Elliott Bay Seawall Project

Cultural Resources Assessment

REDACTED VERSION

September 2012

Submitted to:

City of Seattle
Department of Transportation
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Seattle WA 98124

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CULTURAL RESOURCES REPORT COVER SHEET

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Title of Report: Elliott Bay Seawall Project Cultural Resources Assessment

Date of Report: September 6, 2012

County(ies): King

Section: 6 Township: 24 N Range: 4E,
Section: 31 Township: 25 N Range: 4E, and
Section: 36 Township: 25 N Range: 3E.
Quad: Seattle North and South Acres: 124

PDF of report submitted (REQUIRED) ☐ Yes

Historic Property Inventory Forms to be Approved Online? ☒ Yes ☐ No

Archaeological Site(s)/Isolate(s) Found or Amended? ☒ Yes ☐ No

TCP(s) found? ☐ Yes ☒ No

Replace a draft? ☐ Yes ☒ No

Satisfy a DAHP Archaeological Excavation Permit requirement? ☐ Yes # ☒ No

DAHP Archaeological Site #:
45KI1011
45KI1012
45KI1013
45KI1099

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City of Seattle
Elliott Bay Seawall Project
Cultural Resources Assessment

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

APE	Area of Potential Effects
AWV	Alaskan Way Viaduct
AWVRP	Alaskan Way Viaduct Replacement Program
AWVSRP	Alaskan Way Viaduct and Seawall Replacement Program
BMP	Best Management Practice
BNSF	BNSF Railway
BSP	braced soldier pile
B.P.	Years before present (counted from the year 1950)
bpsl	Below present sea level
CFR	Code of Federal Regulations
City	City of Seattle
DAHP	Washington State Department of Archaeology and Historic Preservation
DPD	Department of Planning and Development
EBSP	Elliott Bay Seawall Project
EIS	Environmental Impact Statement
ELRP	Electrical Line Replacement Project
fbs	feet below the surface
FHWA	Federal Highway Administration
fsw	feet of sea water
GLO	General Land Office
GPS	Global Positioning System
HAER	Historic American Engineering Record
MOA	Memorandum of Agreement
NARA	National Archives and Records Administration
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966, as amended
NRHP	National Register of Historic Places
NWAA	Northwest Archaeological Associates, Inc.
RCW	Revised Code of Washington
ROV	Remote-operated Vehicle
SCL	Seattle City Light
SEPA	Washington State Environmental Policy Act
SDOT	Seattle Department of Transportation
SHPO	State Historic Preservation Officer
SLS&E	Seattle Lakeshore and Eastern Railroad
SMC	Seattle Municipal Code
SR	State Route
TBM	tunnel-boring machine
TCP	Traditional Cultural Property
USACE	U.S. Army Corps of Engineers
USC	United States Code
WAC	Washington Administrative Code
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WSDOT	Washington State Department of Transportation

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EXECUTIVE SUMMARY

The City of Seattle Department of Transportation (SDOT) is proposing to replace the existing seawall that extends north from S. Washington Street to Broad Street along city's downtown waterfront. To expedite construction, SDOT has submitted a permit application to the United States Army Corps of Engineers (USACE) and other agencies for approval of this project under the Clean Water Act and other laws and regulations. As a result of the USACE participation, the Elliott Bay Seawall Project (EBSP) is subject to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended. Other applicable legislation includes the National Environmental Policy Act (NEPA) and the Washington State Environmental Policy Act (SEPA). In addition to the No Action Alternative required under NEPA and SEPA, three build alternatives have been developed. Each build alternative includes habitat restoration.

The area of potential effects (APE) extends up to 600 feet east (landward) and 400 feet west (waterward) from the 7,166-foot-long seawall. Although the southern extent of the seawall is at S. Washington Street, the APE extends one block further to S. Main Street to allow for consideration of potential adverse effects to the built environment. The northern boundary is generally the north side of Broad Street. The eastern boundary is one to two blocks from the existing seawall to incorporate historic properties that may be affected by ground disturbance, noise, vibrations and other project elements. The western boundary of the APE is marked by the waterward end of the existing piers.

The identification of archaeological resources is confined to areas of ground disturbance which are expected along the length of the seawall from S. Washington Street to Broad Street and extending 75 feet east (landward) of the existing seawall and west (waterward) of the existing seawall to the western APE boundary. The maximum vertical depth of the ground disturbance in the APE is estimated at 75 feet below ground surface.

The methodology used in this report can be broadly divided into three phases: (1) identification of cultural, historic and archaeological resources—both previously recorded and newly identified—within the project APE; (2) evaluation of the historical significance and eligibility for the National Register of Historic Places (NRHP), as well as for City of Seattle Landmarks designation; and (3) assessment of the project's potential adverse effects on significant resources. Field studies conducted for the EBSP consisted of two underwater archaeological surveys along the seawall and a geoarchaeological testing program along Alaskan Way (Marcotte et al. 2012; Rinck 2011; Rinck and Valentino 2012; Roberts 2011).

There are eight recorded archaeological sites in the APE. Four were identified during the EBSP underwater surveys. Three of the eight sites are recommended eligible for the NRHP. Two of these, both historical archaeological sites (45KI1012 and 45KI1013), will be adversely affected by the EBSP. In addition, the geoarchaeological investigations and background research identified several areas, primarily [redacted], that have potential for significant archaeological resources which may be adversely affected by the project. There are no known traditional cultural properties (TCPs) within or immediately adjacent to the APE.

Within the APE there are 32 historical buildings or structures and portions of two historic districts (Pike Place Market and Pioneer Square). Eighteen of the buildings and structures are listed in or eligible for

the NRHP. Two of these resources, the Elliott Bay Seawall and Washington Street Boat Landing, will be adversely affected by the project.

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 effects of the project on cultural, historic, and archaeological resources 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.

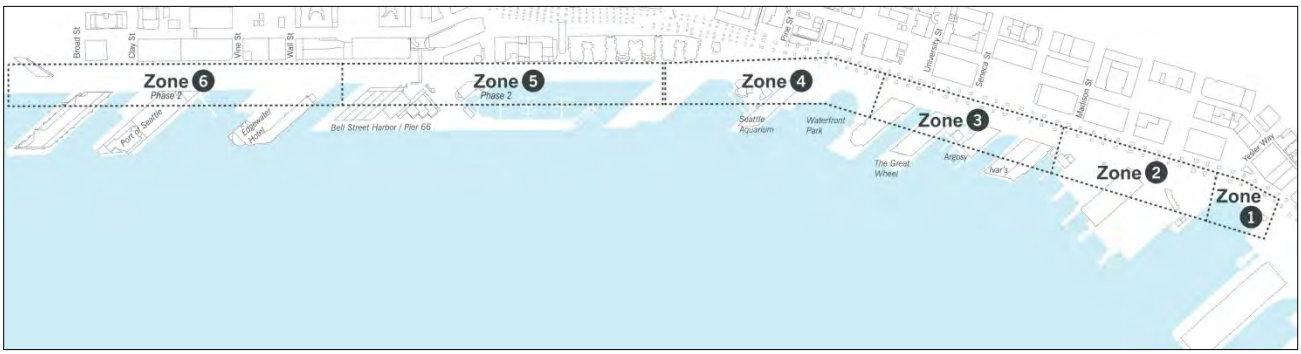


Figure 1-2. Elliott Bay Seawall Zone Designations

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 and, in some locations, installation of a habitat bench and 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, in addition to the habitat improvements described for Alternative A, the construction of a continuous habitat bench and continuous LPS at the piers.
- **Alternative C**, which would move the seawall approximately 10 to 15 feet landward. This alternative would use soil improvements (likely including both jet grouting and deep soil mixing) to provide structural support. Because the seawall would move landward, Alternative C (like Alternative B) would provide a continuous habitat bench and continuous LPS in addition to shoreline enhancements.

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.

Alternative C has been identified as the preferred alternative for the EBSP. This alternative is preferred for the following reasons:

- It provides coastal storm damage protection and seismic protection through soil improvements, which are the most cost effective and least disruptive of the construction techniques evaluated.
- By moving the seawall landward, this alternative affords enhanced opportunities for ecosystem restoration, including a continuous habitat bench for fish passage and development of nearshore enhancements in Zone 1.
- Alternative C requires the fewest seasons of construction, which will reduce impacts on both local businesses and residents as well as the aquatic environment.

Designation of a preferred alternative in the Draft EIS does not mean that the City has officially selected this alternative. Rather, it allows informed public discussion on the alternative that appears to be the

most promising at this point in the design process. Public and agency comments on the Draft EIS may result in improvements to the preferred alternative or in the choice of another alternative.

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 project effects from 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 varying 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, the City, 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 ferry passengers who use Colman Dock daily, 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, the 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 three feet waterward to 75 feet landward of the existing alignment.

The risks of soil liquefaction behind the new seawall would be minimized by the seawall construction methods that would provide stability during seismic events. These methods, soil improvements (jet grouting and/or deep soil mixing) and BSP, differ substantially (as described in Section 1.6). Both methods would provide a high level of protection (soil improvements more so than the BSP method) against seismic action and soil liquefaction when complete. 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.

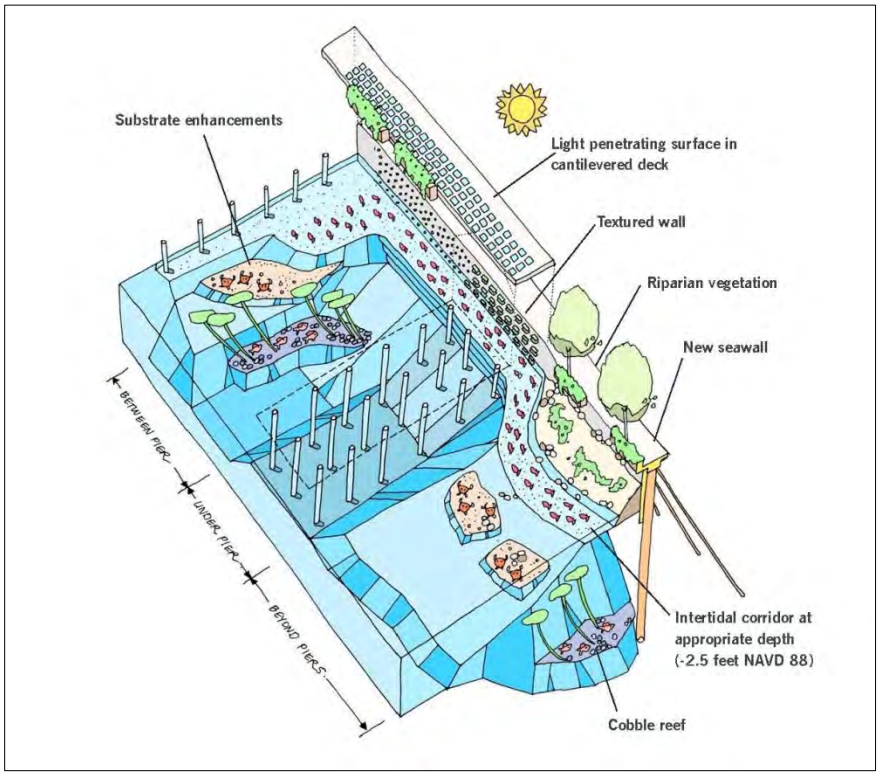


Figure 1-3. Conceptual Rendering of Proposed Habitat Improvements

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 varied aggregate;
- Increasing seawall face textures to encourage the development of marine nearshore habitat and attachment of aquatic organisms;
- Adding riparian plants along the wall and sidewalk; 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 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. A cantilevered sidewalk ranging from 15 to 20 feet in width and including LPS that would benefit the marine habitat below would be constructed along the waterfront. Riparian plantings would be installed along the sidewalk at select areas to provide refuge and food for migrating salmonids. Enhanced 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.

No water quality facilities currently exist to treat surface runoff from Alaskan Way. The project would improve this condition by providing a system for basic water quality treatment of stormwater runoff within the project limits from the Alaskan Way road surface as well as adjacent sidewalks and driveways that drain onto the road surface prior to being discharged to Elliott Bay. Although the design has not yet been finalized, the drainage system would maintain existing drainage patterns as much as possible. Horizontal or vertical adjustments to the existing combined sewer overflows and stormwater outfalls may be necessary to accommodate new seawall infrastructure. Outfall penetrations through the seawall would be coordinated with habitat design.

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 four construction seasons depending on the alternative, with construction seasons extending from approximately Labor Day to Memorial Day to avoid 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 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.

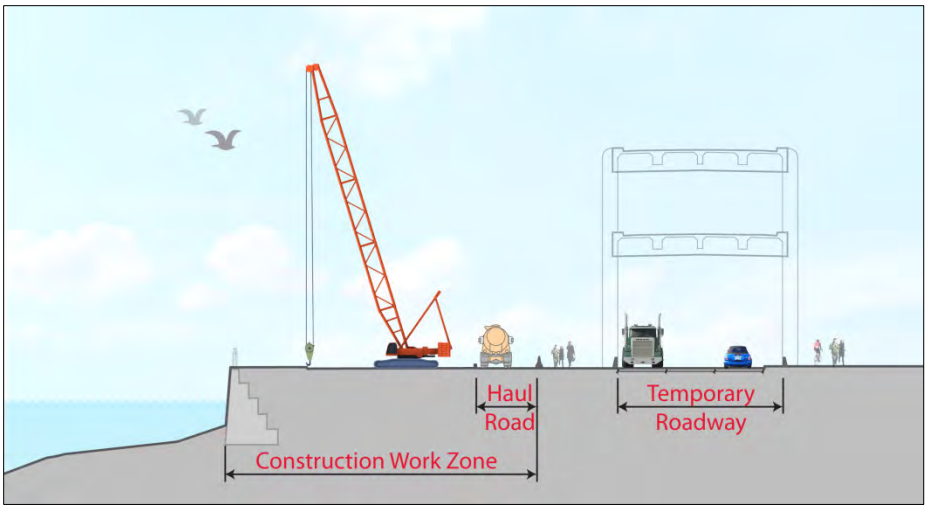


Figure 1-4. Construction Work Zone and Temporary Roadways

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 project 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.

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 channeling truck traffic within the project area.

Temporary parking, consisting of approximately 80 to 100 replacement spaces, could be provided as part of each construction stage during Central Seawall construction. During the first stage of construction, parking could be provided on the existing Alaskan Way roadway to the south of the 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 in Zone 4. A similar program of providing temporary parking would also be undertaken during North Seawall construction to the extent possible.

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 soil stabilization 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 have been discussed 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 inserting a hollow drill pipe a few inches in diameter into the soil to be improved, and, while rotating the drill pipe, spraying grout under high pressure through horizontal nozzles into the surrounding soil. This process cuts the existing soil and mixes the soil and grout. Soil strength would be substantially improved by mixing grout with existing soils, greatly reducing the potential for soil 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 relieving platform to eliminate the need to remove the numerous piles. This cellular arrangement of jet-grout columns would form an enclosure around areas of otherwise liquefiable soil, reaching to the top of the firm glacial till soils below the softer materials. If needed, soil anchors would be installed to tie back the soil block, and the finished arrangement of the grouted columns would create the new seawall. The grouting process generates spoils that would be disposed of using appropriate means.

Deep soil mixing is another technique that could be used for soil improvement. In this technique, an auger would penetrate the ground surface to mix and consolidate the underlying soils to a depth of up to 20 feet. Unlike jet grouting, no grout is applied under pressure in this method and there are less spoils for disposal.

1.6.3.2 Braced Soldier Piles

BSP is a second alternative that could be used to reinforce the existing seawall foundation. The BSP method would involve drilling large holes (approximately eight feet in diameter) to a depth approximately 75 feet below the present street level of Alaskan Way, where the firm layer of glacial till is located. An oscillator, which is a specialized piece of drilling equipment, would install steel casing as the drilling progressed 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 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 was 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

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 settle and/or be treated prior to 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 of 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.

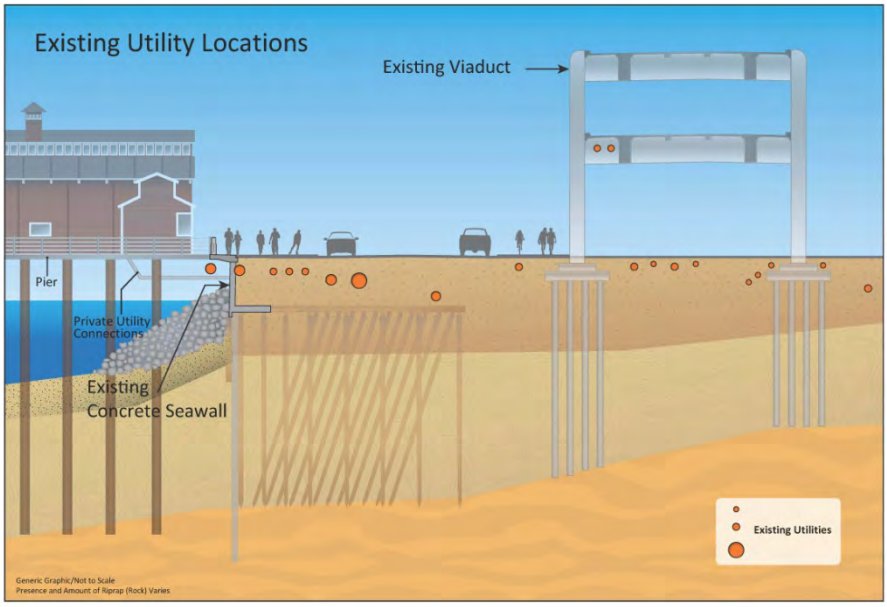


Figure 1-5. Representative Cross-Section Showing Typical Existing Utility Locations within Project Limits

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. Because soil improvement (Alternatives A and C) can be done through small penetrations at the street level, the utility lines above the relieving platform can remain in place during that construction activity. Construction using the BSP method (Alternative B) would require excavation above the relieving

platform, which would mean that many utilities would be temporarily or permanently relocated. With either method, most individual service lines would be temporarily relocated and reinstalled in their final locations as the seawall construction progresses.

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. Figures 1-18 through 1-24 at the end of this chapter provide an overview of each alternative. Table 1-1 (also at the end of this chapter) compares key features of the alternatives.

1.7.1 Alternative A

1.7.1.1 Seawall

In Alternative A, the seawall would be reconstructed as close to the existing alignment as possible, with only a minimal setback (as outlined in the bulleted list below). This would allow construction to proceed without requiring the removal of the existing wall first. As with all seawall construction scenarios, it would be most efficient to leave the existing seawall complex in place during construction of the new seawall and to build the new structure either behind or in front of the existing face.

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 (to the east of) the existing wall; the existing wall would then be demolished west of the new seawall face. In Zone 3, the new seawall structure would be installed 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 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 1 northbound lane and two southbound

lanes. Alternative A would add a 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 expected to be in place prior to the start of seawall construction. Parking and loading zones in the finished configuration 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. 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

As discussed in Section 1.5, and similar to the other build alternatives, 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 as project features. No net loss of ecological function or intertidal elevation would occur.

1.7.1.4 Upland Improvements

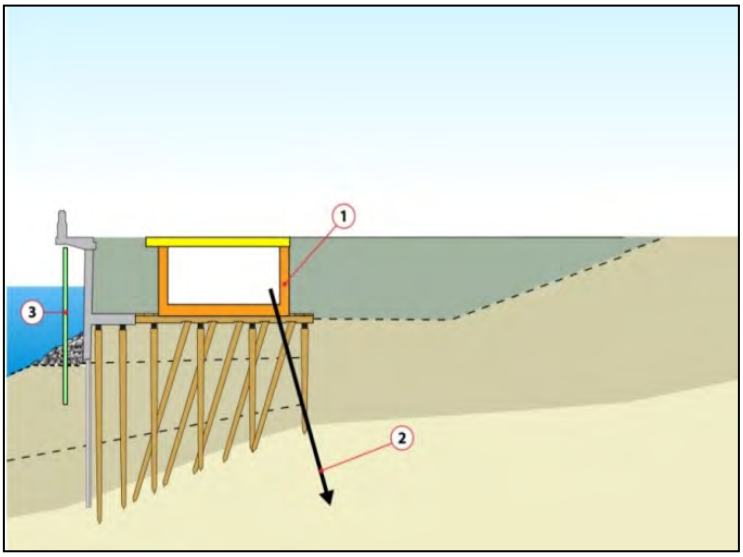
Public amenities in Alternative A would include restoration of the historic Washington Street Boat Landing, improved water viewing opportunities at various locations, new or replaced railings, new sidewalks, waterfront planters, and street plantings. Reconstructed sidewalks would extend from the curb 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

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

[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.

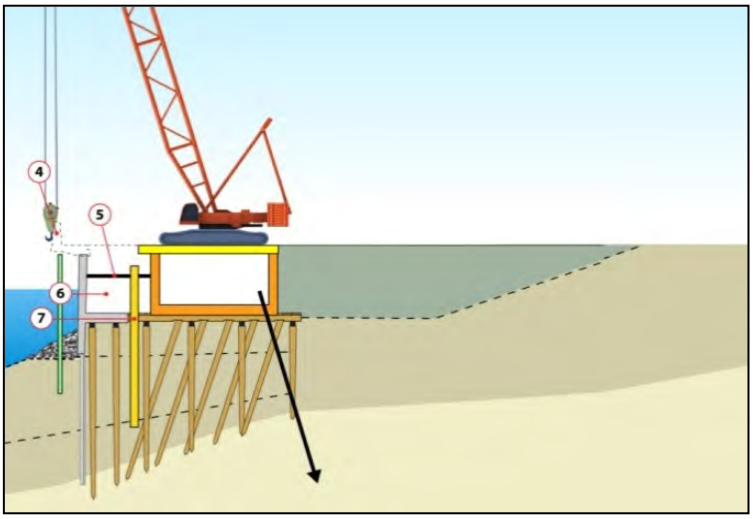
The anticipated construction activities and probable sequence for Alternative A, using jet grouting for the structural improvements, are depicted in a series of figures below. The figures describe four primary stages of work that would occur along the waterfront. The activities within each zone would vary depending on the type of existing seawall present. Figures 1-6 through 1-9 are representative of the expected Alternative A construction sequence, and depict the Type A seawall, which is the most common wall type. (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 began.



