**	**$14,065,000**	**$4,083,000**	**$3,467,000**	**$3,779,000**	**$3,539,000**	**$14,868,000**	**$28,933,000**
	3.01	RESTORED 4-LANE, ILLUMINATION, AND SIGNALS	1	LS	$2,000,000	$1,790,000	$3,790,000	$1,490,000	$1,130,000	$1,440,000	$1,590,000	$5,650,000	$9,440,000
	3.02	TEMPORARY 3-LANE / MAINTENANCE OF TRAFFIC	1	LS	$4,000,000	$4,010,000	$8,010,000	$1,580,000	$1,540,000	$1,640,000	$1,700,000	$6,460,000	$14,470,000
	3.03	DRAINAGE, CO-COMPLIANCE	1	LS	$946,000	$966,000	$1,912,000	$765,000	$612,000	$532,000	$179,000	$2,088,000	$4,000,000
	3.04	TEMPORARY EROSION AND SEDIMENT CONTROL	1	LS	$29,000	$324,000	$353,000	$248,000	$185,000	$167,000	$70,000	$670,000	$1,023,000
	SUBTOTAL COST ELEMENTS 1, 2, & 3 (2011)				**$54,205,000**	**$54,410,000**	**$108,615,000**	**$53,553,000**	**$41,177,000**	**$37,599,000**	**$15,229,000**	**$147,558,000**	**$256,173,000**
	4.01	MOBILIZATION	8%	LS	$4,336,400	$4,352,800	$8,689,200	$4,284,240.00	$3,294,160	$3,007,920	$1,218,320	$11,804,640	$20,493,840
	4.02	CONTINGENCY	30%	LS	$17,562,420	$17,628,840	$35,191,260	$17,351,172	$13,341,348	$12,182,076	$4,934,196	$47,808,792	$83,000,052
	4.03	ESCALATION TO CONST. MID-POINT 2015 INCL. EXT. OVERHEAD	10%	LS				$7,518,841	$5,781,251	$5,278,900	$2,138,152	$20,717,143	$20,717,143
	4.04	ESCALATION TO CONST. MID-POINT 2020 INCL. EXT. OVERHEAD	23%	LS	$17,503,878.60	$17,570,077	$35,073,956						
	SUBTOTAL CONSTRUCTION COST, ENGINEER'S ESTIMATE, ROUNDED (2014)				**$93,608,000**	**$93,962,000**	**$187,570,000**	**$82,708,000**	**$63,594,000**	**$58,068,000**	**$23,520,000**	**$227,890,000**	**$415,460,000**
	5.01	RIGHT-OF-WAY ACQUISITION	1	LS			$100,000					$1,200,000	
	5.02	ART ALLOWANCE	1%	LS			$1,875,700					$2,278,900	
	5.03	DESIGN AND PERMITTING	15%	LS			$28,135,500					$34,183,500	
	5.04	CONSTRUCTION ADMINISTRATION	12%	LS			$22,508,400					$27,346,800	
	SUBTOTAL SDOT PROJECT COSTS						**$240,191,000**					**$292,902,000**	**$533,093,000**
	TOTAL PROJECT IMPACT, INCLUDING PRIVATE UTILITIES, ROUNDED				**NORTH SEAWALL**		**$240,191,000**	**CENTRAL SEAWALL**				**$292,902,000**	**$533,093,000**

General Notes and Assumptions:

1 Sales tax not included as part of a transportation improvement project.

2 Allowances or constraints for coordinating or interfacing with other major construction projects not included.

3 Utilities are relocated once. Does not include costs for subsequent relocations by future or other projects.

4 TESC estimates do not include allowances for in-water work.

5 Impacts to public, private, and franchise utilities included in project impact as shown.

Elliott Bay Seawall Project

10% CONSTRUCTION COSTS - ZONES 1 TO 6

CONCEPT PLAN	ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	ZONE 6: NORTH PIER	ZONE 5: BELL HARBOR	SUBTOTAL NORTH SEAWALL	ZONE 4: PARK / AQUARIUM	ZONE 3: CENTRAL PIER	ZONE 2: FERRY TERMINAL	ZONE 1: PIONEER SQ / SOUTH WASHINGTON	SUBTOTAL CENTRAL SEAWALL	NORTH + CENTRAL SEAWALL TOTAL
					~ 1695 ft	~ 1730 ft	~ 3425 ft	~ 1370 ft	~ 1097 ft	~ 953 ft	~ 321 ft	~ 3741 ft	~ 7166 ft
ALTERNATIVE B - BRACED SOLDIER PILE SEAWALL	**COST ELEMENT 1 - BEACHES, BENCHES & CORRIDORS, & MITIGATION SUBTOTAL**				**$2,910,000**	**$1,400,000**	**$4,310,000**	**$6,530,000**	**$2,630,000**	**$1,600,000**	**$4,370,000**	**$15,130,000**	**$19,440,000**
	1.01	BEACHES AND ACCESS	1	LS	$90,000	$0	$90,000	$70,000	$0	$0	$0	$70,000	$160,000
	1.02	HABITAT IMPROVEMENTS	1	LS	$1,820,000	$410,000	$2,230,000	$1,540,000	$1,520,000	$640,000	$3,120,000	$6,820,000	$9,050,000
	1.03	MISCELLANEOUS LANDSCAPING	1	LS	$160,000	$150,000	$310,000	$4,080,000	$270,000	$120,000	$410,000	$4,880,000	$5,190,000
	1.04	ENVIRONMENTAL MITIGATION	1	LS	$840,000	$840,000	$1,680,000	$840,000	$840,000	$840,000	$840,000	$3,360,000	$5,040,000
	COST ELEMENT 2 - SEAWALL STRUCTURES SUBTOTAL				**$49,070,000**	**$50,380,000**	**$99,450,000**	**$65,660,000**	**$51,290,000**	**$38,280,000**	**$13,190,000**	**$168,420,000**	**$267,870,000**
	2.01	PLATFORM DEMO & EXCAVATION	1	LS	$1,980,000	$1,910,000	$3,890,000	$2,920,000	$3,640,000	$1,380,000	$1,160,000	$9,100,000	$12,990,000
	2.02	OVERWATER STRUCTURES	1	LS	$6,360,000	$6,490,000	$12,850,000	$19,840,000	$9,600,000	$3,580,000	$1,210,000	$34,230,000	$47,080,000
	2.03	CONTRACTOR TEMPORARY STRUCTURES	1	LS	$4,610,000	$4,700,000	$9,310,000	$3,670,000	$2,940,000	$2,560,000	$860,000	$10,030,000	$19,340,000
	2.04	TEMPORARY PEDESTRIAN AND VEHICLE ACCESS	1	LS	$4,200,000	$2,800,000	$7,000,000	$7,690,000	$6,160,000	$5,350,000	$1,130,000	$20,330,000	$27,330,000
	2.05	ANCHORED SOIL IMPROVEMENT SEAWALL	1	LS	$0	$0	$0	$0	$0	$0	$0	$0	$0