Alternative A, Stage 1

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

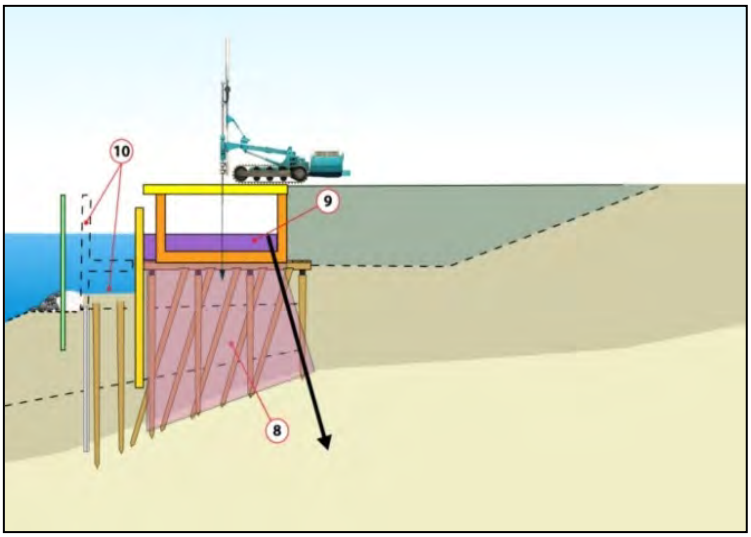
Figure 1-6. Alternative A, Stage 1



Alternative A, Stage 2

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

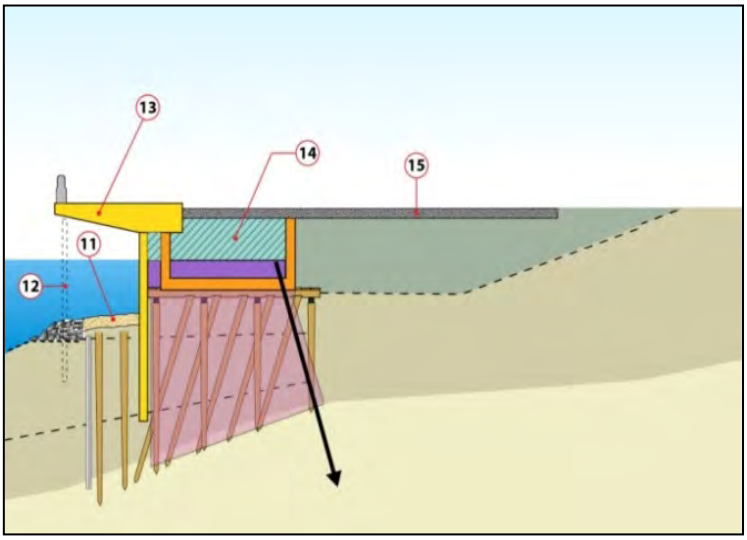
Figure 1-7. Alternative A, Stage 2



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. Backfill
15. Complete restored roadway

Figure 1-9. Alternative A, Stage 4

1.7.2 Alternative B

1.7.2.1 Seawall

Alternative B would move the seawall east of its existing alignment by up to 75 feet (as outlined in the bulleted list below), which would offer the potential for a range of design opportunities. The approximate proposed location of the seawall face for Alternative B, relative to the existing seawall face, would be:

- Zones 1 and 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 further east, providing different opportunities for future habitat and public amenities. This eastward realignment, extending up to 75 feet in some locations, would largely reshape the existing seawall and downtown waterfront. After the new seawall was in place, the existing wall would be demolished.

1.7.2.2 Roadway

Under Alternative B, the lane configuration of Alaskan Way would remain identical to the current configuration due to the confined space that would be available between the new face of the seawall and the existing Alaskan Way Viaduct structure. A temporary northbound lane between Yesler Way and Spring Street would be installed by WSDOT prior to the start of seawall construction and 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

Like Alternative A, 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 increased by setting back the seawall further to the east. Substantial enhancements are proposed within the extra space that would exist in Zones 1, 3, and 4.

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

1.7.2.4 Upland Improvements

Alternative B would include improved water viewing at various locations, as well as additional public gathering and viewing spaces, and interpretive, recreational, and cultural opportunities. The new sidewalks created under this build alternative would be enhanced with LPS and reconfigured with planters and new or replaced railings along the length of the seawall. The additional and enhanced gathering and overlook spaces and new public amenities 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 and would be moved west to improve connections to the water. A new gangway and short-stay boat moorage could be created to restore the historic connection with Elliott Bay. To the north of the boat landing, steps and a boardwalk (Option 1) or boulders (Option 2) could be added for seating and for physical access 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 designed so that they are angled 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.

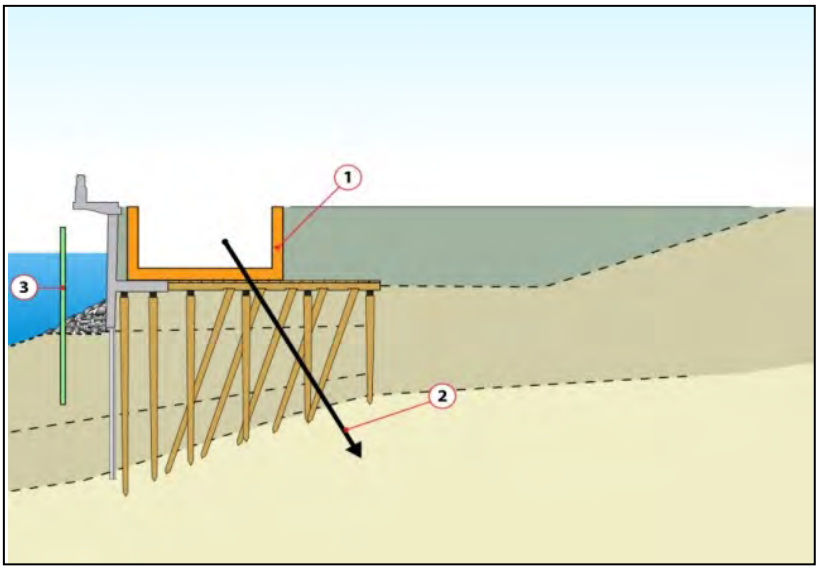
The proposed wall setback of 30 to 75 feet in Zone 4 would provide two types of opportunities: a "Water Plaza" (Option 1) and a "Land Plaza" (Option 2). In Option 1, openings in the expansive plaza and walk would allow users to view tide pools and aquatic life below. In Option 2, raised planters would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

1.7.2.5 Construction and Schedule

The option proposed for design of the primary seawall structural element for Alternative B is BSP, using a drilled-shaft construction method. With this method, the Central Seawall improvements would take approximately five construction seasons to complete, with four summer shutdown periods. North Seawall construction would have a duration of five construction seasons, 1 season longer than Alternatives A and C.

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

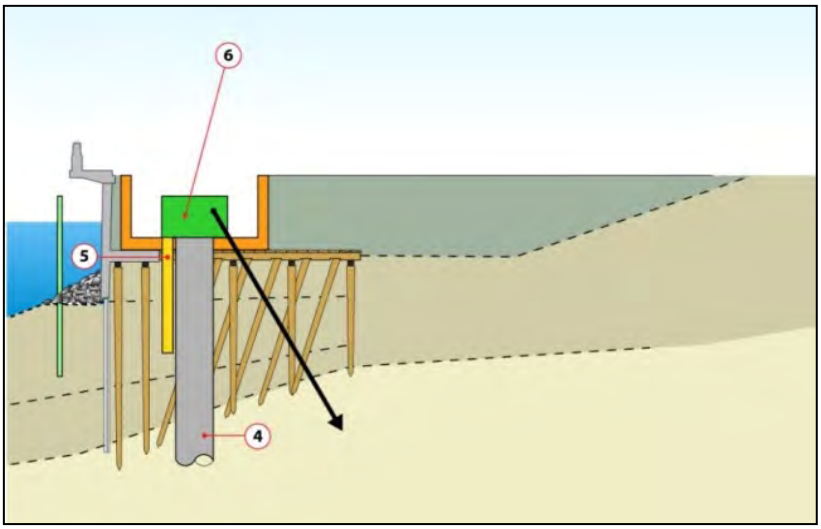
Construction of Alternative B would begin in the Central Seawall in Zone 4, move southward to Zone 3, and then progress to Zones 2 and 1. Central Seawall construction would be followed by North Seawall construction in Zones 6 and 5. The anticipated construction stages for Alternative B (assuming a Type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



Alternative B, Stage 1

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

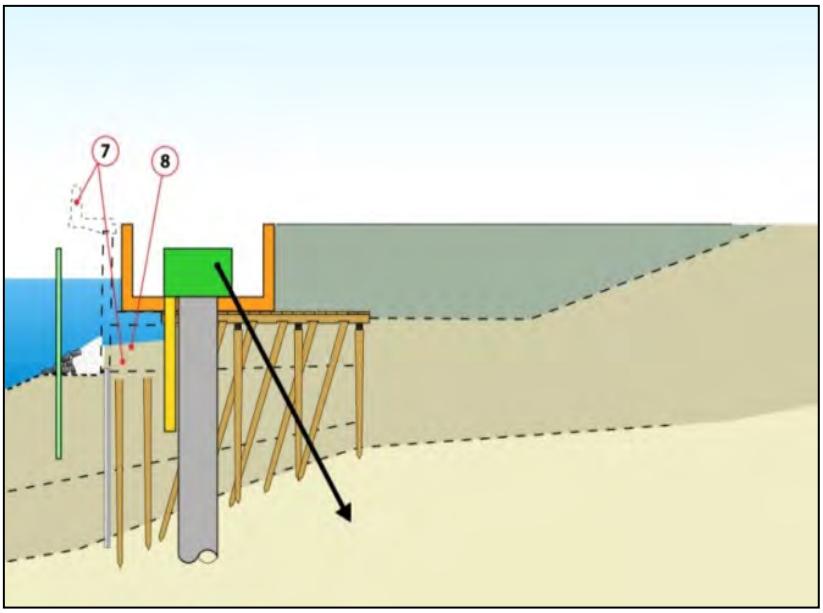
Figure 1-10. Alternative B, Stage 1



Alternative B, Stage 2

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

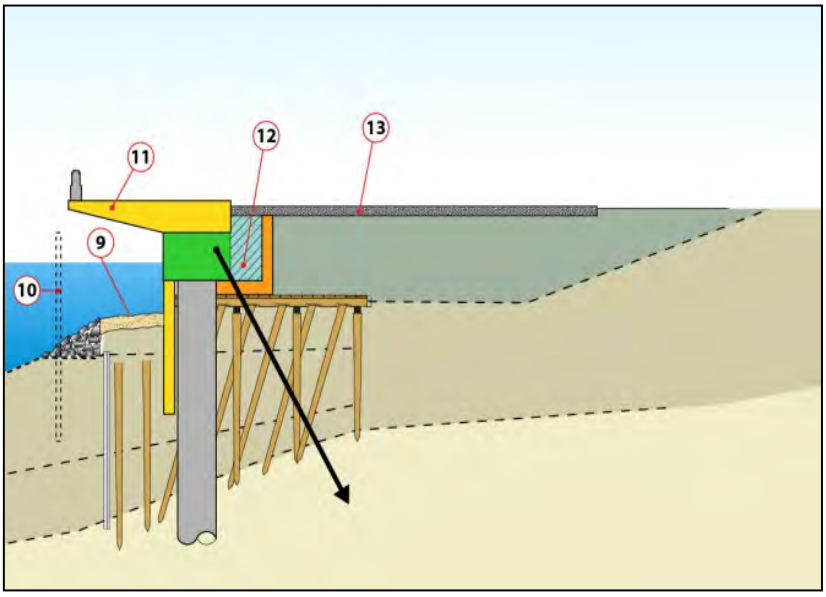
Figure 1-11. Alternative B, Stage 2



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 sidewalk
12. Backfill
13. Complete restored roadway

Figure 1-13. Alternative B, Stage 4

1.7.3 Alternative C

1.7.3.1 Seawall

In Alternative C, the seawall would be reconstructed approximately 10 to 15 feet landward of its existing alignment (as outlined in the bulleted list below). The amount of setback proposed as part of Alternative C would allow soil improvements to proceed without requiring the removal of the existing wall first. 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 1 northbound lane and two southbound lanes. Alternative C would add a northbound lane between S. Washington and Madison Streets[2] to handle traffic in this segment headed to Colman Dock and through to other destinations; a temporary second northbound lane (constructed by WSDOT) is expected to be in place prior to the start of seawall construction. Parking and loading zones in the finished configuration 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. Similar to the other build alternatives, the mixed-use trail on the east side of Alaskan Way would be extended from its existing terminus north 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 development of marine nearshore habitat. A pocket beach would be created in Zone 1, with a variety of substrate sizes and depths. Restoration of riparian areas along the back beach area in Zone 1 would include species of riparian and beach shrubs native to Puget Sound. Marine mattresses (rock-filled

[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.

containers) would be placed to protect the aquatic habitat from wave exposure. Installation of LPS in the cantilevered sidewalk would allow light to access the marine environment below.

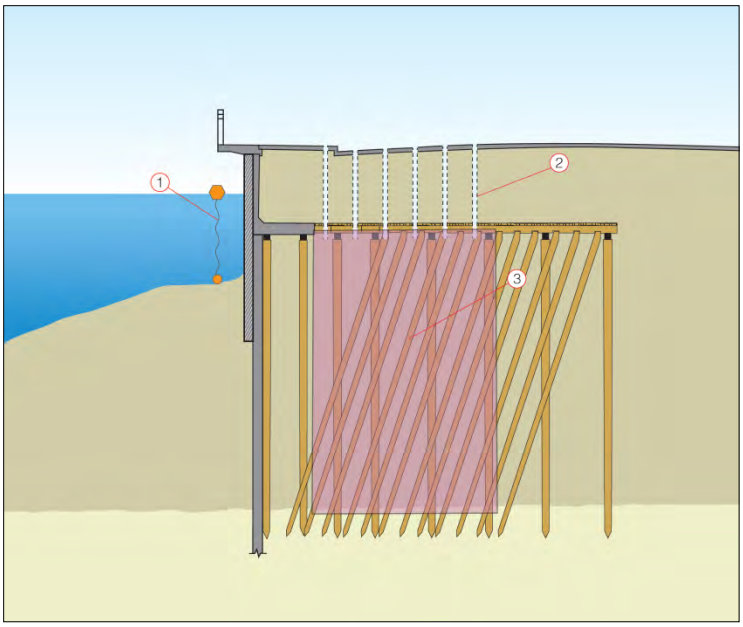
1.7.3.4 Upland Improvements

The restored sidewalk space would include new or upgraded railings, public art, historic elements, wayfinding features, and lighting. Seating would be provided at the existing view corridors that are located between piers. Preserved, enhanced, or additional view opportunities would also be included at Spring Street and University Street. In Zone 1, Washington Street Boat Landing would be restored and reinstalled within the S. Washington Street right-of-way.

1.7.3.5 Construction and Schedule

Similar to Alternative A and consistent with the construction methods description provided in Section 1.6, the proposed construction technique for Alternative C is soil improvement. Unlike Alternative A, Alternative C assumes that soil improvement would be done from street level, without excavating the soils over the relieving platform. Using this method, construction of the Central Seawall would take approximately three construction seasons to complete, with two summer shutdown periods. Construction for the North Seawall would require an additional four construction seasons with three summer shutdown periods. Current plans for Alternative C are to begin Central Seawall construction in Zone 4, move southward to Zone 3, and then progress to Zones 2 and 1. Central Seawall construction would be followed by North Seawall construction in Zones 6 and 5.

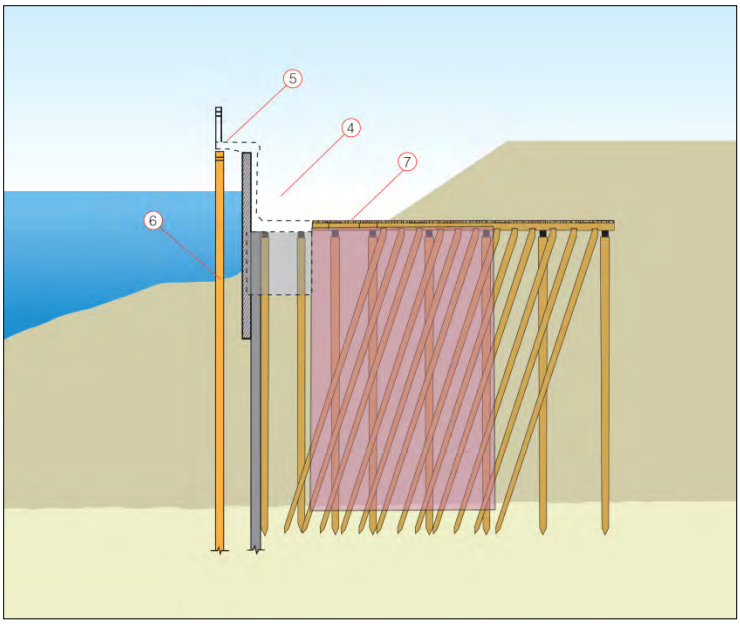
The anticipated construction activities and probable sequence for Alternative C, using soil improvement, are depicted below. The figures describe four primary stages of work that would occur along the waterfront. The activities within each zone would vary depending on the type of existing seawall present.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



Alternative C, Stage 1

1. Place in-water containment curtain
2. Pre-drill and fill existing void beneath timber relieving platform
3. Jet grout to improve soil

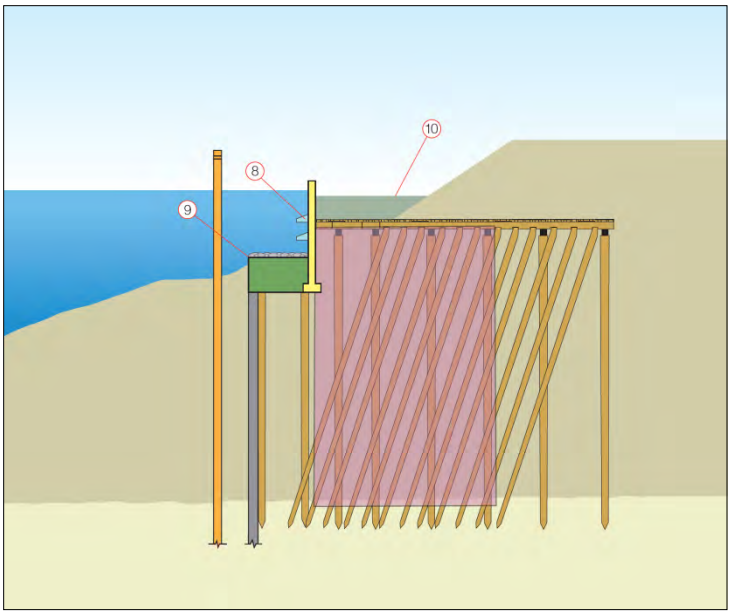
Figure 1-14. Alternative C, Stage 1



Alternative C, Stage 3

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

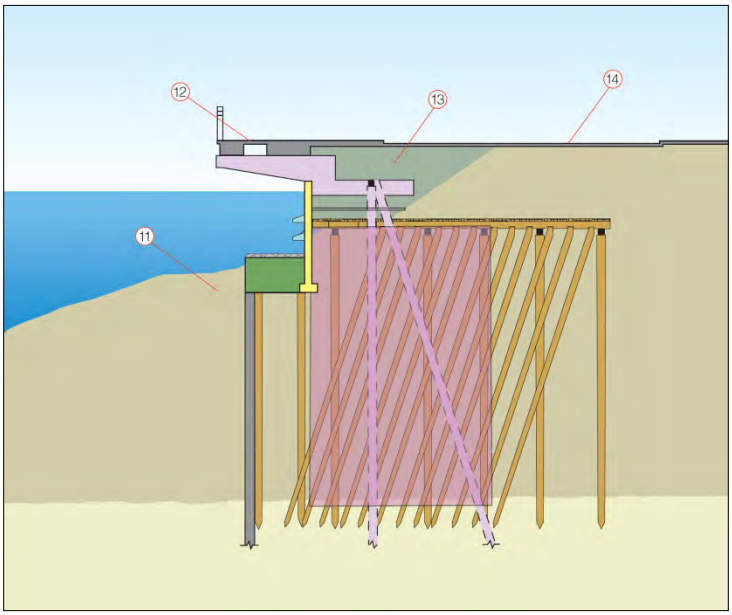
Figure 1-15. Alternative C, Stage 2



Alternative C, Stage 3

8. Install new face panels and habitat shelves
9. Place habitat bench
10. Fill behind new seawall face

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 • Daylighting of cantilevered sidewalk • Cobble reef • Textured seawall face	• Riparian plantings • Substrate enhancement • Daylighting of cantilevered sidewalk • Cobble reef • Expanded habitat bench and backshore	• Riparian plantings • Substrate enhancement • Daylighting of cantilevered sidewalk • 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	• Washington Street Boat Landing restoration (up to 15 feet waterward of existing location)
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 at piers • 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 at piers
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 surface

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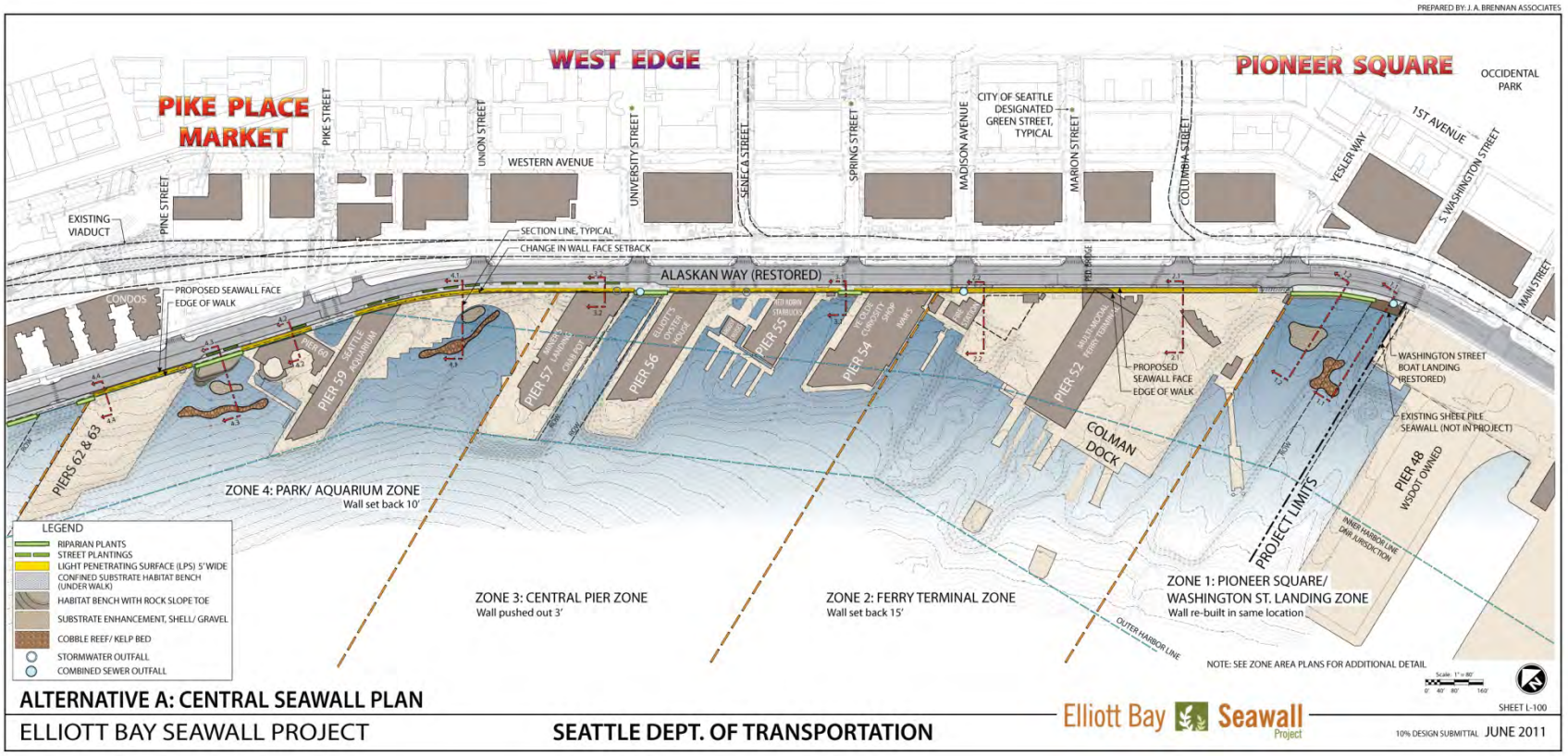