	2.06	BRACED SOLDIER PILE SEAWALL	1	LS	$31,120,000	$34,480,000	$65,600,000	$31,540,000	$28,950,000	$24,610,000	$8,030,000	$93,130,000	$158,730,000
	2.07	TRANSITIONS / TERMINATIONS	1	LS	$800,000	$0	$800,000	$0	$0	$800,000	$800,000	$1,600,000	$2,400,000
	COST ELEMENT 3 - CIVIL & ROADWAY SUBTOTAL				**$7,265,000**	**$7,108,000**	**$14,373,000**	**$4,902,000**	**$4,268,000**	**$4,581,000**	**$4,376,000**	**$18,127,000**	**$32,500,000**
	3.01	RESTORED 4-LANE, ILLUMINATION, AND SIGNALS	1	LS	$2,000,000	$1,790,000	$3,790,000	$1,430,000	$1,070,000	$1,360,000	$1,560,000	$5,420,000	$9,210,000
	3.02	TEMPORARY 3-LANE / MAINTENANCE OF TRAFFIC	1	LS	$4,000,000	$4,000,000	$8,000,000	$2,450,000	$2,400,000	$2,500,000	$2,560,000	$9,910,000	$17,910,000
	3.03	DRAINAGE, CO-COMPLIANCE	1	LS	$946,000	$966,000	$1,912,000	$765,000	$612,000	$532,000	$179,000	$2,088,000	$4,000,000
	3.04	TEMPORARY EROSION AND SEDIMENT CONTROL	1	LS	$319,000	$352,000	$671,000	$257,000	$186,000	$189,000	$77,000	$709,000	$1,380,000
	SUBTOTAL COST ELEMENTS 1, 2, & 3 (2011)				**$59,245,000**	**$58,888,000**	**$118,133,000**	**$77,092,000**	**$58,188,000**	**$44,461,000**	**$21,936,000**	**$201,677,000**	**$319,810,000**
	4.01	MOBILIZATION	8%	LS	$4,739,600	$4,711,040	$9,450,640	$6,167,360.00	$4,655,040	$3,556,880	$1,754,880	$16,134,160	$25,584,800
	4.02	CONTINGENCY	30%	LS	$19,195,380	$19,079,712	$38,275,092	$24,977,808	$18,852,912	$14,405,364	$7,107,264	$65,343,348	$103,618,440
	4.03	ESCALATION TO CONST. MID-POINT 2016 INCL. EXT. OVERHEAD	13%	LS				$14,070,832	$10,620,474	$8,115,022	$4,003,759	$36,810,086	$36,810,086
	4.04	ESCALATION TO CONST. MID-POINT 2022 INCL. EXT. OVERHEAD	27%	LS	$22,458,594.60	$22,323,263.04	$44,781,858						
	SUBTOTAL CONSTRUCTION COST, ENGINEER'S ESTIMATE, ROUNDED (2014)				**$105,639,000**	**$105,003,000**	**$210,642,000**	**$122,308,000**	**$92,317,000**	**$70,539,000**	**$34,802,000**	**$319,966,000**	**$530,608,000**
	5.01	RIGHT-OF-WAY ACQUISITION	1	LS			$100,000					$1,200,000	
	5.02	ART ALLOWANCE	1%	LS			$2,106,420					$3,199,660	
	5.03	DESIGN AND PERMITTING	15%	LS			$31,596,300					$47,994,900	
	5.04	CONSTRUCTION ADMINISTRATION	12%	LS			$25,277,040					$38,395,920	
	SUBTOTAL SDOT PROJECT COSTS						**$269,722,000**					**$410,758,000**	**$680,480,000**
	TOTAL PROJECT IMPACT, INCLUDING PRIVATE UTILITIES, ROUNDED				**NORTH SEAWALL**		**$269,722,000**	**CENTRAL SEAWALL**				**$410,758,000**	**$680,480,000**