Figure 1-18. Alternative A: Central Seawall Plan

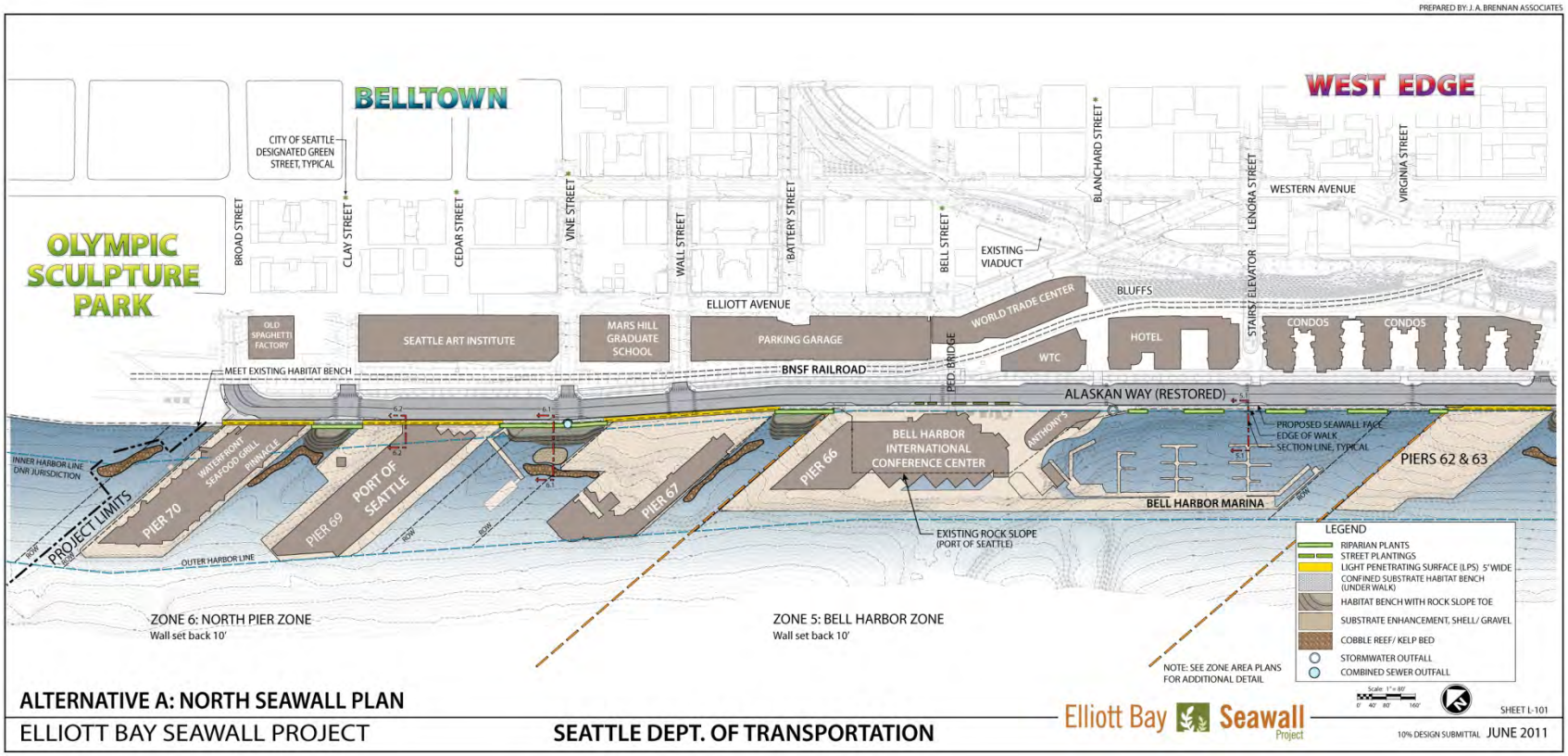

Figure 1-19. Alternative A: North Seawall Plan

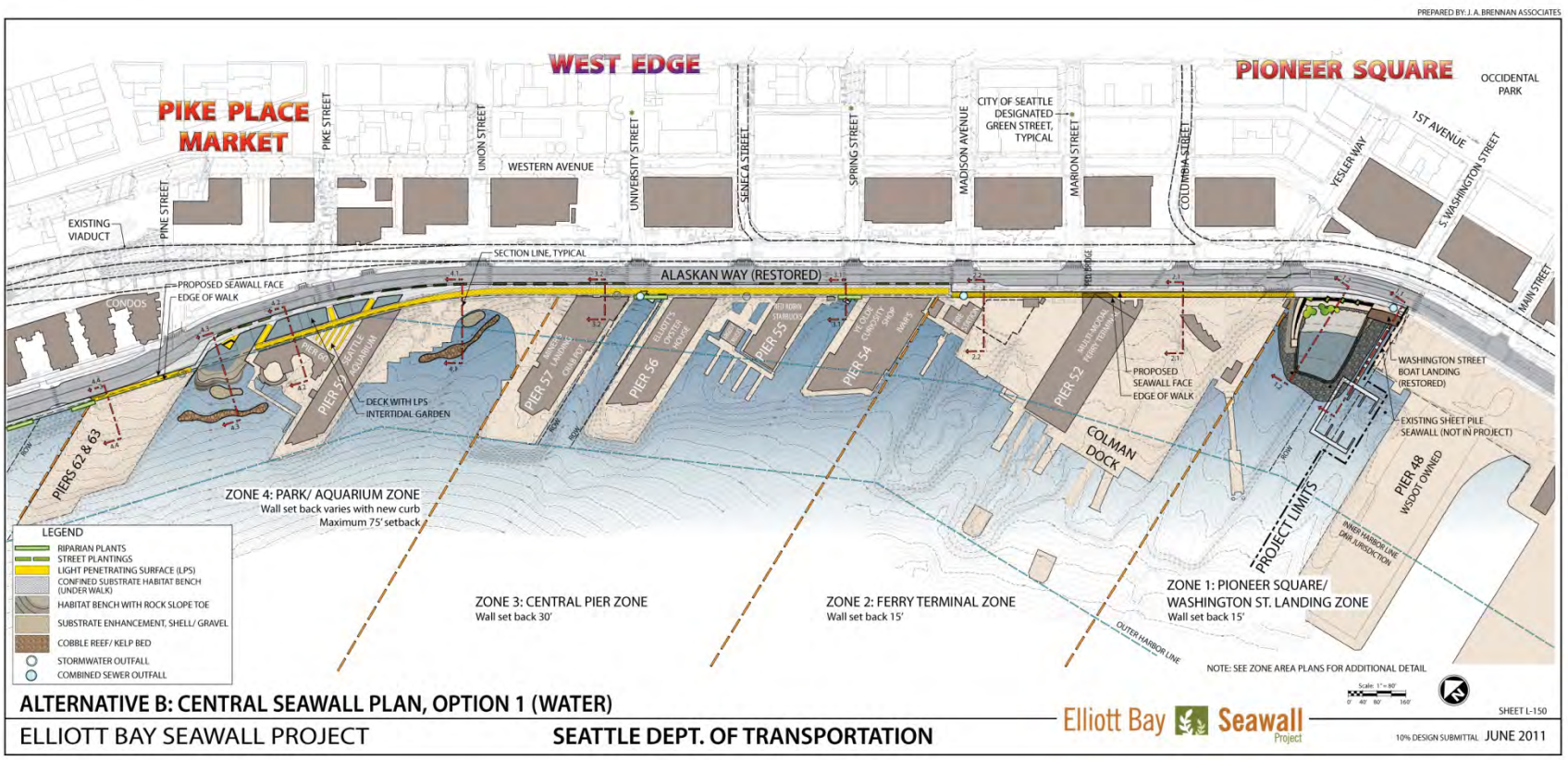

Figure 1-20. Alternative B: Central Seawall Plan, Option 1

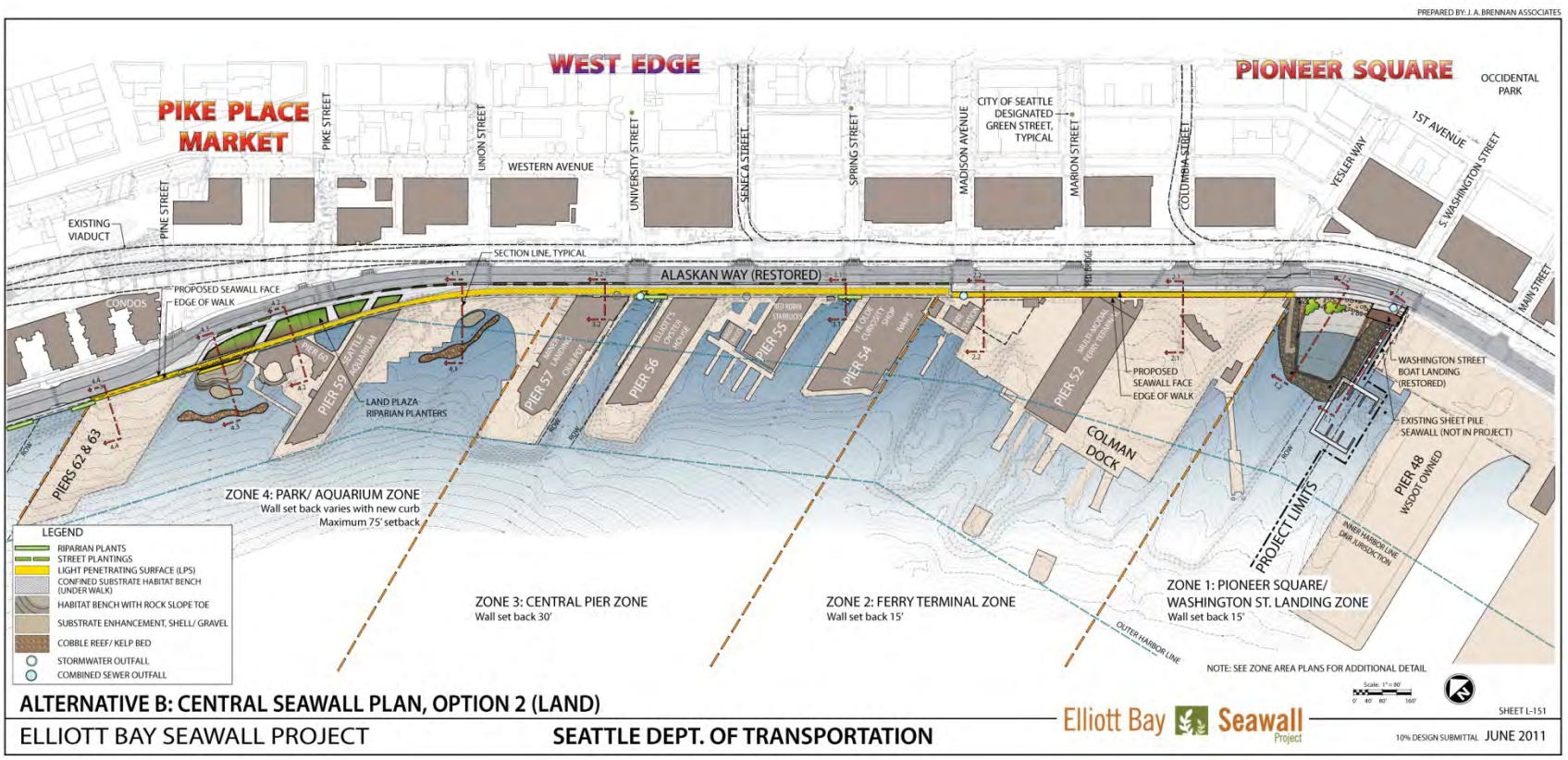

Figure 1-21. Alternative B: Central Seawall Plan, Option 2

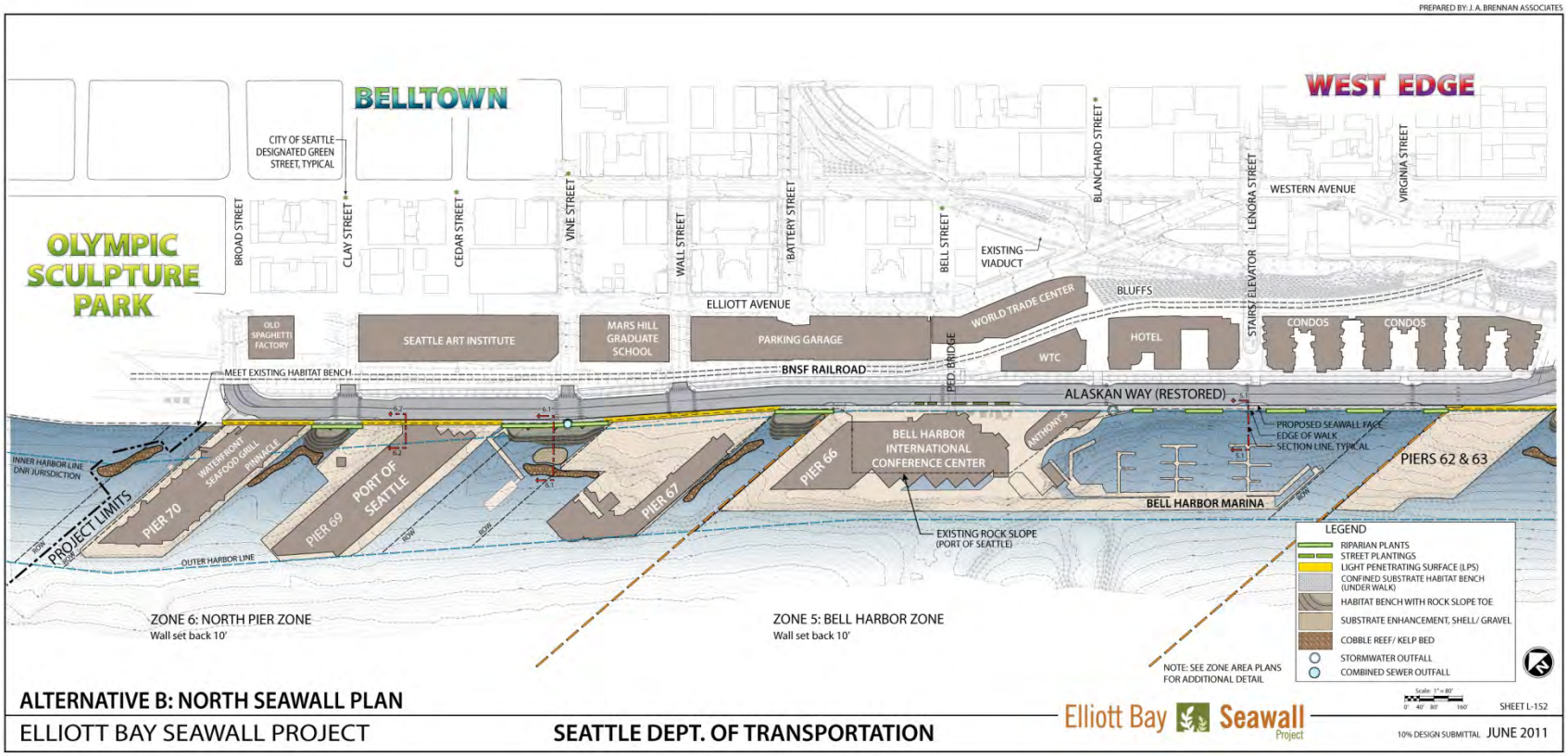

Figure 1-22. Alternative B: North Seawall Plan

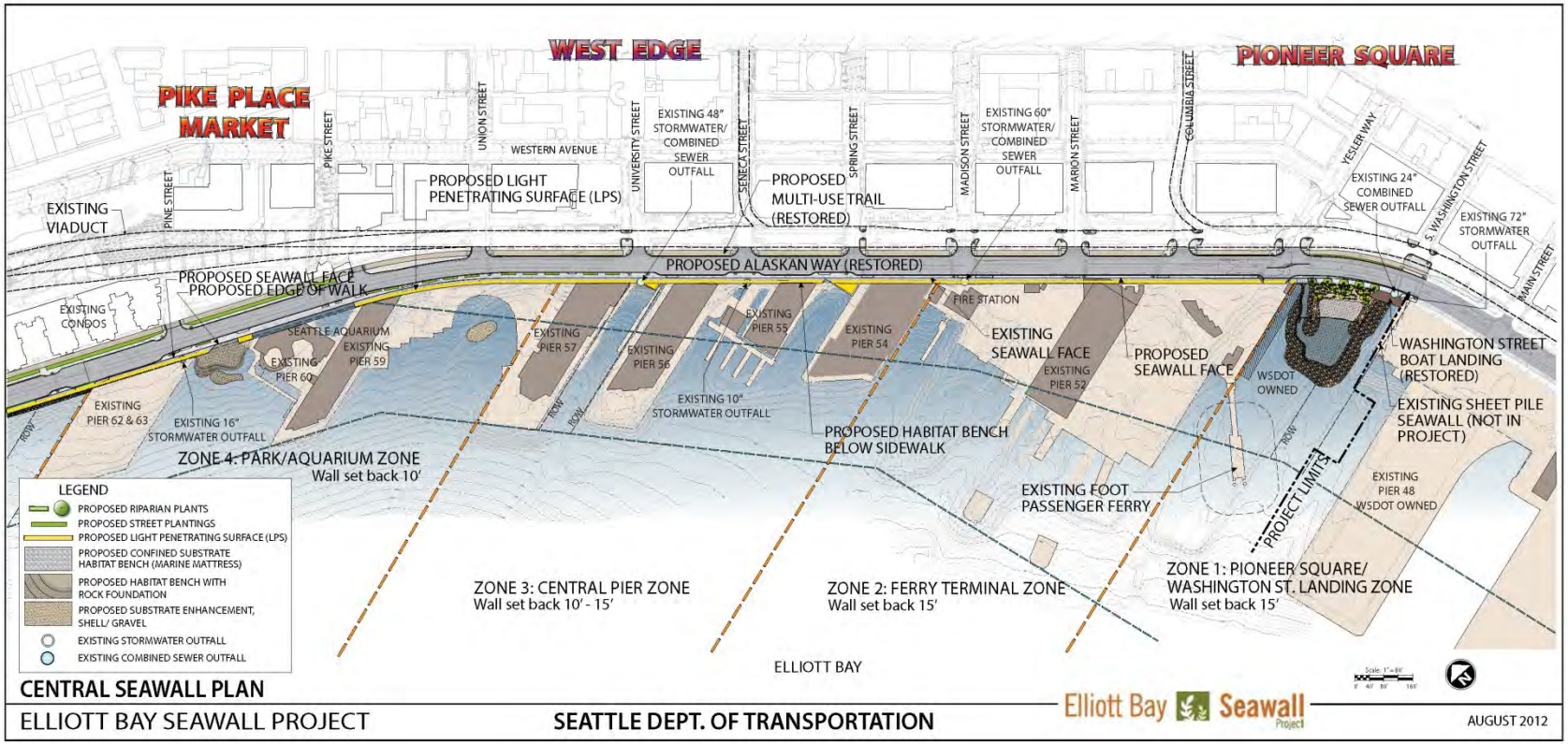

Figure 1-23. Alternative C: Central Seawall Plan

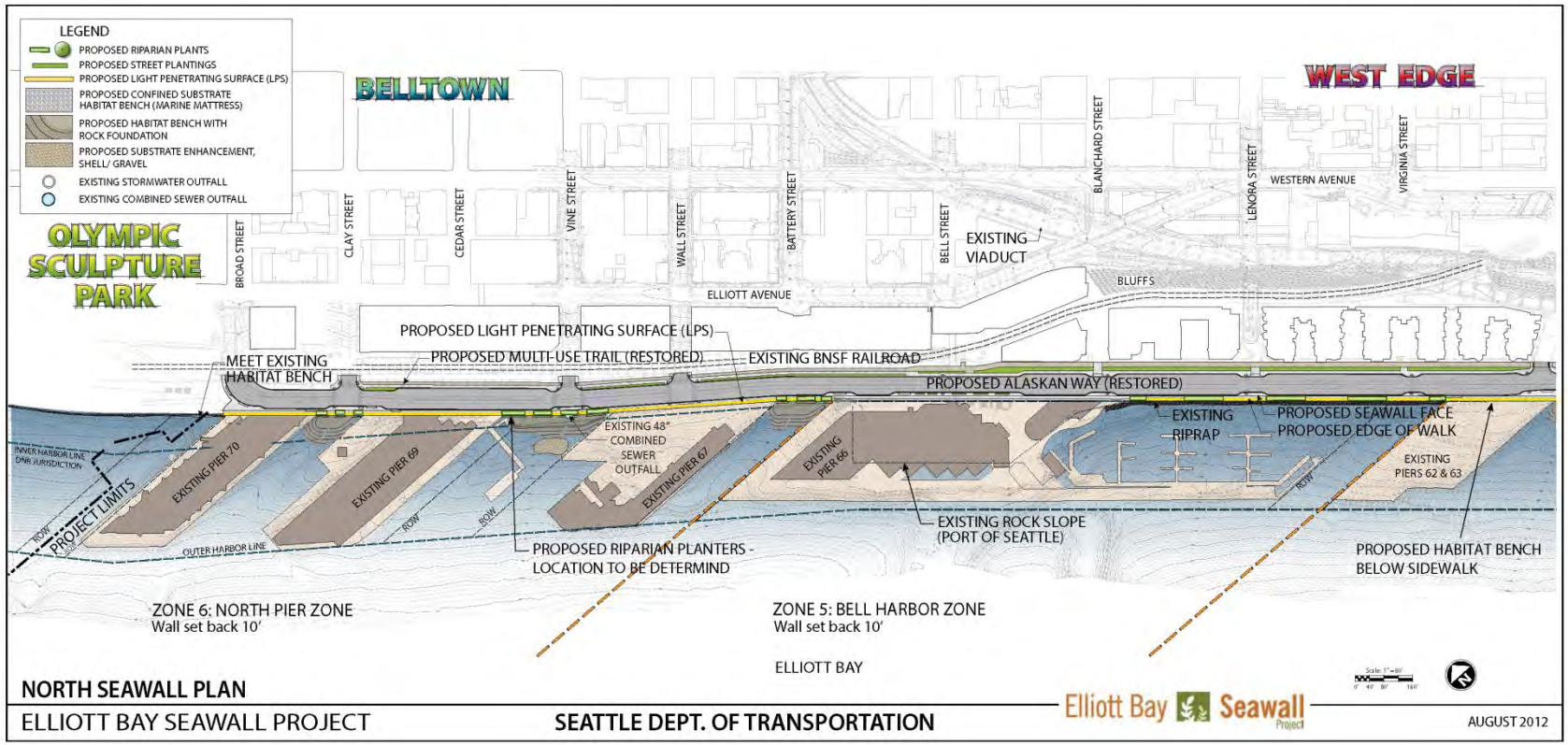

Figure 1-24. Alternative C: North Seawall Plan

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CHAPTER 2. REGULATORY SETTING

The following chapter provides the regulatory context that guided coordination and influenced the type of information sources examined for this report. It also includes a summary of Section 106 consultation and other coordination, as well as a description of the area of potential effects.

2.1 REGULATIONS AND GUIDELINES

The environmental review process for the EBSP is governed by NEPA and SEPA, which are being led by the USACE and the City, respectively. NEPA established the responsibility of the federal government to use all practicable means to preserve important historic, cultural and natural aspects of the national heritage.

The National Historic Preservation Act (NHPA) of 1966, as amended, is a separate authority that established the responsibility of federal agencies to act as stewards of our nation's historical resources. Section 106 of NHPA requires the agency to take into account the effects of an undertaking on historic properties (any district, site, building, structure or object that is included in or eligible for inclusion in the National Register of Historic Places [NRHP]). Amendments to Section 101 of the NHPA in 1992 explicitly allowed properties of traditional religious and cultural importance to be eligible for inclusion in the NRHP.