General Notes and Assumptions:

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3 Utilities are relocated once. Does not include costs for subsequent relocations by future or other projects.

4 TESC estimates do not include allowances for in-water work.

5 Impacts to public, private, and franchise utilities included in project impact as shown.

Elliott Bay Seawall Project

10% CONSTRUCTION COSTS - ZONES 1 TO 6

CONCEPT PLAN	ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNIT	ZONE 6: NORTH PIER	ZONE 5: BELL HARBOR	SUBTOTAL NORTH SEAWALL	ZONE 4: PARK / AQUARIUM	ZONE 3: CENTRAL PIER	ZONE 2: FERRY TERMINAL	ZONE 1: PIONEER SQ / SOUTH WASHINGTON	SUBTOTAL CENTRAL SEAWALL	NORTH + CENTRAL SEAWALL TOTAL
					~ 1695 ft	~ 1730 ft	~ 3425 ft	~ 1370 ft	~ 1097 ft	~ 953 ft	~ 321 ft	~ 3741 ft	~ 7166 ft
ALTERNATIVE C - ANCHORED SOIL IMPROVEMENT SEAWALL	**COST ELEMENT 1 - BEACHES, BENCHES & CORRIDORS, & MITIGATION SUBTOTAL**				**$2,887,991**	**$1,480,000**	**$4,367,991**	**$1,950,000**	**$1,700,000**	**$1,550,000**	**$4,370,000**	**$9,570,000**	**$13,937,991**
	1.01	BEACHES AND ACCESS	1	LS	$100,000	$0	$100,000	$60,000	$0	$0	$0	$60,000	$160,000
	1.02	HABITAT IMPROVEMENTS	1	LS	$1,830,000	$410,000	$2,240,000	$830,000	$590,000	$640,000	$3,120,000	$5,180,000	$7,420,000
	1.03	MISCELLANEOUS LANDSCAPING	1	LS	$117,991	$230,000	$347,991	$220,000	$270,000	$70,000	$410,000	$970,000	$1,317,991
	1.04	ENVIRONMENTAL MITIGATION	1	LS	$840,000	$840,000	$1,680,000	$840,000	$840,000	$840,000	$840,000	$3,360,000	$5,040,000
	COST ELEMENT 2 - SEAWALL STRUCTURES SUBTOTAL				**$44,610,000**	**$46,110,000**	**$90,720,000**	**$47,880,000**	**$40,630,000**	**$32,540,000**	**$11,950,000**	**$133,000,000**	**$223,720,000**
	2.01	PLATFORM DEMO & EXCAVATION	1	LS	$1,980,000	$1,780,000	$3,760,000	$1,830,000	$3,040,000	$1,300,000	$1,210,000	$7,380,000	$11,140,000
	2.02	OVERWATER STRUCTURES	1	LS	$6,360,000	$6,490,000	$12,850,000	$5,140,000	$4,120,000	$3,580,000	$1,210,000	$14,050,000	$26,900,000
	2.03	CONTRACTOR TEMPORARY STRUCTURES	1	LS	$3,090,000	$3,150,000	$6,240,000	$2,690,000	$2,160,000	$1,880,000	$1,440,000	$8,170,000	$14,410,000
	2.04	TEMPORARY PEDESTRIAN AND VEHICLE ACCESS	1	LS	$4,200,000	$2,790,000	$6,990,000	$7,690,000	$6,160,000	$5,350,000	$1,130,000	$20,330,000	$27,320,000
	2.05	ANCHORED SOIL IMPROVEMENT SEAWALL	1	LS	$28,180,000	$31,900,000	$60,080,000	$29,730,000	$25,150,000	$19,630,000	$5,360,000	$79,870,000	$139,950,000
	2.06	BRACED SOLDIER PILE SEAWALL	1	LS	$0	$0	$0	$0	$0	$0	$0	$0	$0
	2.07	TRANSITIONS / TERMINATIONS	1	LS	$800,000	$0	$800,000	$800,000	$0	$800,000	$1,600,000	$3,200,000	$4,000,000
	COST ELEMENT 3 - CIVIL & ROADWAY SUBTOTAL				**$7,255,000**	**$7,460,000**	**$14,715,000**	**$5,063,000**	**$4,277,000**	**$4,559,000**	**$4,179,000**	**$18,078,000**	**$32,793,000**
	3.01	RESTORED 4-LANE, ILLUMINATION, AND SIGNALS	1	LS	$2,590,000	$2,330,000	$4,920,000	$1,960,000	$1,480,000	$1,800,000	$1,910,000	$7,150,000	$12,070,000
	3.02	TEMPORARY 3-LANE / MAINTENANCE OF TRAFFIC	1	LS	$3,690,000	$3,840,000	$7,530,000	$2,090,000	$2,000,000	$2,060,000	$2,020,000	$8,170,000	$15,700,000
	3.03	DRAINAGE, CO-COMPLIANCE	1	LS	$946,000	$966,000	$1,912,000	$765,000	$612,000	$532,000	$179,000	$2,088,000	$4,000,000
	3.04	TEMPORARY EROSION AND SEDIMENT CONTROL	1	LS	$29,000	$324,000	$353,000	$248,000	$185,000	$167,000	$70,000	$670,000	$1,023,000
	SUBTOTAL COST ELEMENTS 1, 2, & 3 (2011)				**$54,752,991**	**$55,050,000**	**$109,802,991**	**$54,893,000**	**$46,607,000**	**$38,649,000**	**$20,499,000**	**$160,648,000**	**$270,450,991**
	4.01	MOBILIZATION	8%	LS	$4,380,239	$4,404,000	$8,784,239	$4,391,440.00	$3,728,560	$3,091,920	$1,639,920	$12,851,840	$21,636,079
	4.02	CONTINGENCY	30%	LS	$17,739,969	$17,836,200	$35,576,169	$17,785,332	$15,100,668	$12,522,276	$6,641,676	$52,049,952	$87,626,121
	4.03	ESCALATION TO CONST. MID-POINT 2015 INCL. EXT. OVERHEAD	10%	LS				$7,706,977	$6,543,623	$5,426,320	$2,878,060	$22,554,979	$22,554,979
	4.04	ESCALATION TO CONST. MID-POINT 2020 INCL. EXT. OVERHEAD	23%	LS	$17,680,835.93	$17,776,746	$35,457,582						
	SUBTOTAL CONSTRUCTION COST, ENGINEER'S ESTIMATE, ROUNDED (2014)				**$94,555,000**	**$95,067,000**	**$189,622,000**	**$84,777,000**	**$71,980,000**	**$59,690,000**	**$31,659,000**	**$248,106,000**	**$437,728,000**
	5.01	RIGHT-OF-WAY ACQUISITION	1	LS			$100,000					$1,200,000	
	5.02	ART ALLOWANCE	1%	LS			$1,896,220					$2,481,060	
	5.03	DESIGN AND PERMITTING	15%	LS			$28,443,300					$37,215,900	
	5.04	CONSTRUCTION ADMINISTRATION	12%	LS			$22,754,640					$29,772,720	
	SUBTOTAL SDOT PROJECT COSTS						**$242,817,000**					**$318,778,000**	**$561,595,000**
	TOTAL PROJECT IMPACT, INCLUDING PRIVATE UTILITIES, ROUNDED				**NORTH SEAWALL**		**$242,817,000**	**CENTRAL SEAWALL**				**$318,778,000**	**$561,595,000**

General Notes and Assumptions:

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