Implementing regulations for Section 106 provide guidance on how the NEPA and Section 106 processes can be coordinated [Section 800.8(a)] and set forth the manner in which the NEPA process and documentation can be used to comply with Section 106 [Section 800.9(c)]. Identification of historic properties and assessment of effects of the undertaking in a manner consistent with existing NHPA regulations (Sections 800.4 through 800.5) are among the provisions.

Properties will qualify for listing in the NRHP if they are least 50 years old, and meet at least one of four criteria of eligibility(36 CFR 60.4):

- (A) Association with events that have made significant contributions to the broad patterns of our history;
- (B) Association with the lives of persons significant in our past;
- (C) Embodiment of the distinctive characteristics of a type, period, or method of construction, or representation of the work of a master, or possession of high artistic value, or representation of a significant and distinguishable entity whose components may lack individual distinction; and/or
- (D) Has yielded or may be likely to yield important information about the past.

NRHP-eligible properties must also possess characteristics of integrity including location, design, setting, materials, workmanship, feeling and association.

SEPA (RCW 43.211C) implementing rules (WAC 197-11) require identification of historic, archaeological, and cultural resources listed in or eligible for listing in the NRHP or in local or state registers. State and local historical registers often incorporate NRHP criteria into their own evaluation systems. This is the case for the Washington Heritage Register.

On the local level, the City of Seattle's Historic Landmark Preservation Ordinance (SMC 25.12) protects properties of historic and architectural significance. An object, site or improvement that is more than 25 years old may be designated for preservation as a landmark if it has significant character, interest or value as part of the development, heritage or cultural characteristics of the city, state, or nation; if it has integrity or the ability to convey its significance; and if it falls under one of six criteria (SMC 25.12.350):

(A) It is the location of, or is associated in a significant way with, an historic event with a significant effect upon the community, city, state or nation;

(B) It is associated in a significant way with the life of a person important in the history of the city, state or nation;

(C) It is associated in a significant way with a significant aspect of the cultural, political, or economic heritage of the community, city, state or nation;

(D) It embodies the distinctive visible characteristics of an architectural style, or period, or of a method of construction;

(E) It is an outstanding work of a designer or builder; or

(F) Because of its prominence of spatial location, contrasts of siting, age or scale, it is an easily identifiable visual feature of its neighborhood or the city and contributes to the distinctive quality or identity of such neighborhood or the city.

Under the City of Seattle's SEPA regulations, properties that are likely to meet City landmark criteria must be formally reviewed for designation before demolition. This determination and other review decisions concerning landmarks are made by the Seattle Landmarks Preservation Board.

Several Washington state laws specifically address archaeological sites and Native American burials. The Archaeological Sites and Resources Act (RCW 27.53) prohibits knowingly excavating or disturbing prehistoric and historic archaeological sites on public or private land without a permit from the Washington State Department of Archaeology and Historic Preservation (DAHP). The Indian Graves and Records Act (RCW 27.44) prohibits knowingly destroying American Indian graves and requires their inadvertent disturbance by construction or other activity to be followed by re-interment under supervision of the appropriate Indian tribe.

In addition to those noted above, the following laws, ordinances, agreements and guidelines address historic, cultural and archaeological resources in the project vicinity:

- American Indian Religious Freedom Act of 1978;
- Executive Order 13287, Preserve America (March 3, 2003);
- Pioneer Square Preservation District Ordinance (SMC 23.66.115) and guidelines;
- Pike Place Market Historic District Ordinance (SMC 25.24) and guidelines;
- U. S. Secretary of the Interior's Standards for Rehabilitation (36 CFR 67);
- Interdepartmental Agreement between the Department of Planning and Development (DPD) and the Department of Neighborhoods, City of Seattle, on Review of Historic Buildings during SEPA Review; and

- Waterfront Historic Character regulations (SMC 23.60.704).

The City addresses archaeological resources through DPD Director's Rule 2-98 which provides clarification of SEPA Historic Preservation Policy for potentially significant archaeological sites and requirements for archaeological assessments.

2.2 CONSULTATION AND COORDINATION

The USACE (Planning Branch) initiated consultation for the project following provisions of the NHPA while the City conducted independent coordination with additional entities. The USACE began consulting with the Washington State Historic Preservation Officer (SHPO) in April 2006, prior to the City's involvement in the rehabilitation or replacement of the seawall. At that time, the project was called the Alaskan Way Seawall Project. In addition to SHPO, USACE contacted the Muckleshoot Indian Tribe, the Suquamish Tribe, the Tulalip Tribes, and the Confederated Tribes and Bands of the Yakama Nation requesting that each tribe consider participating in the Alaskan Way Seawall Project as a cooperating agency. SHPO confirmed that the DAHP would serve as a cooperating agency. The USACE continued consultation with updates of the area of potential effect (APE) and planned archaeological studies. By 2009, USACE adopted a narrower, but well researched, approach to selecting tribal Section 106 consulting parties and again invited the Suquamish Tribe and the Muckleshoot Indian Tribe to participate as cooperating agencies. On a staff to staff basis, the USACE sought comments from these tribes, as well as DAHP, concerning the project APE and EBSP underwater reconnaissance survey and geoarchaeological study.

With the application for a USACE permit and Public Notice in June 2012, the USACE (Regulatory Branch) is continuing to consult with DAHP and the Suquamish Tribe and the Muckleshoot Indian Tribe, and is in the process of inviting other tribes and stakeholders to participate in consultation as the EBSP moves forward.

The City, under SEPA, continues coordination with the Tulalip Tribes, Yakama Nation, as well as the Suquamish Tribe and the Muckleshoot Indian Tribe per the EBSP Tribal Coordination Plan (SWCA and Anchor QEA 2011). In February 2011, letters describing the EBSP and APE, and asking about heritage resources concerns were sent to these tribes, as well as the Snoqualmie Indian Tribe and Duwamish Tribe.

2.3 AREA OF POTENTIAL EFFECTS

An APE is identified based on the geographical extent of a project and the activities that may affect cultural, historic or archaeological resources. The EBSP APE is in Section 6, Township 24 North, Range 4 East; Section 31, Township 25 North, Range 4 East; and Section 36, Township 25 North, Range 3 East, Willamette Meridian and extends up to 600 feet east (landward) and 400 feet west (waterward) from the existing seawall (Figures 2-1 and 2-2). Although the southern extent of the seawall is at S. Washington Street, the APE extends one block further to S. Main Street to allow for consideration of

Figure 2-1. Project location.

Figure 2--2. Project Area of Potential Effect (APE).

potential adverse effects to the built environment. The northern boundary is generally the north side of Broad Street. The eastern boundary is one to two blocks from the existing seawall to incorporate historic properties that may be affected by ground disturbance, noise, vibrations and other project elements. The western boundary extends into Elliott Bay and is based on the waterward limit of proposed ecosystem restoration, water-access elements of the project, or the end of piers.

The identification of archaeological resources is confined to areas of ground disturbance which are expected along the length of the seawall from S. Washington Street to Broad Street and extending 75 feet east (landward) of the existing seawall and west (waterward) of the existing seawall to the western APE boundary. The maximum vertical depth of the ground disturbance in the APE is estimated at 75 feet below ground surface.

CHAPTER 3. METHODOLOGY

Project methodology can be broadly divided into three phases: (1) identification of cultural, historic and archaeological resources within the project APE; (2) evaluation of the historical significance of the identified resources; and (3) assessment of the project's potential effects on those resources judged to be significant.

3.1 RESOURCE IDENTIFICATION

Federal, state and local agencies, including USACE, City of Seattle Department of Neighborhoods, and DAHP, were contacted to obtain information about cultural resources for this report. Primary sources, however, were documents produced for WSDOT's Alaskan Way Viaduct and Seawall Replacement Project (AWVSRP). Chief among these sources were studies of the built environment (Sheridan 2005, 2008) and archaeological and cultural resources (Miss and Hodges 2007; Miss et al. 2007a, 2007b). Other information was gathered from the University of Washington Libraries, Seattle Public Library, and the University of Washington's GeoMap NW website (geotechnical data). Additional data were obtained during two underwater archaeological surveys, a geoarchaeological analysis, and a geoarchaeological field study conducted for the EBSP (Marcotte et al. 2012; Rinck 2011; Rinck and Valentino 2012; Roberts 2011).

Previously recorded historic resources, including national and local historic districts, were identified through searches of the NRHP, the Washington State Heritage Register, the City of Seattle Landmarks listing, the City of Seattle Historic Resources Survey Database and the Washington DAHP's Washington Information System for Architectural and Archaeological Records Data (WISAARD) database. Many of the previously recorded resources were documented and evaluated in conjunction with the AWVSRP, which overlaps with much of the EBSP APE.

Primary materials for this study came from a variety of sources. Major repositories whose collections were reviewed included the National Archives and Records Administration (NARA), the Seattle Municipal Archives, the Washington State Archives and the University of Washington Special Collections. Resources at NARA included General Land Office plat maps and tract books and records of the Army Corps of Engineers in relation to the Seattle harbor. The Seattle Municipal Archives provided many city records related to the waterfront including reports of the Harbor Master and the City Engineer. King County property cards for all of the waterfront piers were found at the Washington State Archives as well as additional tax records and maps. The University of Washington Special Collections included its useful Pacific Northwest Index as well as the personal papers of several major Seattle figures in waterfront history.

Newspaper research proved extremely valuable as did the use of Seattle City Directories. Microfilm of newspapers at the University of Washington Library was supplemented with the online version of the historic Seattle Times as well as digitized copies of many of the state's earliest newspapers from the Washington State Library. Hard copies of the R.L. Polk directories and some earlier business directories of Seattle were utilized in hard copy at the Seattle Public Library and the University of Washington Library. Much use was also made of city directories as well as copies of the federal and state censuses and other primary materials now made available by online research sites such as Ancestry.com. Sanborn

Fire Insurance maps as well as many other historic maps were also found online or duplicated at the same repositories. Photographic research was conducted at the Museum of History and Industry, the University of Washington and other historical organizations. Use was also made of several waterfront contexts produced by the City of Seattle Historic Preservation Office, Seattle Department of Neighborhoods.

3.1.1 Underwater Archaeological Investigations

Two underwater archaeological surveys were conducted for the EBSP: a reconnaissance dive in 2011 and an intensive survey in 2012. Both underwater archaeology surveys were conducted from the SWCA research vessel, providing a platform for the marine archaeologists. Topside support was provided by archaeologist/diver Ross Smith, M.A., and boatman/fisheries biologist Ryan French, B.S. During the 2012 survey, a small row-boat provided additional surface support, assisting in laying baselines and following the divers under the pier to assist in case of emergency. The larger support boat was also equipped with a dive alert siren that enabled the recall of divers from the water in case of emergency, and Smith was fully suited, possessing dive gear, to act as a rescue diver.

3.1.1.1 Reconnaissance Survey

Maritime archaeologists Andrew Roberts, M.A. and Donovan Griffin conducted the reconnaissance survey between January 24 and 29, 2011 (Roberts 2011). The survey extended from Pier 48, near S. Washington Street to Pier 62 at Pine Street, a distance of about 3,250 feet, following a strategy developed by Ron Kent, archaeologist, Environmental and Cultural Resources Branch, Seattle District, USACE. The survey area was divided into 14 segments to facilitate descriptions of current and pre-existing conditions along the seawall (Figure 3-1). This area corresponds to the north/south extent of docks in the late nineteenth century and was deemed to have high probability for significant cultural resources. The survey area was restricted to within 50 feet of the seawall and to depths no greater than 20 feet of sea water (fsw). The 14 segments ranged in length from 80 feet to 840 feet and in depth from 12 feet to 20 feet. Most work was conducted during low tide to maximize survey coverage. Even so, some areas were beyond the survey depth and were not examined.

In preparation of the reconnaissance survey, archaeologists reviewed the underwater video footage taken by the EBSP biological assessment team (Anchor QEA 2011). This video was useful in identifying possible historical material such as glass, ceramic, and metal scatters and concentrations within and outside of the survey area. This information was geo-referenced and mapped within GIS and examined with other layers including historical maps and historic and current aerial photographs, to further target areas for the underwater survey. Finally, a phone interview was conducted with a local diver who was familiar with the underwater archaeological resources along the central waterfront. His knowledge of buried deposits proved to be valuable in identifying areas with a high probability for encountering archaeological resources.

The reconnaissance survey divers established a survey reference base line by placing fiberglass tape measures along a compass bearing from a known point. A handheld global positioning system (GPS) unit was used to record the starting and ending position of each survey transect. Divers then surveyed areas

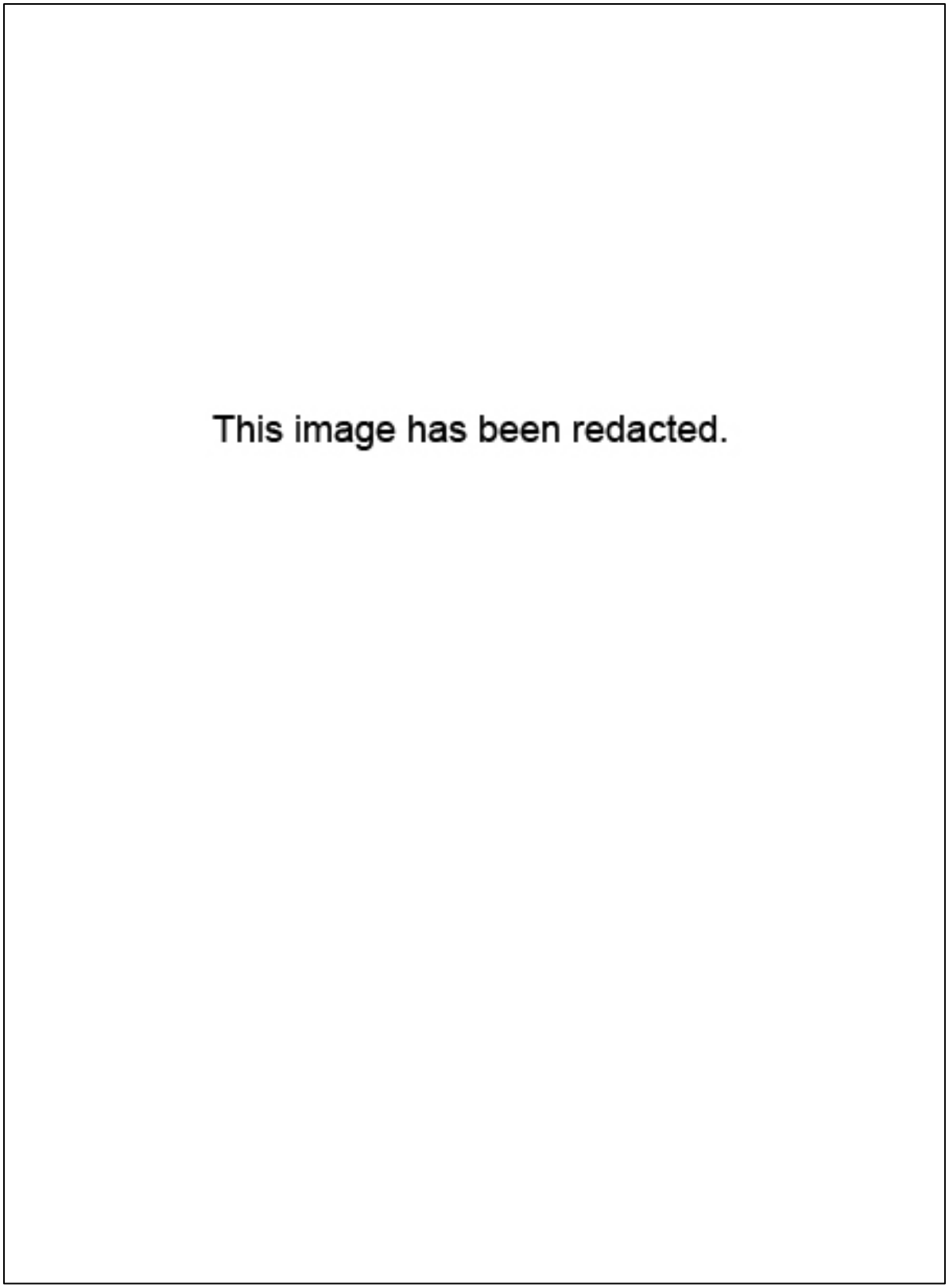

Figure 3-1. Underwater survey areas.

along the baseline. All transects were video recorded and still photographs were taken of site areas and temporally diagnostic artifacts. Descriptions of cultural materials and features were relayed to top-side crew members who kept detailed notes of the observations. No artifacts were collected.

The three sites identified during the reconnaissance survey were recorded on State of Washington Archaeological Site Inventory Forms that included information on location and access, as well as a site description, maps, and photographs. These forms were submitted to DAHP and issued Smithsonian Trinomials 45KI1011, 45KI1012, and 45KI1013 (Appendix A).

3.1.1.2 Intensive Survey

The 2012 intensive underwater archaeological survey was designed to establish the extent, content, and integrity of historical sites 45KI1011, 45KI1012, and 45KI1013, identified during the 2011 reconnaissance dive, and to examine Piers 62/63 and Pier 67 (Figure 3-1). [redacted] were considered high probability areas for intact archaeological resources because they had been protected from dredging by dock/pier structures since the late 1890s.

The underwater survey occurred from May 2, 2012 to May 10, 2012, and was conducted by maritime archaeologists Jacqueline Marcotte, M.A., and Jeanette Hayman, M.A. The depth of dives was no more than 60 fsw, allowing for survey coverage up to 300 feet from the seawall (Marcotte et al. 2012). During the final days of investigation, extreme low tides allowed archaeologists to perform pedestrian survey of previously submerged lands by walking spaced transects parallel to the seawall. The area observed during low tide was between 50 feet to 240 feet west of the seawall (Appendix B).

Divers established a survey base line by positioning fiberglass tape measures along a compass bearing from a known point. Baselines were deployed from a rowboat on the surface to allow directed placement. A handheld GPS unit was used to record the starting and ending points of each survey transect. In instances where satellite signals were blocked by pier coverage, transect end points were determined by distance and bearing. Using the buddy system, two archaeologists then surveyed the area along the baseline. Divers completed the transects on either side of the baseline, no more than an arm's distance apart, allowing each diver to scan the seafloor both forward and to the side, creating a transect width of approximately 10 feet. To support a safe dive profile, archaeologists conducted transects in deeper water at the start of the day, then moved to transects in shallower depths nearer the seawall. All transects were recorded by video and still photography. Site boundaries, descriptions of cultural materials and features, and site notes were recorded by the divers on Mylar sheets. In some cases, diagnostic artifacts were brought to the surface for illustration and photography before being returned to the site.

Field data was transferred onto Archaeological Site Inventory Update Forms, with photographs and maps of revised boundaries, for 45KI1011, 45KI1012, and 45KI1013. These forms were submitted to DAHP. A Washington Archaeological Site Inventory Form was completed for the one additional site identified during the 2012 survey. This form was submitted to DAHP and issued Smithsonian Trinomial 45KI1099 (Appendix A).

3.1.2 Geoarchaeological Investigations

Geoarchaeological investigations concentrate on establishing a lithologic and stratigraphic framework for understanding the landform history, depositional environments, and formation history of potential archaeological sites in the EBSP APE. The framework is a useful relative chronometric aid that can be used to correlate precontact archaeological materials and natural deposits across the APE and it may also allow those local sequences to be related to larger scale past events. The lithologic and stratigraphic framework is also useful for correlating historical cultural materials found within the fill to particular people, places, or events.

Two geoarchaeological studies were completed for the EBSP. The first study was a desktop examination completed in order to summarize available existing information and to define gaps in the existing geotechnical and geoarchaeological data from S. Washington Street to Broad Street (Rinck 2011). The initial data gap analysis focused on the area between the existing seawall and eastern edge of Alaskan Way where ground disturbing activities were anticipated during early project planning. The data gap analysis resulted in plan for additional exploration. The second study presents the results of the technical field investigation in areas defined as gaps during the desktop assessment (Rinck and Valentino 2012). Results of the geoarchaeological survey work are presented in Chapter 5.

3.1.2.1 Analysis of Existing Geoarchaeological Information

Geoarchaeological analysis of existing borehole data from 45 borings drilled along the seawall was completed as part of preparation of the EBSP Archaeological Field Study Plan (Hudson and Sheridan 2010; Rinck 2011). The cores in this analysis were drilled using a number of different techniques, including mud-rotary, hollow-stem auger, sonicore, and rotary core drilling, as well as geoprobes and test pits (Shannon and Wilson, Inc. 2010). Vactoring, or removing the surface sediments with an air knife and vacuum, was often used to ensure utilities were not present in the upper five to ten feet of fill. Some previous cores drilled along the seawall were archaeologically monitored by NWAA, especially those boreholes drilled for the Alaskan Way Viaduct and Seawall Replacement Program. When coring was archaeologically monitored, the resulting data was recorded by a geoarchaeologist. When the coring was not archaeologically monitored, the geoarchaeologist transcribed the existing geotechnical borelog data into the standard NWAA logging system. Detailed information on specific cultural materials and sediment constituents was not common in the unmonitored borelogs, reflecting the geological, rather than historical, interests of the recorders. The borelog data were entered into the software program Rockworks, a database that allows core data to be used for production of detailed lithologic and stratigraphic cross sections and models. These graphic representations of the subsurface deposits along the seawall were correlated with the historic record to identify data gaps along the EBSP APE where sonicores could be drilled.

3.1.2.2 EBSP Geoarchaeological Investigation

The goal of the field portion of the EBSP geoarchaeological investigation was to better understand the landform history, depositional environments and formation history of potential archaeological sites in the APE. Initially, 33 locations were selected for sonicores based on the historical activities that

occurred, the post-depositional history, reasonable feasibility of drilling in the selected location, and the absence of subsurface characterization from other sources. However, once fieldwork began a number of core locations had to be eliminated due to logistical challenges; lowering the number of completed sonicores to 28. Fieldwork occurred between April 14 and May 18, 2011. Twelve of the proposed borings along the western side of Alaskan Way had to be relocated to the east side of the road after mid-fieldwork engineering review. Archaeologists conducting the study recognized that the formation history of the east side of Alaskan Way is not necessarily representative of the stratigraphy along west side of Alaskan Way.

The sonicores were drilled using a track-mounted rotosonic drill that utilizes high-frequency vibrations to advance a core barrel into the ground after the upper six-to-seven feet of deposits were removed with an air knife and vacuum to avoid damage to unmarked utilities. The eight-inch diameter core barrels were advanced in either five- or 10-foot runs, as determined by the driller, and the runs were extracted and laid out in sequence, logged, and sampled at the drill site. Each sample was photographed before lithologic and stratigraphic descriptions were recorded on standard borelogs using a system designed to characterize each depositional unit, described below (Miss et al. 2007b). The classification system tracks changes in the archaeological and lithological character of each depositional unit and allows for them to be grouped into stratigraphic assemblages (Miss et al. 2007b). Each unit is the product of a depositional process within a particular environment that results in a set of distinctive and observable lithologic characteristics owing to that environment. Observable physical properties include color, lithology, texture, and sedimentary structure (Boggs 1995, Miall 2000). Once the lithology and stratigraphy were described, the sediments were screened through one-quarter-inch mesh at a nearby screening area to recover artifacts and faunal remains. Artifacts and other cultural material were examined, photographed and cataloged in the field. Selected diagnostic artifacts were collected for further analysis.

The deposits buried within the APE have been divided into three strata, based on temporal origin. The deepest sediment encountered in the borings is Pleistocene-aged, dating to the most recent glacial period. These deposits pre-date the arrival of humans to the region, and are logged simply as "Pleistocene." Holocene-aged sediments overlie the glacial deposits. These sediments date to the period between about 10,000 years ago and A.D. 1850s. The depositional units are composed of sediment that was deposited through natural processes and some of the units within the Holocene stratum contain potential for pre-contact cultural materials. The Holocene-aged deposits were logged based on the primary lithologic constituents in each depositional unit.

In this system, the modal grain size of the depositional unit is indicated with a capital letter, which is shown in Table 3-1. For example, a layer dominated by sand would be designated with the letter "S." Secondary properties are designated by lower-case letters appearing before the capital letter as an additional sand descriptor and as subscript after the capital letter to describe secondary constituents of the depositional unit. So, in the unit fSz, the "S" indicates that sand is the primary constituent, the "f" signals the sand size is fine, and the "z" indicates that silt is a secondary component of the unit.

TABLE 3-1. NOMENCLATURE FOR CLASSIFICATION OF HOLOCENE DEPOSITIONAL UNITS.

Modal Grain Size of Depositional Unit	Secondary Properties	Sand Modifiers
G – Gravel	g - gravelly	f - fine
S – Sand	s - sandy	m - medium
Z – Silt	z - silty	c - coarse
C – Clay	c - clayey	
	f - fine	

Each depositional layer in the historic fill was also assigned a unit name based on similar observable properties. Unit names for the historic fill represented by the word of the dominant material constituent are in Table 3-2. A layer containing gravelly sand with a few pieces of coal, for example, would be logged as "Sand." If archaeological materials form the dominant constituent within a deposit (usually 20 percent or more), the unit is named after that material type. The 10 depositional units logged in the historic fill along the EBSP APE can be assigned to one of four groups, Mass Deposits, Building Materials, Sedimentary Fill, and Other, based on the type of archaeological materials or sediments that characterized them.

TABLE 3-2. NOMENCLATURE FOR CLASSIFICATION OF DEPOSITIONAL UNITS IN THE HISTORIC FILL.

Group	Depositional Unit
Mass Deposits	Wood
	Sawdust
	Cinders
Building Materials	Asphalt
	Concrete
Sedimentary Fill	Gravel
	Sand
	Silt
	Clay
Other	Undifferentiated

Depositional units belonging to the Mass Deposits group include material of archaeological interest that does not conform to the usual notions of artifacts or features. For example, Cinders and Sawdust are important archaeological materials but are not typically expressed as discrete objects. The Building Materials group includes archaeological materials that are commonly associated with buildings or structures, such as Asphalt and Concrete. The Sedimentary Fill group includes depositional units that are considered "clean" relative to the overall nature of the fill in the sense that the deposits tend to have

little to no admixture of archaeological objects or matrix. Sedimentary fill along the seawall may represent deposition from regrade or dredging. At greater depths, Sedimentary Fill deposits may represent wave reworking during early stages in fill accumulation. Undifferentiated fill lacks a dominant archaeological constituent and does not have distinctive properties allowing it to be assigned to one of the other units. Undifferentiated fill tends to be poorly-sorted with fragments of brick, wood, and so on scattered throughout the matrix.

3.1.2.3 Coring Justification

Coring has proven to be an effective method to investigate large and linear project areas with deeply buried deposits to identify areas with high potential for cultural resources (Miss et al. 2007b, 2008b, Rinck and Valentino 2012, Valentino et al. 2010). Coring is most effective in conjunction with open excavation to identify historic properties by focusing efforts on areas where cores show potential for archaeological resources. Previous projects illustrate that continuous cores allow for precision when delineating stratigraphic boundaries in a relatively rapid time frame to guide subsequent open excavation. Sonicores also allow for a presence or absence of cultural materials across a wide area. Issues associated with coring, such as lateral extensibility and the limitations of vactoring, can be addressed during targeted excavation that would follow sonicoring (Valentino et al. 2008). Sonicoring as part of the EBSP geoarchaeological field strategy is consistent with the Section 106 process and takes into consideration the magnitude and nature of the project, the nature and extent of potential effects on historic properties, and likely nature and location of historic properties within the APE. Discovery of cultural material does not guarantee identification of an archaeological site or NRHP eligibility of the material. Federal guidelines and regulations provide the process for evaluating significance of archaeological sites (36CFR800).

3.1.3 Built Environment Investigations

Historic resources that have been evaluated previously were identified in the NRHP, the State Heritage Register, the City of Seattle list of landmarks and Historic Resources Survey Database, and DAHP's WISARRD database. The boundaries of national and local historic districts were also identified. Most historic buildings within or adjacent to the APE were previously recorded and evaluated for the AWVSRP. DAHP inventory forms were completed for each property in the APE built in or before 1965, as needed. Those properties not included in the AWVSRP were evaluated using information from City construction records, King County tax assessor records, city directories and other archival information sources. Results of the investigations are presented Chapter 5.

3.2 RESOURCE EVALUATION

The authors of this report evaluated the significance of identified resources using the NRHP criteria for significance and integrity (see Chapter 2) which was applied in conjunction with historical property information derived from historical maps, King County Assessor's office records, City of Seattle construction permits, City directories or other archival materials.

3.3 POTENTIAL EFFECTS

The project will have an effect on historic properties if it changes the characteristics that qualify a historic property for inclusion in the NRHP. The effect is adverse if it diminishes the integrity of such characteristics.

Pre-contact, ethnohistoric and historical archaeological resources could be directly affected by ground disturbance from construction, including removal, reconstruction or construction of the seawall, and construction related to habitat restoration and access improvements. Any ground disturbance affecting Holocene-aged sediments and historical fill deposits could damage archaeological resources.

To determine the effects on archaeological and cultural resources, construction locations and methods were evaluated in context with known or potential archaeological sites. Existing information from historical shoreline mapping and prior subsurface explorations, as well as new data from the underwater survey and geoarchaeological investigations were used to evaluate whether project elements have the potential to affect archaeological resources. This evaluation included an assessment of proposed ground improvements, seawall removal, new seawall construction, and related shoreline improvements and habitat restoration activities.

To determine the direct effects on historic resources, the type and extent of permanent effects (such as the number of buildings/structures to be demolished or altered) caused by the project were identified. The degree to which the alterations potentially affect the property's historic significance was then analyzed, using the Secretary of the Interior's Standards for Rehabilitation. In addition, the type, extent (length of time and area) and intensity of shorter-term direct effects (such as reduced access and parking) caused by the project were identified. The extent to which these effects affect the condition of the historic properties was analyzed based on experience with previous activities and events that have caused similar effects.

Indirect effects caused by the project are later in time or farther removed in distance, but are still reasonably foreseeable. To identify these, broader changes (such as changes in land use) that the project may cause in the greater downtown area were identified and analyzed, based primarily on the effects seen from previous projects.

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CHAPTER 4. SETTING

Human settlement and subsistence in the APE vicinity have been structured by the shoreline environment. The variety and abundance of natural resources that were present along the shores of Elliott Bay attracted both pre-contact Native American and early Euroamerican settlement. Much of the following description of the natural and cultural setting of the APE comes from previous investigation of the vicinity completed for the AWVSRP (Miss and Hodges 2007; Miss et al. 2007a).

4.1 NATURAL SETTING

Archaeological evidence indicates that human occupation of the Pacific Northwest occurred as least as early as about 12,500 calibrated years ago (B.P.) (Gustafson and Manis 1984; Jenkins et al. 2012; Kirk and Daugherty 1978). Natural factors, including glaciation, post-glacial changes in climate, alluvial processes, volcanism, and tectonics in the Puget Basin have affected the potential distribution of resources used by people as well as the suitability of particular landforms for human occupation over the past 12,500 years. Historical development has also affected preservation and visibility of the archaeological record.

4.1.1 Geology

The Puget Basin is part of an elongated structural trough that developed between the Cascade Range and the Olympic Mountains during subduction of the Juan de Fuca tectonic plate beneath the North America plate (Orr and Orr 1996). The modern topography and surficial geology within the basin is the result of repeated continental glaciations throughout the Pleistocene Epoch. The last glacial maximum, known regionally as the Vashon Stade of the Fraser glaciation, began when the Cordilleran Ice Sheet advanced south from what is now British Columbia before 18,750 B.P. (Easterbrook 1993, 2003; Porter and Swanson 1998; Thorson 1989). This ice sheet reached its maximum extent about 60 miles (90 kilometers) south of the APE by about 16,950 B.P. and ended abruptly with the onset of climatic warming about 16,300 B.P. By about 13,600 radiocarbon years before the present, the future Seattle vicinity was ice free (Clague et al. 1980; Porter and Swanson 1998; Thorson 1989).

The Puget Lowland topography is now dominated by north-south-trending ridges and troughs that were created by ice scouring and water flowing across the newly exposed landscape during and after ice retreat (Booth and Goldstein 1994). The elevation of the lowland is rarely more than 500 feet. Today, the waters of Puget Sound, Lake Washington, and Lake Sammamish occupy the troughs (Galster and Laprade 1991; Liesch et al. 1963; Yount et al. 1993). The uplands are usually composed of glacial outwash deposited by meltwater, glacial till deposited directly by the ice, and glaciomarine sediment deposited into the sea by the Cordilleran Ice Sheet (Armstrong et al. 1965; Booth 1994; Booth and Goldstein 1994; Booth et al. 2004; Waldron et al. 1961; Yount and Gower 1991; Yount et al. 1993). Many of the upland surfaces have not been extensively modified by postglacial erosion, except where streams have carved short, steep-sided valleys.

Global sea level rose rapidly as ice sheets around the world melted at the close of the Pleistocene. Locally, the marine incursion was held at bay while glacial ice and large proglacial lakes occupied the Puget Lowland. Marine water flooded the Puget Lowland once the ice sheet retreated past northern

Whidbey Island and the Puget Sound was connected to the Pacific Ocean. The marine incursion and continued global sea level rise raised relative sea level in the central Puget Sound up to 140 feet (43 meters) above the current level (Anundsen et al. 1994; Blunt et al. 1987; Booth et al. 2004; Carlstad 1992; Dethier et al. 1995, Easterbrook 2003, 1966; Kovanen and Slaymaker 2004; Porter and Swanson 1998; Swanson 1994; Thorson 1980, 1981). The APE would have been inundated during this marine high stand referred to as the Everson Interstade and glaciomarine deposits would have been deposited.

Relative sea level in the Puget Lowland was affected simultaneously by sea level rise related to increased global meltwater and rebound of the land released from the weight of the ice sheet (Thorson 1989). Depressed land areas uplifted at a rate that outpaced continued global sea level rise between about 12,000 and 9,000 years ago, causing relative sea level in the Puget Sound to lower about 60 meters (200 feet) (Troost and Booth 2008). The APE would have been exposed and available for human occupation, but the shoreline would have been farther west than today. Rebound slowed by about 9,000 years ago and global sea level rise was once again the dominant geologic force controlling shoreline elevation. The earliest Holocene shorelines were drowned after about 9,000 years ago (Crandell 1963; Dragovich et al. 1994). As sea-level rose in the APE vicinity, the bluffs along the shoreline were cut back by the waves, beaches were reworked, and younger intertidal sediments were deposited on top of older beaches. After 7,000 years ago, the rate of global sea level rise began to slow and relative sea level was only about 16 feet (4.8 meters) below the modern shoreline by about 5,000 years ago. Understanding the history of relative sea-level in the Puget Sound has implications for the identification and preservation of archaeological sites. A slight sea level increase, as is forecasted, could submerge archaeological sites that are present along the historic shoreline, making future identification efforts more difficult.

Sedimentation on Puget Sound deltas also resumed after about 9,000 years ago and a delta began to form at the head of the Duwamish Embayment to the south of the APE, near present-day Auburn (Crandell 1963; Dragovich et al. 1994). The early Holocene Duwamish River delta was buried by a pulse of sediment introduced to the basin about 5,700 B.P. when a large-scale summit and flank collapse on Mount Rainier resulted in the Osceola Mudflow (Dragovich et al. 1994; Mullineaux 1970). The Duwamish embayment began to fill in due to the influx of mudflow sediment and the Duwamish River delta grew northward towards Elliott Bay. Sediment carried from the Duwamish delta composes the tideflats that were deposited in Elliott Bay over the past 1100 years and are now buried below fill at the south end of the APE (Barnhart et al. 1998; Pringle and Scott 2001; Zehfuss et al. 2003). Fill in the north APE buries beach and intertidal sediment eroded from the adjacent bluffs as a result of wave erosion.

4.1.2 Earthquakes

The project is at the north edge of the Seattle Fault Zone (SFZ). The SFZ is a complex of thrust and reverse faults that is at least 43 miles (70 kilometers) long and up to 4 miles (7 kilometers) wide between the Seattle Uplift to the south and the Seattle Basin to the north (Nelson et al. 2003; Sherrod 2001). A large earthquake on the SFZ between 1050 and 1020 B.P. caused several meters of uplift south of the SFZ at Alki and Restoration Points and about 1 meter (3 feet) of subsidence in the Seattle Basin at West Point (Atwater and Moore 1992; Bucknam et al. 1992). The same event caused landslides into Lake Washington, tsunami generation on Puget Sound, subsidence at the Snohomish River delta, and possible

subsidence in southern Puget Sound (Atwater and Moore 1992; Bourgeois and Johnson 2001; Sherrod 2001). Surficial evidence for SFZ faulting can be observed at the Toe Jam Hill scarp on Bainbridge Island. Offset along the scarp correlates with the 1050 to 1020 B.P. event. Other earthquakes on the Toe Jam Hill scarp may have preceded this event with evidence pointing to activity between 1200 and 1700 B.P. and between about 2500 and 1900 B.P. (Nelson et al. 2000, 2002, 2003).

The APE experienced subsidence related to activity on the SFZ in the past. Subsidence would have inundated and subsequently buried or eroded any archaeological deposits that may have been present on the beaches or in the backshore environment (Sherrod 2001). Intertidal deposits and loose sands would have probably experienced liquefaction. Today, many unreinforced buildings in Pioneer Square and along the central waterfront would be damaged by a SFZ earthquake or by the related tsunami that modeling has shown could be generated on Elliott Bay.

4.1.3 Geomorphology

Several geomorphic units are mapped in the project area by geologists using existing core data, and although the natural topography has been obscured by up to 60 feet of artificial fill, the underlying natural geomorphology is shown on local and regional maps (Troost and Booth 2008). A narrow band of mapped tideflats (Qtf) compose most of the APE. The tideflats consist of fine-grained sediment that collected on the coastal bench. Quaternary beach (Qb) and peat (Qp) deposits are mapped just south and east of the APE where Denny Island and a lagoon were present prior to historic filling of the shoreline. The bluffs east of the APE south of about Battery Street are mapped as consisting of pre-Olympia non-glacial unconsolidated sediment (Qpon), pre-Olympia glacial till (Qpogt), pre-Olympia unclassified glacial sediment (Qpog), and Pre-Olympia undivided deposits (Qpo). The pre-Olympia bluff deposits are unconsolidated sediments that are more than 65,000 years old. The bluffs between about Broad and Battery Streets are mapped as Olympia Beds (Qob) that are between 15 and 65 thousand years old and undivided pre-Fraser glacial deposits (Qpf) (Booth et al. 2005; Galster and Laprade 1991; Troost et al. 2005; Waldron et al. 1962; Yount and Gower 1991; Yount et al. 1985, 1993). The beach and backshore environments in the APE vicinity would have been composed of sand and gravels eroded from the pre-Olympia and Olympia Bed bluffs onto the shoreline. The tide flats would have been at least partially composed of the finer-grained silts and sands from the bluffs and sediment from the Duwamish River.

Soil maps of Seattle were completed prior to historic development and classification of the project vicinity as urban land. Soils of the Everett Series were mapped on the upland slopes east of the APE, dominated by Everett gravelly, sandy loam. Everett gravelly sandy loam is described as a thin (15 inches or 38 centimeters) soil that forms in a glacial drift parent material (Magnum et al. 1912). Soils supported by the same landforms were mapped as Urban Land just 26 years later, illustrating the speed at which the project vicinity developed (Poulson et al. 1938). The tideflats and beaches were not mapped on either historic soil survey.

4.1.4 Contact-Era Shoreline

The Elliott Bay shoreline was carefully mapped for the first time in the mid-1870s. It is from these early maps that we know details about the early historic shoreline of Elliott Bay. For example, explorers described low wave-cut banks backed by steep slopes around Elliott Bay, except where tidal-marsh complexes were present (Collins and Sheikh 2005). Tidal marshes were at what is now the north parking lot of Century Link Field and at Interbay. Ravines downcut through the glacial bluffs at Bell and Seneca Streets and small alluvial fans were present at the mouths of those creeks where they entered Elliott Bay. Early maps also show that a beach berm, narrow backshore zone, and relatively narrow intertidal zone were historically below the bluffs in the APE vicinity (Collins and Sheikh 2005). The tideflats broadened south of the APE between Alki and Pioneer Square (Figure 4-1).

Today, the historical shoreline is buried behind and below the existing seawall and fill. In most of the APE, the foot of the former bluff line and backshore is west of First Avenue and east of the Alaskan Way Viaduct at the eastern edge of the APE. Most ground disturbance in the APE is planned west of the historic shoreline of Elliott Bay, in what was once the intertidal zone (Downing 1983; Shipman 2004). Archaeological material in this setting could represent limited pre-contact activity, but is much more likely to be related to the historical development of the waterfront.

4.1.5 Flora and Fauna

The Elliott Bay area provided important and diverse resources that influenced the locations and times of occupation for pre-contact period people. The tidal flats, the shoreline below the bluffs, and the heavily wooded slopes above the shoreline supported a wide range of habitats. The open water harbored squid, shrimp, various sea mammals and runs of anadromous fish, including sockeye and Chinook salmon and steelhead trout. Bottom dwellers included ling cod, flounder, sole, rockfish, and invertebrates such as clams, sea cucumbers, crabs and octopuses. The intertidal zone, which extended along the waterfront, included many invertebrates, among them crabs, shrimp, clams, oysters, mussels, chitons, barnacles and sea urchins. Portions of the relatively young tidal flats were water-saturated but above the mean high tide, and were covered with salt-tolerant sedges, grasses and rushes. The tidal flats also hosted migratory and resident birds, while the forest above the shoreline was inhabited by various mammals, large and small, and provided important cedar and other trees and plants useful for wood, fiber, food, tools and medicines (Gunther 1945; Suttles 1990; Suttles and Lane 1990).

4.2 CULTURAL SETTING

The following sections describe the cultural setting of the project area. Documents created for the AWVSRP include extensive background research regarding the pre-contact, ethnohistoric and historic development of downtown Seattle. This document focuses on the EBSP APE more specifically. For more in-depth background, readers are referred to the AWVSRP reports (Miss et al. 2007a; Miss and Hodges 2007).

Figure 4-1. Historic map showing the predevelopment shoreline (1875) in relation to the seawall and the project APE.

4.2.1 Pre-Contact Period

The earliest settlement of the region occurred in the early postglacial period, at least 11,000 years ago, based on finds of extinct mammals such as the Manis Mastodon near [redacted] and scattered finds of artifacts thought to be of similar antiquity. The closest discoveries of these sorts of artifacts to the APE are associated with ancient peat bogs near [redacted]; the [redacted] find was beneath a peat layer dated to 10,500 B.P. (Kopperl et al. 2010; Meltzer and Dunnell 1987). Pre-contact period sites from around the Pacific Northwest suggest continuous habitation throughout the ensuing 11,000 years (Ames and Maschner 1999; Matson and Coupland 1995). In the Puget Sound Region, assemblages of stone tools called "Olcott" are attributed to early occupations. Olcott tools are found on the edges of terraces, often away from the saltwater shoreline, a position that suggests a site with expansive views as might benefit hunters. Such locations also may have been chosen to avoid the wet bottomlands, meltwater-swollen rivers, and fluctuating sea levels that occurred during the early postglacial period.

Shorelines that might have hosted early inhabitants were inundated by about 5,000 B.P., as rising sea levels accompanied continued postglacial warming, making evidence of marine-oriented settlement before this time difficult to find.

Sites dating after about 5,000 B.P. are more common. During this period, groups began to organize themselves in more complex ways. The subsistence base included a broad spectrum of locally available resources. The period from 3000 to 1000 B.P. saw the emergence of a semi-sedentary settlement pattern based on central villages with highly specialized seasonal camps. There is evidence of increasingly sophisticated use of storage technology, increased population, and emergence of ranked societies. The final 1,000 years of coast prehistory are characterized by permanent houses in central villages, a salmon-based economy, and ascribed social status (Matson and Coupland 1995; Morgan 1999).

4.2.2 Ethnographic and Ethnohistoric Period

The APE is in the traditional territory of the Duwamish, a Lushootseed-speaking group that lived in villages on the shores of Elliott Bay, Lake Washington, Lake Union, Salmon Bay and on the banks of the Duwamish, Black and Cedar rivers. Today, many Duwamish descendants have chosen to become members of federally-recognized tribes, including the Muckleshoot Indian Tribe, Snoqualmie Indian Tribe, Suquamish Tribe and the Tulalip Tribes, while others continue to seek independent Duwamish tribal status. Like many other Puget Sound groups, the Duwamish traditionally followed a seasonal subsistence cycle that was tied to available resources. The region is one of mild climate and abundant resources, and usually enough salmon could be harvested in a few weeks to last the winter. In spring and summer, people dispersed from winter villages of cedar plank houses to live in temporary camps to fish, hunt land and sea mammals, and collect roots, berries and other plants. In winter, preserved forms of these foods supported the village while important ceremonial work was completed. Winter was also important for establishing and maintaining social relationships. Heads of households hosted public events marking changes in status, such as naming, puberty, marriage or death rites. The more important the family, the more guests were welcomed, representing ties of marriage, adoption, trade and social obligation (Miller 1999).

The Lushootseed names of places remembered by former inhabitants dot the margin of Elliott Bay, the Duwamish Delta, and adjacent lakes and waterways. The names represent the memory of a people intimately familiar with the local landscape and refer to resource locations, encampments, events, and places of myth, or are simply descriptive. A detailed description of ethnographic place names throughout Seattle is provided elsewhere (Miss and Hodges 2007; Miss et al. 2007a), but places in the immediate vicinity of the EBSP APE are discussed below (Table 4-1, Figure 4-2).

TABLE 4-1. LOCATIONS NAMED IN ARCHIVAL SOURCES (NUMBERS KEY TO FIGURE 4-2)

No.	Name or Type	Citations	Description/Comments
1	*Baba'kwob* (see also Muck-Muck-Wum)		**This information has been redacted.**
2	Encampment		
3	Encampment		
4	*ča?k^{w}sed or cta'qwcld* Elliott Bay-Lake Union Trail		
5	Burials		
6	Encampment		
7	Muck-Muck-Wum, Mukinkum		

No.	Name or Type	Citations	Description/Comments
8	Encampment		
9	*Bo'lots* or *Bu?lac*		
10	Encampment		
11	Burial		
12	Cemetery		
13	Encampment Tzee-tzee-lal-litch		
14	Burial		
15	Encampment		

No.	Name or Type	Citations	Description/Comments
16	Trail		
17	Trail		
18	Ballast Island		
19	Encampment		
20	*Djidjdkila'lltc* Tseettsal-al-ich		
21	Dancehouse		
22	Encampment		
23	Encampment		

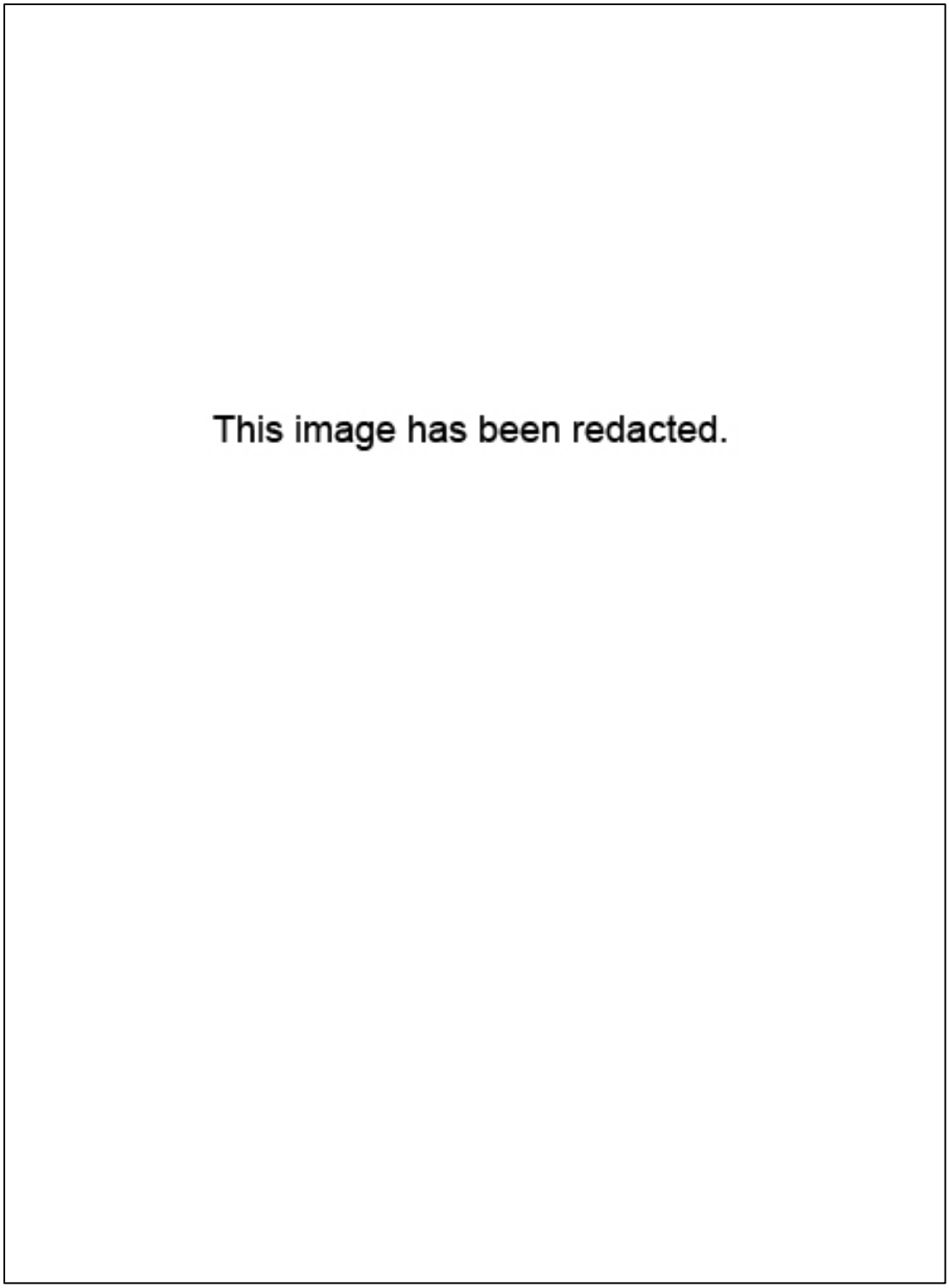

Figure 4-2. Map showing locations named in archival sources (numbers key to Table 4-1).

At the [redacted] were villages near *Djidjil3lltc* (Figure 4-2), "the crossing over place." This place name refers to the promontory [redacted]. A village was located on each side of the promontory and a trail led from the beach on [redacted], hence the crossing over. Accounts from the 1850s confirm encampments and possibly a longhouse on the promontory near *Djidjil3lltc* and [redacted].

At the [redacted] was *Baba'kwob* (Figure 4-2, #1), or prairie, a series of open spaces. These open spaces were crossed by *Cta'qwcld* (Figure 4-2, #4), a trail between [redacted] that originated on the [redacted] (Waterman 2001). The trail is likely the same one that appears on the 1879 T-Sheet as *ča?kʷsed*. Confusion exists about the meaning of *Baba'kwob* in some accounts. Most sources apply the name to prairies and open spaces [redacted], but the same or a similar name is applied to an encampment that may have included a longhouse on [redacted], or may have been an encampment on the beach at the [redacted] (Figure 4-2). David Denny's house near [redacted] (and within the prairie-meadow marsh identified as *Baba'kwob*) was reportedly the site of a gathering place for potlatches (Figure 4-2).

Other encampments included temporary camps at [redacted]; between [redacted] in early settler Arthur Denny's pasture (Figure 4-2, #10); on the beach [redacted] (Figure 4-2, #13); "Curley's Camp" at [redacted] (Figure 4-2, #15); Ballast Island at [redacted] (Figure 4-2, #18;); on the beach [redacted] (Figure 4-2, #19); on the tidelands [redacted] (Figure 4-2, #22); and [redacted] (Figure 4-2, #23).

These residential locations represent three periods of historical Native American presence: existing villages and longhouses observed by the earliest American settlers; areas occupied by Indians displaced from traditional sites, but still resident in the city; and temporary camps occupied by transient traders and hop pickers later in the nineteenth century after exclusionary laws were passed by the City. In the late nineteenth and early twentieth centuries, sailors, fishermen and many of the unemployed lived near the waterfront west of First Avenue, while those who were slightly better off lived on First, Second, or Third Avenues or along alleys between blocks in small apartments, boarding houses, or occasionally rooms on the upper floors of commercial buildings. Rooming houses and small dwellings clustered around sawmills, packing plants and the railroad housed much of the work force. Among these was the small house of Princess Angeline, Chief Seattle's daughter (Figure 4-2, #8), at [redacted]. Indian use of Elliott Bay continued with canoes drawn up and tents pitched for temporary camps on the newly filled tidelands (Figure 4-2, #24).

The early historical record also includes descriptions of burial sites and cemeteries. Accounts include discoveries of burial sites during construction [redacted] in the 1870s (Figure 4-2, #5), near [redacted] (Figure 4-2, #11), and [redacted] (Figure 4-2, #14). A cemetery was reported on [redacted] (Figure 4-2, #12).

4.2.3 Historical Period

The first non-Native settlements within the current city limits of Seattle were established along the Duwamish River and on the forested Alki peninsula in 1851. Donation land claims were established around eastern Elliott Bay by early 1852 (Figure 4-3), and early the next year, Henry Yesler's first mill began producing lumber on the thin strip of land that connected Denny Island to the mainland (Figure 4-4). The city's development continued from this early start, interrupted briefly by the Indian Wars in 1856 and spurred on by events of the nineteenth and twentieth centuries, including the Yukon Gold Rush, the Spanish-American War, World War I and World War II, the development of railroad transportation and ever-changing national fortunes.

4.2.3.1 General Waterfront Development

Development north of Yesler's Mill was limited by the steep bluffs. Over time, however, regrading and filling took place, and new wharves were built. In May 1882, the Columbia and Puget Sound Railway (a subsidiary of the Northern Pacific Railroad) was granted a 30-foot right-of-way along the shoreline of Elliott Bay. In 1885 the Seattle, Lakeshore and Eastern (SLS&E) Railroad constructed a small terminal at the foot of Columbia Street and a trestle to the west of the earlier line, extending from King Street to Smith Cove at the northern end of Elliott Bay. To accommodate additional rail traffic, the City passed Ordinance 804 establishing a two-mile-long trestle along Railroad Avenue. This January 1887 ordinance essentially allowed a 125-foot-wide right-of-way across the waterfront with a common user clause allowing all railroads to have access. The SLS&E Railroad was the first to build along the inner 30 feet, completing its portion of the trestle by October of 1887. It was quickly followed by the West Coast Railroad, the Seattle and Montana Railroad and, after 1893, the Great Northern Railway, which all added their tracks along the western side of Railroad Avenue (Armbruster 1999: 126–129; Hanford 1923: 96; Bagley 1916:251; Beaton 1914:46). According to one early pioneer, Railroad Avenue was "made of piles and rip rap and broken rock and filled in with earth from the hills" (Bass 1937: 172–173). Once the trestle was completed, additional wharf construction took place. One of the only points of access to Railroad Avenue and the waterfront from the upper part of the city was a ramp at Madison Street, which was clogged with wagons and teams of horses (Magden 1991:22). Seattle's Great Fire in 1889 destroyed most of Railroad Avenue and adjacent structures, but they were quickly rebuilt along with many new docks.

On July 17, 1897, the steamer *S.S. Portland* arrived from Alaska with the fabled "ton of gold" from the Klondike. Fortune seekers streamed to Seattle from throughout the world. The city, with its new transcontinental railroad terminus and deep harbor, was the logical point of departure for Alaska. City residents staged a strong campaign promoting Seattle as the place to buy supplies and prepare for the trip to the gold fields, and it soon became the warehousing center for groceries, dry goods, clothing and hardware shipped to the north. By spring of 1898, local merchants had reached $25 million in Klondike trade. This activity decisively brought the city out of the depression that had followed the Panic of 1893, establishing it as the commercial center of the northwest and a mature city in its own right. The population more than tripled between 1900 and 1910. As additional transcontinental rail lines began to compete for Seattle's business, they purchased more wharves and established worldwide shipping

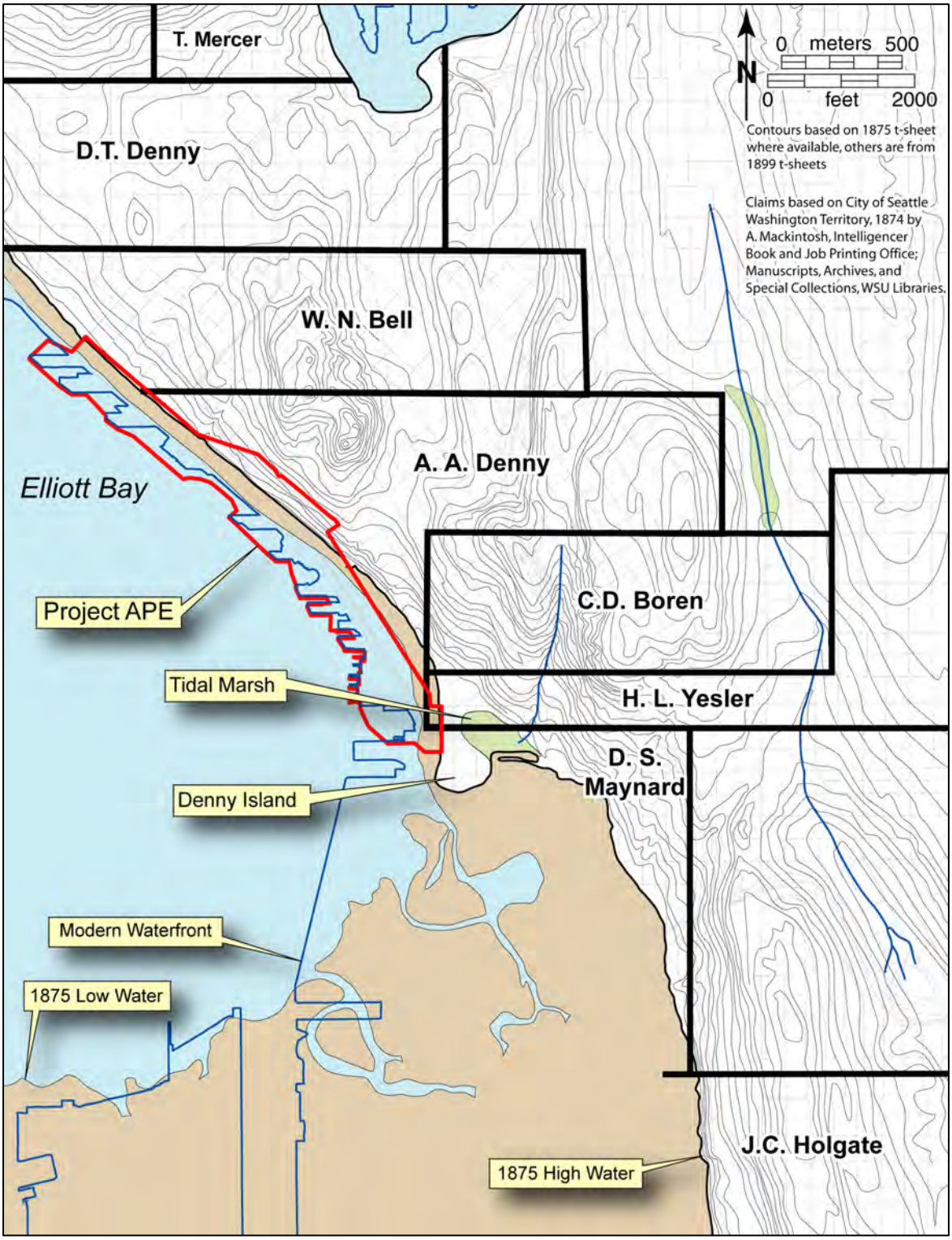

Figure 4-3. Early land claims in the project vicinity.

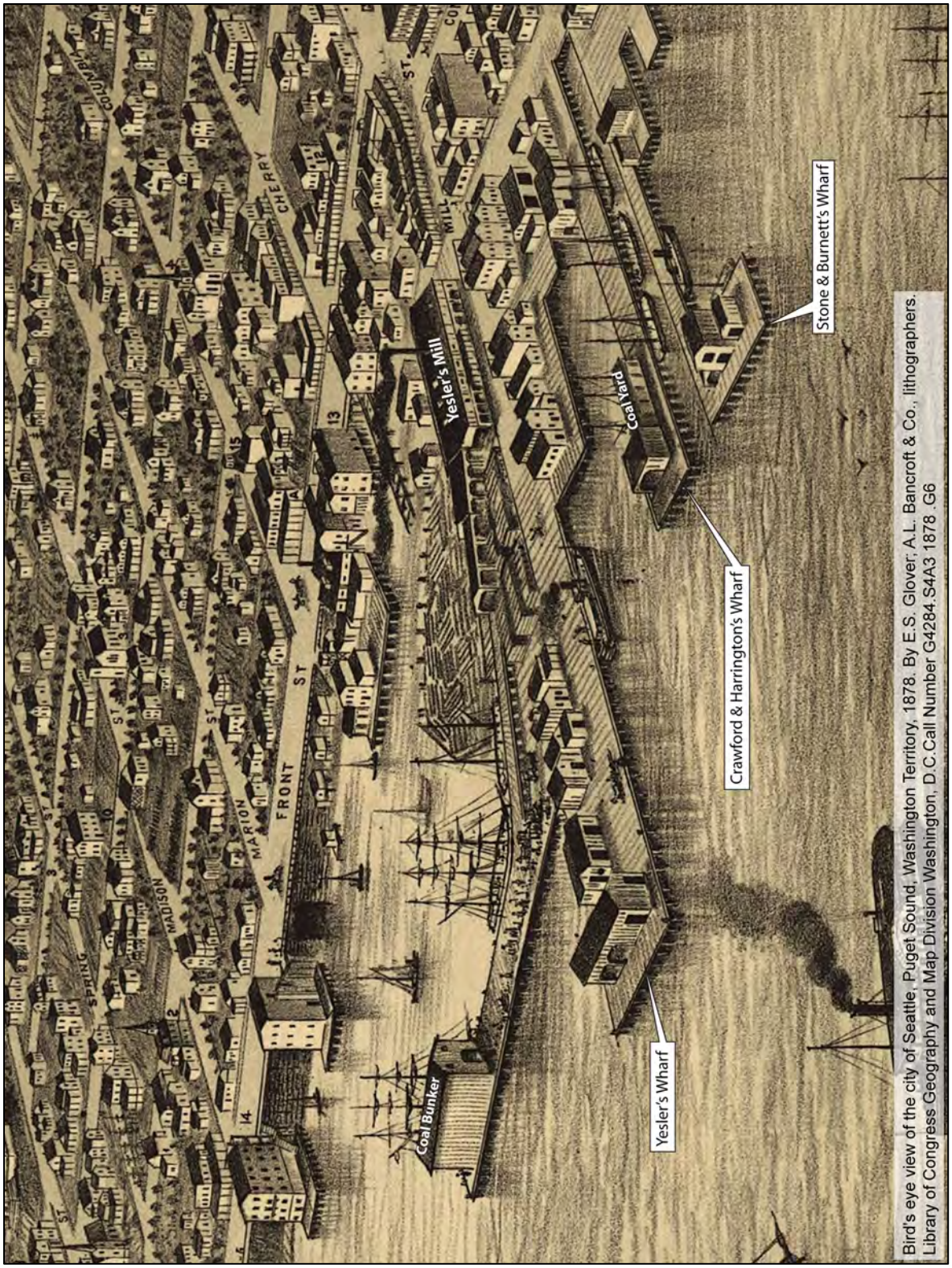

Figure 4-4. A bird's-eye view of Yesler's Warf, 1878.

networks, linking rail service directly to ships. As more complex transportation systems evolved, the city's range of influence expanded. Commodities could be imported for use in Puget Sound, but also shipped to other ports on the Pacific Coast or even to the Far East. Strong trade ties with Alaska and British Columbia based on natural resources strengthened this transshipment role (Berner 1991:22–23; Hershman et al. 1981:57).

The increased Alaska trade encouraged further growth along the waterfront, although much of it was haphazard. By 1900, the chaotic growth emphasized the need to rebuild the waterfront piers, though most were no more than 10 years old. Washington Territory had achieved statehood in 1889, requiring a Harbor Line Commission to delineate Seattle's harbor lines in conformance with the new constitution. A replat of the tidelands was adopted by the state legislature in 1897, necessitating the reconstruction of many piers and wharfs. City Engineer R. H. Thomson imposed an orderly parallel pattern, extending due east-west at a 45 degree angle from shore, between Washington and University Streets. Wharf owners were only required to conform to the plan when they rebuilt, but soon after the turn of the century many had done so, thus establishing the pattern of pier development for the future. Naming practices were also standardized, as piers north of Yesler's Wharf were numbered and those to the south were identified by letters (Finger 1968:312, 314; Hershman et al. 1981:57, 61–62; Dorpat 2006:1, 117).

By 1895, most of the piers were owned by the three transcontinental railroads (Great Northern, Northern Pacific and Union Pacific). In 1903, construction began on the north approach to a tunnel that would carry rail traffic under the city rather than adding further congestion to Railroad Avenue. The Great Northern Railway, in partnership with the Northern Pacific Railroad, built the mile-long tunnel from Virginia Street to the south portal located near S. Washington Street between Third and Fourth Avenues. Hydraulic pumps were used to remove much of the earth on the hill along the area between Stewart and Virginia Streets and northward two-and-a-half blocks to Blanchard Street. The tunnel construction resulted in the removal of nearly 500,000 cubic yards of fill, most of which was probably taken by rail car to the Great Northern-owned land on the tidal flats south of King Street. Some of this earth, however, may also have been dumped along the Great Northern trestle that followed the waterfront northward to Smith Cove (Dorpat 2006:124–126).

Wharf space was in high demand during the huge mobilization for World War I. Because of the decrease in Atlantic trade, Seattle became the principal port on the West Coast, with 47 piers and wharves and an annual trade of 5.7 million tons valued at more than $650 million. With the Armistice in November 1918, the city lost much of this military business, but the Panama Canal opened new markets around the world to Seattle shipping. Within another decade, however, marine transportation began to decline as trucks and cars competed for shipping and transport business, and the economic depression of the 1930s further undermined business (Berner 1991:180). Passenger traffic declined as steamboats faced competition from increased automobile use. Steamers continued on some runs into the 1930s, but were then replaced by auto-carrying ferries. By the 1920s many railroad facilities had moved to the filled tidelands south of downtown Seattle, where much of the industrial base was located. In 1929, the railroads signed a new franchise agreement that limited through tracks along the central waterfront solely to the eastern side of Railroad Avenue. Only spur lines to the piers would actually cross the main

portion of Railroad Avenue. This agreement allowed the city to proceed with its plans to build a seawall along the rest of the waterfront (Dorpat and McCoy 1998:160).

Railroad Avenue's trestles and planked roadways were not only inefficient and unsafe, but the pilings were being attacked by woodboring worms known as teredos. Between 1911 and 1917, the City constructed a concrete gravity-type seawall from S. Washington Street north to Madison Street to prevent some of this type of damage (Figure 4-5). A structural sidewalk supported by pilings was constructed to provide access to the piers. Railroad Avenue was then gradually back-filled with materials removed in the regrading of Jackson Street. This structure established the present shoreline between S. Washington Street and Madison Street (Dorpat 2006:181–183). Budget problems prevented construction north of Madison Street, so those pilings continued to deteriorate until 1933. In that year, funding was secured for the City Engineering Department to continue the seawall north to Broad Street, with construction beginning in 1934 (Figure 4-6). The innovative nature of the design engendered considerable publicity, including an article in the *Engineering News Record.* The design involved an assembly of several components including steel sheet piling, wooden piling, a relieving platform, and three types of pre-cast concrete panels, depending on the expected loading. A distinctive pre-cast concrete railing system was mounted on top of the wall to complete the assembly. Because of these innovations, the City was forced to finance and construct the structure itself, as no one was willing to assume the risk. As the seawall was constructed, Railroad Avenue was filled and then paved to Broad Street. Following its completion in 1936, the name was changed to Alaskan Way. Although the main purpose of the seawall was to protect the pilings from the effects of water and the teredos, it also served to establish the permanent shoreline we see today (Dorpat 2006:217–219; Engineering News-Record 1934:579–580; Phelps 1978:80).

During World War II, Seattle's port served primarily as a supply point for Alaska. Members of the Quartermaster Corps purchased sleeping bags, cold weather gear and other equipment, often from companies that had started during the Klondike Gold Rush (Berner 1999:59). Most activity was to the north and south of the central waterfront. Much of Interbay and its piers, originally developed by the Great Northern Railroad, were acquired by the U. S. Navy and served as a Port of Embarkation for troops going to the Pacific, many of whom were billeted or trained at nearby Fort Lawton. Pier 36, a steamship pier, became the major Port of Embarkation for the U. S. Army; it is now the district headquarters for the U. S. Coast Guard. In 1944, the U. S. government renumbered the piers to reduce confusion. The previous system, adopted in 1900, had resulted in duplicate numbers and some piers having no number. The new system, still in use today, numbered piers consecutively beginning in West Seattle. Gaps in the numbering sequence reflect empty spaces where piers could theoretically be built in the future (Dorpat 2006:156, 158).

By the late 1950s, shippers began consolidating cargo in large shipping containers, which completely revolutionized shipping and pier design. Freight sheds and warehouses on the piers were no longer needed, as cargo, secure in containers, was moved by large cranes directly from the ship to trucks or railcars. Instead of the narrow piers with transit sheds found on the central waterfront, large parking areas were required to accommodate cranes, trucks and containers. To the south of Pier 48, the Terminal 37/46 complex was created by filling and joining several piers (Hershman et al. 1981:27).

Figure 4-5. The early seawall at the foot of Columbia Street, January 1917.

Figure 4-6. View north along Railroad Avenue from University Street showing the construction of the seawall, March 21, 1935.

4.2.3.2 Construction of Waterfront Piers

Zone 1

This zone was originally part of Elliott Bay and the tide flats to the west of the Maynard donation land claim. The Stone and Burnett wharf, built in the fall of 1869, extended into the bay just south of the end of S. Washington Street. Stone and Burnett catered to both the wholesale and retail trade with their general merchandise business on Commercial Street. In October of 1871, the company's warehouse on the wharf collapsed taking the rest of the wharf with it because of damage done by teredos. Some merchandise was saved, and the wharf was quickly rebuilt (Bagley 1916:II–672, 675; Grant 1891:288, 292).

The Harrington and Smith Wharf (also known as the Crawford and Harrington Wharf) was also in Zone 1 and was immediately south of Yesler Wharf (which was primarily in Zone 2 and is discussed below). Founded in 1867, Crawford and Harrington was a wholesale firm that purchased the assets of several early stores. They occupied the Dexter Horton building on Commercial and in 1883 purchased the site of the building as well as the wharf. The warehouse space on the waterfront was enlarged after the purchase, but by 1893 had become the Hatfield Wharf, and, in addition to warehouses, included an office, junk shop, and tent and awning company. By the turn of the twentieth century, Northern Pacific Railroad had purchased the Hatfield and Yesler Wharfs as well as other properties along the waterfront. The company rebuilt these piers in 1900 and 1901, providing new warehousing facilities for freight loading and unloading (Grant 1891:253–254; Hershman et al. 1981:61–62).

Many of the sailing vessels that carried cargo and passengers to Puget Sound used gravel and rock for ballast, and during the 1870s and into the 1880s, a number of them began unloading these materials at the end of [redacted]. This ballast was on the south side of the Stone and Burnett Wharf and may have served to support it when it was rebuilt. The pile of rocks and fill ultimately extended nearly 400 feet from the shoreline, becoming so visible it was called Ballast Island (Watt 1959:174–175; Bass 1937:171–172; Hershman et al. 1981:22). The area created by the ballast was not very stable for building, so it became a popular camping spot for many Indians of the region (Figure 4-7). It was particularly busy in the 1880s as a stopping point for large numbers of Native workers headed in the fall to the hop fields of Issaquah and south King County (Dorpat 2006:53, 56–57; Willis 1943:24).

Pier 48 (formerly Pier A) is what remains of one of the two piers built by the Pacific Coast Company in 1900. An earlier structure on the site, the Ocean Dock, was destroyed in the Great Fire of 1889 and had used ballast from Ballast Island for footing. Immediately after the fire, the Oregon Improvement Company built two large identical piers and pier sheds, known as Piers A and B. In 1900, these piers were replaced by the Pacific Coast Company (part of the Northern Pacific Railroad), retaining the names Pier A and Pier B. In 1935–36, the original Pier B was shortened to allow for the expansion of Pier A. The pier shed was extensively remodeled for the McCormick Steamship Company, which served West Coast ports between the Northwest and South America. In the 1940s it became the Pope & Talbot Steamship Company. The Port of Seattle purchased the property in 1950, leasing it to Matson Navigation Company for its Hawaiian freight service through the 1950s–60s. During this period the apron was widened from 28 to 50 feet to allow the installation of two additional railroad tracks. Pier 48 later became the

Figure 4-7. Native Americans at Ballast Island ([redacted]), c. 1895; note the shelter dug into the bank.

southern port for the Alaskan Marine Highway, a largely auto-oriented ferry, until the late 1980s. It was then used for service to Victoria (Stena Lines and the B. C. Ferries) until the late 1990s (Dorpat 2006:145, 198; Sheridan 2005:13). The pier has been largely vacant since then and the pier shed was razed in 2010.

In 1920, the City built a decorative iron pergola at the foot of S. Washington Street, designed by City architect Daniel R. Huntington (Figure 4-8). The pergola served as a gateway to the city and a covered waterfront waiting area. A large sign marked it as the Seattle Harbor Department, and a small room at the north end served as the headquarters of the City's harbor patrol. A gangplank led down to a wooden float where the harbor patrol boats docked. By 1927, the float was being used by boats bringing sailors from ships anchored in Elliott Bay, and during World War II, it was heavily used by water taxis to and from the Harbor Island shipyards. In 1973–1974, the pergola was restored and a new concrete float was built. The harbor patrol moved out at about this time, and the new float served as the only public boat landing on the downtown waterfront. The float was later removed after suffering storm damage, and it has not been replaced. The pergola remains, but is not currently in use by the City (Dorpat 2006:194).

Zone 2

Yesler constructed a wharf at the foot of Mill Street (now Yesler Way) in 1854 which became Seattle's "link with the outside world," and, according to at least one historian, may have been more important to Seattle's economy than his sawmill (Reiff 1981:22). Yesler continued to strengthen and add to the length of the wharf, and by the early 1860s, it stretched nearly 200 feet into Elliott Bay. As support for the structure, Yesler dumped any available material into the water, including sawdust and slabs from his mill

Figure 4-8. Washington Street Boat Landing from the water (above) and from Railroad Avenue (below), 1921.

as well as ballast from incoming ships and local rock. He often covered these materials with dirt and planking, followed by gravel and sand (Finger 1968:299–300). By 1875, Yesler had also constructed a wing on the wharf that extended to the north for coal bunkers (Figure 4-9). The wharf was destroyed in the Seattle fire of 1889, but was quickly rebuilt. In 1890, Yesler signed an agreement to sell the wharf to the Seattle, Lakeshore and Eastern Railroad, which had become a subsidiary of the Northern Pacific (Finger 1968:312, 314).

Colman Dock/Pier 52 at the foot of Marion Street was the center of the "mosquito fleet," the steamers that connected towns and villages throughout Puget Sound (Figure 4-9). During its heyday (1890–1920), more than 25 routes were served by 2,000 boats over the years. A larger dock was built after the 1889 fire, followed by a still larger structure in 1908. This imposing structure, with its 72-foot Romanesque clock tower, was rammed by the Alaska steamer *Alameda* on April 25, 1912, and it was replaced once again. Colman Dock was one of the first piers to show evidence of the automobile's influence, as a short slip for auto ferries was added in 1923. In 1937, the pier was rebuilt in the Art Deco style to accommodate automobile ferries. In 1951, the Puget Sound Navigation Company, which had acquired a monopoly on cross-sound traffic, had financial difficulties and sold the system to the State of Washington. In 1964–65, Washington State Ferries replaced the Art Deco structure with a Modernist building. Ticket offices, waiting areas, shops and offices are located on the second floor, with the lower level open for vehicles. The building originally had a generally nautical appearance, but was altered in

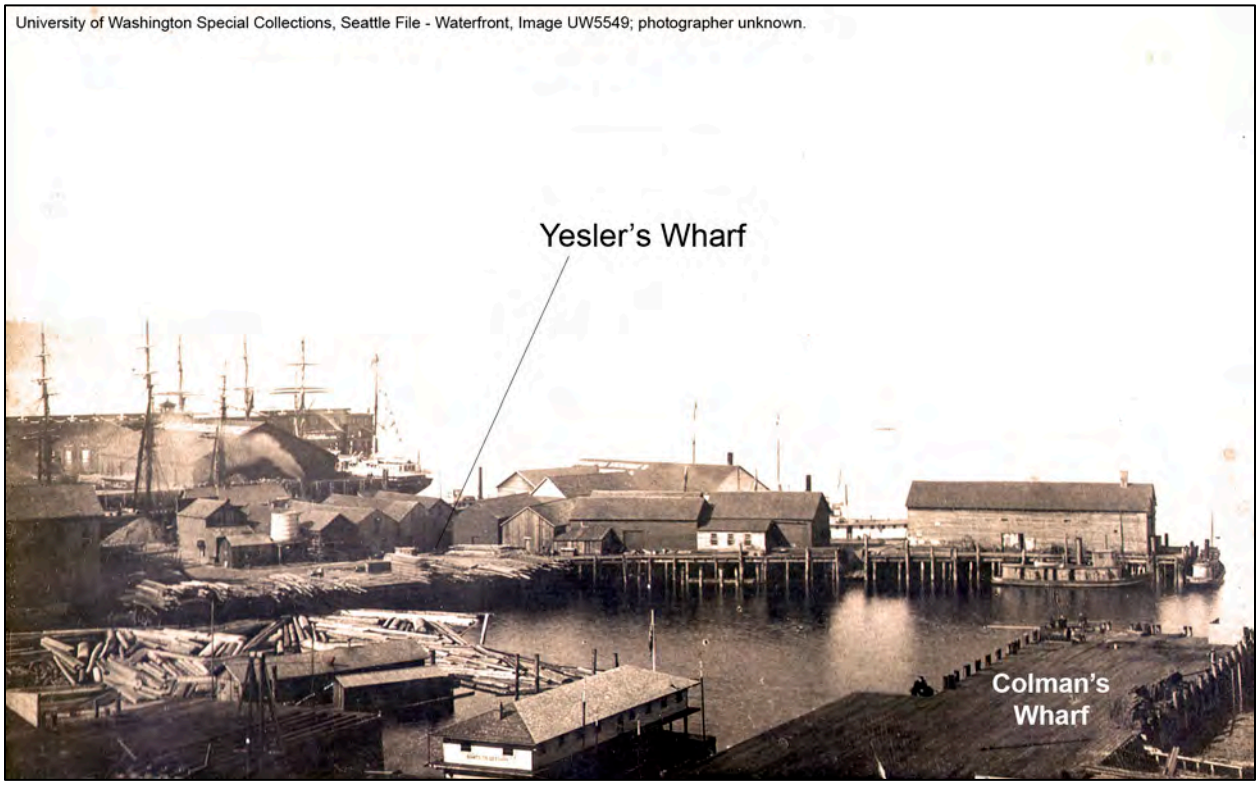

Figure 4-9. View south showing Yesler's Wharf and Colman's Columbia Street Wharf, c.1885.

the 1990s with the addition of a prominent two-story glazed entry pavilion and stairway. Pier 51, just to the south, housed a popular Polynesian restaurant for many years, but is now also used by the King County Water Taxi and the Port of Kingston Soundrunner ferries. To the north of Colman Dock is the site of the Grand Trunk Pacific Dock built in 1910. The largest wood pier on the Pacific Coast, it exploded into flames on July 30, 1914, with the loss of five lives (Dorpat 2006:179–181; Hershman et al. 1981). This area is now a parking lot for vehicles waiting for the ferry.

Nearby at the foot of Madison Street, Fire Station No. 5, a small frame building, was built soon after the 1889 fire; a slip to the north accommodated the fireboat *Snoqualmie* and later the *Duwamish*. This station was replaced on the same site in 1902. A larger brick station in the Craftsman/Tudor style was built in 1917. By the 1960s it became apparent that the support pilings were failing, and the 1917 station was replaced in 1963 by a larger Modernist building (Dorpat 2006:183–184; Seattle Fire Department c. 1989). Just north of the fire station was a large coal bunker for the Seattle Coal and Iron Company, used after the 1889 fire.

Zone 3

Pier 3 (now Pier 54), was another of the three piers built by the Northern Pacific Railroad in 1900. It was originally leased by Galbraith-Bacon and Company, a wholesale dealer of grain and hay, and some of its slips were used by steamships and tugs as well as two sternwheelers that made daily runs to Tacoma and Olympia. Later, the pier was also the Seattle home of the Kitsap Transportation Company, whose boats were an important part of the Mosquito Fleet. In 1938, that company, which had not updated to car ferries, went out of business and the pier was leased by Ivar Haglund, a folk singer and showman. This was the first pier to become primarily tourist/visitor oriented, as Haglund opened the area's first aquarium here, with a small fish-and-chips counter. By 1947, Haglund had expanded the café, renaming it Ivar's Acres of Clams. In 1966 he purchased the pier, and it became the centerpiece of his growing restaurant chain (Dorpat 2006:154–56, 199). Since his death in 1985, the company has continued to operate the restaurant and pier.

Pier 4 (now Pier 55) replaced the dock of an Alaska steamship service, the White Star Line, which had collapsed in September 1901 (Figure 4-10). Engineers believed the cause was inferior ballast, but earth and gravel suitable for the foundation of new docks was expensive, and most waterfront pier owners initially did little to change the situation (Klingle 2001:80–81). The pier was replaced in 1902 and was leased by the Arlington Dock Company (an agent for trans-oceanic steamship companies) and the Alaska Commercial Company, which operated steamers in the Alaska trade. It was occupied by Fisheries Supply Company from 1938 until the 1980s. The shed was remodeled in the 1990s, with gift shops on the street front, a restaurant on the main floor and offices above. In 1965, a small pavilion and finger pier were built to the north of this structure to accommodate harbor cruise boats, an important water-related tourist use (Dorpat 2006:157–158; Sheridan 2005:10, 13–14).

After the 1889 fire, the H.W. Baker and Company warehouse was built south of University Street on the Gilmore wharf. According to at least one historian, the section of the waterfront just offshore from University Street north to Union Street was particularly deep, and when the wharf was extended 60 feet in 1891, the piles were not substantial enough to support the structure. It collapsed in the severe storm of November 1892. The wharf (Pier 5, now Pier 56), was rebuilt by the Northern Pacific in about 1900.

MOHAI, Seattle Historic Society Collection, Image SH6956 A, B, C, and D. Photographer unknown.

Figure 4-10. The collapse of the White Star Dock, Pier 4 (modern number 55), September 14, 1901

It was later known as Arlington Dock and was accessed by a ramp that extended down University Street from First Avenue (Dorpat 2006:116). The pier was leased to Frank Waterhouse and Company, a large shipping agency that managed boats in the Alaska fleet and also loaded army transports during the Spanish-American War. It was here that President Theodore Roosevelt arrived on the steamer *Spokane*, accompanying the Great White Fleet in 1903. The pier continued to be owned by the railroad through the 1950s (Dorpat 2006:119, 154–158; Sheridan 2005:9–14). Pier 56 hosted a small private aquarium in the 1960s, displaying two captured orcas. It was a very controversial effort and closed within a few years. Restaurants and a retail import store operated here for more than twenty years (1970s–late 1990s). The pier and pier shed were remodeled in 2000, and the shed now houses a restaurant and gift shop, with architectural offices on the second floor (City of Seattle 2007–2008).

In the 1890s, a small-frame boathouse owned by Clark and Bartette, located near the foot of Union Street, offered boat rentals. A new pier (Pier 6, now Pier 57) was built by wholesaler John B. Agen in 1902 between Pier 5 (now Pier 56) and Schwabacher's dock (Pier 7, now Pier 58). Agen owned a large brick warehouse across Railroad Avenue in the Western Avenue commission district and shipped eggs, dairy and other food products from his wharf. The Chicago, Milwaukee and St. Paul Railroad (familiarly known as the Milwaukee Road) purchased the wharf in 1909, after which it was used for coastal shipping and later for Japanese and European steamship lines. In the same year, the railroad also bought Schwabacher's dock (Pier 58), which was occupied by other large steamship companies. Maps show a small coal bunker and wharf in place of the Clark and Bartette boathouse by 1912. Pier 57 was redeveloped in 1974 as part of the city's adjacent Waterfront Park Project. Now privately owned, it is known as the Bay Pavilion and houses a restaurant and amusement arcade (Dorpat 2006:196).

Zone 4

Prior to the 1889 fire there were at least two wharves in the Union-Pike Street area. North of Union Street was Schwabacher Dock, which served one of the city's most prosperous early hardware and dry goods companies. Farther to the north was the Columbia Canning Company wharf, with both salmon-processing and storage facilities. Schwabacher's was the only major wharf along the central waterfront that was spared during Seattle's fire of 1889, and it became the center of shipping as the city began its rapid, post-fire rebuilding process. Most of the materials for the reconstruction of Seattle were unloaded there, and the company soon widened the structure by 40 feet to the south and built a larger warehouse. Even though new docks were quickly constructed after the fire, Schwabacher's continued to play a central role in the evolution of the waterfront. Trade with the Far East increased, and after negotiations with the Great Northern Railroad, the Japanese Mail Steamship Company (Nippon Yusen Kaisha) made Seattle its West Coast port. In August 1896 the first of its steamers, the *Miike Maru*, docked at Schwabacher's wharf. The Klondike Gold Rush era also began at Schwabacher's when the *Portland*, called by some the "Ship of Gold," was berthed at the company's north slip when it brought back the first successful miners from the gold fields (Armbruster 1999:175–177; Boswell and McConaghy 1996a:4; Hershman et al. 1981:78). Schwabacher's rebuilt the pier as required by the city in 1902; it was known then as Pier 7 (later Pier 58). The pier was taken over in 1909 by the Chicago, Milwaukee & St. Paul Railroad. The Port of Seattle purchased the pier in 1946, using it as a small-boat moorage for a number of years. During the 1962 World's Fair, a hotel ship was berthed here, but in 1967 the Port tore down the dilapidated dock. In 1968, Seattle voters passed the Forward Thrust bond initiative, which

included a new waterfront park and aquarium. Waterfront Park, designed by the Bumgardner Partnership, opened in 1974 (Dorpat 2006:254–256; Sheridan 2005).

One the largest of the early waterfront structures was located at Pike Street. By approximately 1872, a dock 70 feet in height projected out into Elliott Bay at least 200 feet from the foot of Pike Street (see Figure 4-1). The Seattle Coal and Transportation Company, an early industrial enterprise, mined coal east of Lake Washington and brought it to this dock for shipment. A small, narrow-gauge steam railway line ran from Lake Union to the top of a steep bluff at Pike Street, where an incline railway connected the trams to coal bunkers and chutes that loaded the coal into ocean-going ships. In June of 1877, the pilings supporting the dock were undermined by a boring wormlike mollusk, the teredo, and a portion of the dock and the coal bunker with 3,000 tons of coal collapsed (Figure 4-11). The company's coal-storage and loading facilities were then moved south to the King Street wharf. Some sources indicate that at least part of the Pike Street dock was rebuilt by 1880, when it formed the northern boundary of the central waterfront, but any coal-company activity had likely ended by 1878 (Armbruster 1999:49–51, 56–57; Grant 1891:159; *Daily Post-Intelligencer*, March 25, 1872; Magden 1991:7–8; Dorpat 2006:38–40). The old steamer *Mississippi* was also beached along the waterfront after it caught fire at the King Street coal bunkers in 1883. The hull was towed to the bottom of Stewart Street, where it remained for a time, although its final disposition is unknown (Newell 1960:79–80; Willis 1943:23; Dorpat 2006:51).

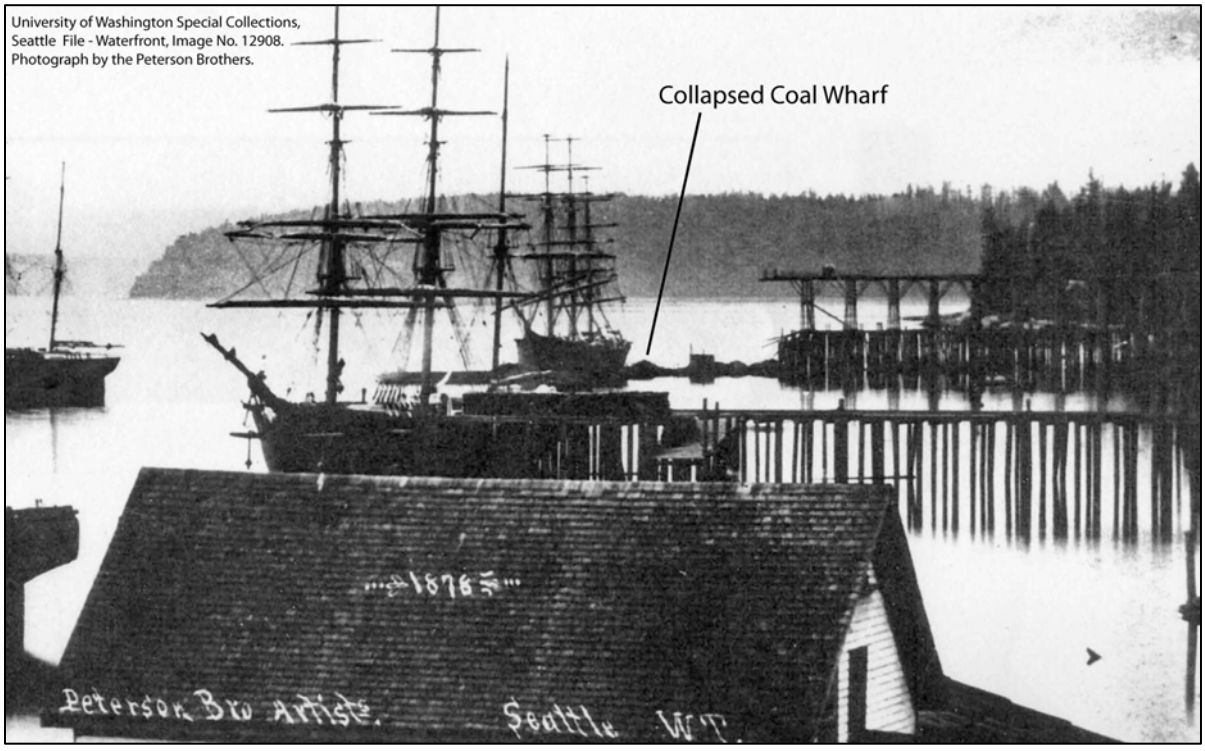

Figure 4-11. View north of the collapsed Seattle Coal & Transportation Co.'s Wharf.

To the north of the Schwabacher Dock was the Seattle Fish Company Dock, later known as the Pike Street Wharf. Like most of their fellow wharf owners, Ainsworth and Dunn, the proprietors of Seattle Fish, constructed their first small pier at right angles to the shoreline. Initially built in 1896, the dock (now known as Pier 59) was reconfigured and enlarged in 1903–1904 to comply with the new alignment standards, and a two-story warehouse was added. The company handled feed and grain as well as fish and also had a retail outlet on the wharf. They were soon joined on the pier by Willis W. Robinson, a Mount Vernon farmer who hauled his own hay and grain from the Skagit Valley on small sternwheelers. Later businesses on the pier included the steamship agents Dodwell and Company, followed by Pacific Net and Twine Company, which was later known as the Pacific Marine Supply Company. The Pike Street Dock soon became the main central waterfront location for the Seattle fishing fleet and also a number of other fishing-related enterprises, including the offices of the non-profit Purse Seiner's Association, Fishing Vessel Owners Association, the Seattle Fish Exchange, and shops for a variety of sailmakers, fish brokers and supply companies (Dorpat 2006:161–164; Sheridan 2005). It was purchased by the City in 1973 and was subsequently (1974–76) renovated by the Bumgardner Partnership to contain support activities for the aquarium, including a store, ticket area, offices, meeting rooms and a cafe. The aquarium, a new adjacent building, opened in 1977. The original pier and shed (not the aquarium itself) were designated as a Seattle landmark in 2001.

A squatters' community had grown up across the beachfront and along the bluff at the top of Pike Street and streets to the north, but other docks were not built here until after the development of Railroad Avenue. Following the fire of 1889, the Renton wharf between Pike and Pine Streets was enlarged, and by at least 1890, the location of the Clark and Sons dock was listed in city directories at the foot of Pike Street, with the Collins Wharf and Huron Lumber Company's dock both at the foot of Pine Street, and Gatzert and McNaught's placed between Pine and Virginia Streets. The Sanborn map of 1893 does not name these piers except for Johnstone's Fish Company dock at the foot of Virginia Street (Warren 1989:50–51; *Daily Times*, June 12, 1889:1; *Seattle Post-Intelligencer* July 3, 1889:4; Polk 1890:104a–104b; Polk 1893:102).

In later years, additional small fish company piers were located between Pike and Pine Streets. The San Juan Fish Company had purchased the interests of Ainsworth and Dunn in 1903, and they processed and packed fish on a small dock and in a building across Railroad Avenue. By 1912, the Reliable Oyster and Fish Company and the Ocean Fish Company operated on the dock, followed by the Whiz Fish Company. The Diamond Restaurant may also have shared the pier for a time. The Arden Salt Works is shown in 1916 on another small pier immediately to the south, which later became the home of Palace Fish Company. These two docks were renamed Piers 60 and 61 during World War II and then were purchased by the Port of Seattle in December 1945. Both were eventually torn down in the mid 1970s to make way for the construction of the Seattle Aquarium complex (Dorpat 2006:166–168).

The Gaffney Pier (Pier 9 and later Pier 62) at the foot of Pine Street was constructed around 1902, followed by the Virginia Street Dock (Pier 63) in 1906. The sheds on the two docks were similar in shape and separated by a rail spur. The Virginia Street Dock was used for newsprint storage, and a pedestrian overpass connected it to a warehouse on the east side of Railroad Avenue. By the 1930s at least one residential apartment was also located in the shed (Dorpat 2006:167–168). Piers 62 and 63 remain, but

the pier sheds were demolished in the 1980s because of their dilapidated condition. The open piers were acquired by the city about 1990 but are now unused because of the poor structural condition of the pilings.

Zone 5

The Orient Dock, between Virginia and Lenora Streets, originally ran parallel to the shoreline because the water was too deep for a standard finger pier. By 1904 there was also a row of small, one-story buildings along the western side of Railroad Avenue south of Virginia Street. In addition to a tool and die house, there were offices and bunkers holding concrete and stone that were possibly associated with the concrete plant in operation between Stewart and Virginia Streets during construction of the railroad tunnel. The United Warehouse Company had large warehouses on the Orient Dock and the adjacent Pier D, located just to the north of Virginia Street and owned by the Pacific Coast Company, a part of Henry Villard's railroad network. United Warehouse had developed a number of large storage facilities around the region, and advertisements described its "dry, commodious warehouses" as well as its cold storage, with the "Finest equipment on the Pacific Coast for handling Eggs, Butter, Cheese, Poultry, Fish, etc." (Polk 1907; Sanborn Map Co. 1904–1905). By 1918 the Orient Dock had become known as Pier 11 and the U.S. Government Dock at the base of Lenora Street was Pier 11b. In later years the Lenora Street Piers (Piers 64 and 65), the home of the "Princess" ships of the Canadian Pacific Railroad, replaced the Orient Dock. In the mid 1990s the Port of Seattle initiated a major waterfront revitalization project and demolished Piers 64 and 65 as well as the Bell Street Terminal (Pier 66) to the north. The Port replaced Piers 64 and 65 with a new small-boat marina (Sheridan 2005:11, 17).

A ravine near present-day [redacted] provided access to the bluffs and a natural meadow that extended toward [redacted]. [redacted] was likely the location of the permanent Native American camp site known as Baba'kwob and possibly related to Muck-Muck-Wum (see Section 4.2.2), which continued to be used by Native peoples after a growing population of non-Native settlers began to occupy the Seattle area. During the historic period, and particularly after Seattle residents passed an ordinance in 1865 banning Indian peoples from living within city limits, the camp of a group known as "Curley's band" was located in this vicinity, which may also be related to Baba'kwob (see Section 4.2.2). In subsequent years it was used as a temporary residence by migrant Native American groups who stopped on their way to seasonal work in the hop fields. Squatters from a variety of ethnic backgrounds later occupied the area, living in shacks on the beach as well as in homes on pilings or floats offshore (Dorpat 2006:22–25).

An early dock development in this area was the Brighton Boathouse, likely built by the owner, Frank Fabre, in the early 1890s. The two-story boathouse provided moorage and rentals for recreational boats. It was also the home of the Elliott Bay Yacht Club, which was started in 1894 and sponsored many of the city's most prestigious regattas and boating festivals. The boathouse remained just south of the foot of Battery Street until 1910, when Fabre moved it seven blocks north because of the large amount of dirt dumped into the area by work on the railroad tunnel and on the Denny Regrade (Dorpat 2006:125). A cabin on a float was also located at the foot of Battery Street in 1893, and directly to the west was the Dennee Boathouse, owned by boat builder Cornelius H. Dennee. Dennee also rented sail and row boats,

but by 1895, city directories indicate that he had moved his business to the foot of Pike Street (Hershman et al. 1981:81; Polk 1895:1026).

Along the waterfront inland from the railroad trestle, a shantytown extended along the front of the bluff as well as down the hill and on the beach. This shantytown expanded during the economic depression of 1893, creating a "sub-culture of squatters" on the beach. Of mixed races and ethnicities, the people who lived below the cliffs occupied homes that were "sometimes built on a raft anchored in the water, sometimes on piles driven in the strip of sand between the high and low tide lines and sometimes on the beach just above the water mark…" (Dorpat 2006:123). Cleanup attempts were generally unsuccessful until 1903.

The establishment of the Port of Seattle in 1911 spurred development of the northern shoreline of Elliott Bay. By 1910 Seattle leaders felt that modernization was necessary to capture the new business that the opening of the Panama Canal and expansion of Pacific Rim trade was expected to bring. Dissatisfaction with the city's lack of public dock space and its inability to force any action by individual wharf owners led Seattle officials to spearhead the Port District Act, passed by the Washington State Legislature in 1911. A port district was an independent public entity empowered to buy or condemn property for harbor and transportation improvements and to levy property taxes. Local voters approved the Seattle Port District in a special election held in September 1911 (Port of Seattle 1981:14–15; Berner 1991:142–143).

The Port Commission immediately began to diversify and modernize waterfront facilities. Funding for five of its proposals came from bonds authorized by the public at another special election in 1912. Since so much of the central waterfront was already owned by various railroad companies and other private parties, the Port focused its initial land acquisition on less expensive properties at the north end of the waterfront. One of its first major accomplishments was the construction of the Bell Street Terminal, later known as Pier 66, which was completed in 1915. It was built on fill from the Denny Regrade rather than on pilings. The facility included a large pier capable of handling both ocean-going ships and smaller vessels carrying produce and other cargo around the Sound. Intending to capture some of the trade through the newly-opened Panama Canal, the terminal also included dry and cold storage in a four-story, office-warehouse building as well as large freight sheds and railroad spurs for offloading goods. It was the advent of World War I, however, that caused immediate demand for these modern terminal facilities and within a year catapulted Seattle over San Francisco as the leading West Coast port (Sheridan 2005:8; Port of Seattle 1981:18–19; Burke 1976:55–56; Dorpat 2006:186).

In addition to international trade, the Bell Street Terminal also provided a significant boost to local and regional commercial opportunities. One major activity of the terminal was to supply the Public Market at the end of Pike Street, and a viaduct was constructed over Railroad Avenue to provide easier access. Fish and apples were among the major products handled at the Bell Street pier, and the Port was able to offer lower wharfage fees than some of its competitors. A small-boat basin and public dock located at the north end of the terminal near the foot of Battery Street were designed for the "mosquito fleet," which continued to transport goods and passengers throughout Puget Sound. On top of the Bell Street Terminal building the Port also constructed a public park, which offered various recreational opportunities, including a salt-water pool, a solarium and a children's playground. The park proved to be

more popular for sailors and prostitutes than local families and was closed in the 1920s. The Port of Seattle tore down the Bell Street Terminal in 1993 and replaced it with a small boat marina, a cruise ship terminal, a maritime museum and the Bell Harbor conference center and restaurant complex. Pedestrian bridges at Bell and Lenora Streets connect across Alaskan Way to Belltown, replacing earlier bridges. The Port offices were moved to the north on remodeled Pier 69 (Burke 1976: 43–45; Sheridan 2005:8, 17; Dorpat 2006:266).

Zone 6

The north end of the waterfront remained under the waters of Elliott Bay and without known development until the 1880s, when Manning's Dock was built at the foot of Wall Street. Manning's, which offered lumber storage and also served as the residence of its owners, was enlarged during the period of rapid wharf development that followed the 1889 blaze. City directories indicate that by 1893 several other wharves had been built near Manning's, including the Wall Street Slip, Squire's Dock at the foot of Battery Street, Hall's Wharf between Wall and Vine Streets, City Scavenger's at the foot of Vine Street, the Seattle, Lakeshore and Eastern Wharf at the base of Clay Street, and Coffman's Wharf at Lake Avenue (later known as Broad Street). During this period, a shingle mill occupied the wharf just north of Wall Street, while other docks included warehouse space for a variety of goods. Hall Brothers' Wharf between Wall and Vine Streets contained the shipyards of one of the city's premier builders of two- and three-masted sailing schooners.

Manning's Dock was replaced sometime after 1901 by a new pier (also known as Pier 12 and now Pier 67) built by the Galbraith-Bacon Company, the grain and building materials wholesale firm that also occupied Pier 54 pier between Madison and Spring Streets. Its transit shed was demolished in 1961 for construction of the Edgewater Inn before shoreline regulations prohibited such developments. The hotel, completed just before the 1962 World's Fair, was originally designed by a prominent local firm, John Graham & Company, in a distinctly 1960s style. It was remodeled in 1969 and has been substantially altered at least twice since then.

A 1910 fire that began on the east side of Railroad Avenue near Wall Street was considered second in size to the Great Fire of 1889. The blaze destroyed a number of buildings along Elliott Avenue south toward Battery Street, but because of easterly winds did not harm the Galbraith-Bacon Wharf or much of Railroad Avenue in that vicinity (Dorpat 2006:184–185). By 1912 a series of small docks had been built near the foot of Cedar Street. The Seattle Fish and Storage Company and later the Superior Fish Company occupied the center pier, which was flanked by sand and gravel bunkers and owned for at least a few years by the Vashon Sand and Gravel Company. To the north the American Can Company had taken over the former Roslyn Coal Company Wharf near the foot of Clay Street by 1916.

North of Virginia Street to Broad Street and beyond, much of the Railroad Avenue trestle was separated in the center by water and piers with no decking or tracks. These open areas remained until the City completed the northern part of the seawall from Madison Street to Broad Street between 1934 and 1936. A plank driveway extended along the pier side of Railroad Avenue, and a few buildings and structures lined this thoroughfare west of the Railroad Avenue tracks but east of the piers. By 1905, for example, a small stable and a salt-storage house were located just north of Wall Street, probably

associated with the Chlopeck Fish Company. A mattress factory was in a similar position at the end of Broad Street near the Ainsworth and Dunn Wharf.

The Chlopeck Fish Company was operating on their dock between Wall Street and Vine Street by 1901; the pier was only 200 feet long with fish-packing and cold-storage facilities as well as moorage and an office. This same pier (later Pier 68) was then the home of Booth Fisheries Company, which operated a smokehouse and packing plant across Railroad Avenue. Although the pier is gone, the smokehouse became part of the Skyway Luggage Factory and is still extant, used as a public storage facility (Dorpat 2006:199; City of Seattle 2007–2008).

Pier 69 was built in 1900 by the Roslyn Coal and Coke Company at the foot of Cedar Street. The company operated an elevated tramway that crossed above the tracks to additional coal bunkers and warehouses on the east side of Railroad Avenue (Dorpat 2006:164). The American Can Company acquired the pier in the 1920s, using it as a warehouse to store rolls of aluminum for the manufacture of cans at their factory across the street. The structure was a three-story concrete warehouse, totaling more than 200,000 square feet**.** By 1979 Pier 69 was purchased by Canadian interests and became the home of the *Princess Marguerite*, serving Victoria, British Columbia. The large warehouse was completely redeveloped in 1993 by the Port of Seattle to serve as its headquarters. The American Can Company factory on the east side of Alaskan Way closed in the 1970s. The large building was remodeled into a trade center in the 1980s and is now the headquarters of Real Networks (Sheridan 2005:11; City of Seattle 2007–2008).

At Broad Street, Ainsworth and Dunn, the fish packing and grain wholesaler, added another wharf facility by 1901 in conjunction with the Puget Sound Wharf and Warehouse Company. The facility (originally known as Pier 14, and now Pier 70) primarily handled salmon from the company's cannery near the Canadian border (Sheridan 2005:11; Dorpat 2006:164). By 1912 Ainsworth and Dunn was sharing the pier with the American-Hawaiian Steamship Company. Before 1920 it became the home of Dodwell Dock and Warehouse Company and served as the terminal for the Northland Steamship Company, the Blue Funnel Line, and the Hamburg-American Line, which operated freighters. After World War II it served as U.S. Coast Guard headquarters and a berth for visiting naval vessels; it was later used as a warehouse by the Washington State Liquor Control Board. In the 1970s the pier was converted to retail and restaurant use, with forty small stores and restaurants arranged around the interior warehouse space. Changes at that time were minimal, leaving much of the original fabric as it was. However, a major remodel in 2000 significantly altered the structure. A law firm now has offices upstairs and restaurants occupy the street front and the end of the pier (Dorpat 2006:196–200, 249; Sheridan 2005:18).

4.3 ARCHAEOLOGICAL RESOURCES

The EBSP APE contains many historically significant properties, including the central waterfront piers and the seawall. It also includes one historic district (Pioneer Square) and is adjacent to another (Pike Place Market), both of which are listed in the NRHP. Archaeological resources—both pre-contact Native American and historical period—have also been identified in the APE, and additional archaeological resources are likely buried beneath surface streets and fill. The following section summarizes past

cultural resources studies and previously recorded archaeological sites in the APE, and highlights areas within the APE that have potential for significant undiscovered cultural resources.

4.3.1 Previous Cultural Resources Studies

Multiple cultural resources studies have been conducted in the project vicinity, most in compliance with Section 106 of the NHPA and other cultural resources regulations. Among the most important of these investigations are studies employing both archival and geotechnical data to assess the potential for intact, buried cultural deposits in this highly urbanized environment. Since access to subsurface deposits is severely limited or non-existent, archaeological monitoring during construction activities was used on other projects that included ground disturbance in areas deemed to have a higher probability of subsurface cultural remains. A number of cultural sites, both pre-contact Native American and historic, have been identified during archaeological monitoring. Selected cultural resources studies previously completed in the EBSP vicinity are summarized in Table 4-2.

TABLE 4-2. SELECTED CULTURAL RESOURCES STUDIES IN THE PROJECT VICINITY.

Author	Date	Project[1]	Relationship to APE	Sites Identified[2]
Earth Technology Corporation	1984	Archaeological Resources Assessment for the Downtown Seattle Transit Tunnel	0.1 mile E.	None
Hart Crowser	1986a	Identification of Archaeological Research Topics and Questions for the Downtown Seattle Transit Project	0.1 mile E.	None
Weaver and Thompson (Hart Crowser	1986b	Research Design for Archaeological Test Excavations, Downtown Seattle Transit Project	0.1 mile E.	None
Evans-Hamilton	1988	Location, Identification and Evaluation of Potential Submerged Cultural Resources for Three [USACE] Dredged Disposal Areas	Within	None
Evans-Hamilton	1988	Remotely Operated Vehicle Reconnaissance of Submerged Cultural Resources in Elliott Bay, Washington	0.5 mile W.	None
Dames and Moore	1996	Denny Way/Lake Union Combined Sewer Overflow (CSO)	Within	None
Forsman et al.	1997	Denny Way/Lake Union CSO, Cultural Resources Assessment (	Adjacent	None
Bowden and Larson	1997	Proposed [redacted] Extension	[redacted]	Noted possible shipwrecks
Weaver	1997	Seattle Football Stadium EIS Cultural Resources	0.15 mile SE	None

Author	Date	Project[1]	Relationship to APE	Sites Identified[2]
Forsman et al.	1998	Wall Street Project Cultural Resource Overview, Seattle, King County	Within	None
Hart-Crowser	1998	Football/Soccer Stadium and Exhibition Center (CenturyLink Field) Project, Appendix K: Cultural and Archaeological Resources Technical Report	0.15 mile SE	None
Miss	1998	[redacted] Archaeological Assessment and Monitoring	[redacted]	Foundation remains and 1870s-1910s historical artifacts
Lewarch and Larson	1998	Update on Archaeological Test Excavations and Construction Excavation Monitoring of 45KI456, the Baba'kwob Site, at the [redacted] Construction Site as of March 20, 1998	[redacted]	Baba'kwob Site (45KI456)
Lewarch et al.	1999	Denny/Lake Union Combined Sewer Overflow Control Project: Archaeological Resources Treatment and Monitoring Plans	Within	None
Liddle	1999a	Results of Cultural Resource Monitoring for the [redacted]	[redacted]	45KI482
Holstine	1999	Potential Effects on Historic Properties: WSDOT's SR 519, Intermodal Access Project, Seattle	0.3 mile S.	6 buildings
Forsman et al.	2000	Proposed Aspen Murray Hotel/Condominium Project Archaeological and Traditional Cultural Places Overview, Seattle	0.1 mile E.	None
Lewarch et al.	2002	Archaeological Evaluation and Construction Excavation Monitoring at the [redacted], Baba'Kwob Site (45KI456), Seattle	[redacted]	Baba'kwob (45KI456)
Roedel et al.	2003	Denny Way/Lake Union CSO Control Project, Archaeological Resources Monitoring, Seattle	0.3 mile NW	None
Larson Anthropological Archaeological Services, Ltd.	2004	SR 99: Alaskan Way Viaduct & Seawall Replacement Project, Draft EIS Appendix M, Archaeological Resources and Traditional Cultural Places Technical Memorandum	Within	No new sites recorded
Gillis et al.	2005	SR 99: Alaskan Way Viaduct & Seawall Replacement Project: Archaeological Resources Monitoring and Review of Geotechnical Borings from South Spokane Street to the Battery street Tunnel	Within	None
Hodges	2006	SR 99 Alaskan Way Viaduct & Seawall Replacement Project: Geoarchaeological Examination of Solid-Core Geoprobes	Within	None

Author	Date	Project[1]	Relationship to APE	Sites Identified[2]
Miss and Hodges	2007	Alaskan Way Viaduct & Seawall Replacement Project: Research Design for Identification of Archaeological Properties, Part I: Native American Properties	Within	None
Miss et al.	2007a	Alaskan Way Viaduct & Seawall Replacement Project: Research Design for Identification of Archaeological Properties, Part II: Historical Properties	Within	None
Hodges et al.	2007	SR 99 Alaskan Way Viaduct & Seawall Replacement Project: Archaeological Assessment: Bents 93 and 94 Emergency Repair	Within	None
Hudson	2007	SR 519 Intermodal Access Project Phase 2: South Atlantic Corridor	0.4 mile S.	3 buildings and 1 historic district
Fallon et al.	2007	Cultural Resources Monitoring for the [redacted] Expansion Project	[redacted]	45KI765
Miss et al.	2008a	SR 99 Alaskan Way Viaduct & Seawall Replacement Program: Results of the Archaeological Core Collection Program, Phase I	Within	None
Miss et al.	2008b	SR99: Alaskan Way Viaduct Moving Forward Projects Archaeological Assessment Interim Technical Memorandum: South Holgate Street to South King Street	0.1 mile S.	None
Valentino	2008	SR 519 Intermodal Access Project Phase 2: South Atlantic Corridor, Addendum to Cultural Resources Discipline Report: Results of Supplemental Archaeological Investigations	0.4 mile S.	None
Sheridan	2008	SR 99: Alaskan Way Viaduct & Seawall Replacement Program: Section 106 Technical Report, Historic Resources S. Holgate Street to S. King Street Viaduct Replacement Project	Adjacent	17 buildings
Valentino and Rinck	2009	Assessment for the West Thomas Street Pedestrian Overpass Project, Seattle, King County, Washington	0.5 mile NW	None
Miss and Sheridan	2010	Alaskan Way Viaduct Replacement Project: Appendix I, Section 106: Historic, Cultural, & Archaeological Resources Discipline Report	[redacted]	45KI924, 45KI943, 45KI942, 45KI930, 45KI947
Valentino et al.	2010	Alaskan Way Viaduct & Seawall Replacement Program: Results of Monitoring for the [redacted]	[redacted]	45KI924, 45KI943

Author	Date	Project[1]	Relationship to APE	Sites Identified[2]
Casella et al.	2010	SR 99: Alaskan Way Viaduct [redacted], Stage 1, Archaeological Monitoring	[redacted]	Historical artifacts noted
Mullaley et al.	2010	SR 519 Intermodal AccessP2: [redacted] Improvements	[redacted]	Historical artifacts noted
Huber et al.	2010	SR 99 Alaskan Way Viaduct and Seawall Replacement Project , Synthesis of Archaeological Coring Programs, Bored Tunnel Alternative	Adjacent	None
Gehrke	2011	Marine Division Passenger Ferry Maintenance and Moorage Barge Project	Within	None
Schneyder et al.	2011a	SR 99: Alaskan Way Viaduct Data Recovery Report for 45KI924	[redacted]	45KI924
Schneyder et al.	2011b	Revised Archaeological Treatment Plan, SR 99: Alaskan Way Viaduct Replacement Project	Within	None
Wilt	2012	Seattle City Light Transmission Line Relocation	[redacted]	45KI1084, 45KI1085

Notes: [1]Complete citation is in References Section.
[2]Archaeological sites recorded within 0.5 mile of the APE.

The first inventory of the submerged resources in Elliott Bay was conducted in 1988 to assess affects of the USACE's open water disposal of dredged materials (Evans-Hamilton, Inc. 1988). The archaeological project included a literature review and remote sensing that recorded several sonar features and recognized eight shipwrecks in the bay. Sixteen of the features were defined as sunken boats, barges, or other man-made debris, located at [redacted] from the seawall. In 1996, a project was conducted for the Denny Way/Lake Union CSO Control Project, focusing on the area [redacted]. Three shipwrecks were noted during the sidescan sonor survey. Two of the wrecks were previously identified during the 1988 survey. The third wreck is located within [redacted] (Dames and Moore 1996). One year later, a literature review of U.S. Customs records, insurance records, and newspapers provided a list of shipwrecks in the Elliott Bay (Bowden and Larson 1997). Two further wrecks were noted, *Apollo* (sunk in 1901) and *Columbia* (sunk in 1910). *Apollo* sank 125 [redacted], and *Columbia* sank [redacted] As yet, the locations of these vessels have not been confirmed by underwater survey.

Examples of other cultural resources studies in the project area include investigations conducted by NWAA from 2007 through 2009 for the AWVSRP. During these studies, in-depth historical research was used to identify areas of ethnographic and ethnohistoric Native American activity and early historical period development along the Seattle waterfront. Project fieldwork included archaeological monitoring of geotechnical coring and project construction activities. Analysis of geotechnical cores contributed substantially to an understanding of subsurface deposits in this area of intensive urban development,

particularly on the reclaimed tidelands (Hodges et al. 2007; Huber et al. 2010; Hudson 2007; Miss and Hodges 2007; Miss et al. 2007a, 2007b, 2008a, 2008b; Valentino 2008; Valentino et al. 2008). Geotechnical data identified evidence of long-term industry, railroads, and wharf development in the area, and locations of early dredging and regrade fill episodes (Miss et al. 2008a). During archaeological monitoring of construction activities, NWAA recorded four historical archaeological sites (45KI924, 454KI942, 45KI943, and 45KI947) on the filled tidelands which contained early commercial and residential structural remains and associated features (Meyer 2009; Meyer and Shong 2010; Shong 2009; Shong and Valentino 2009a, 2009b). Although NWAA identified no pre-contact Native American resources in the project area, intact tideland and beach sediments were present in some locations beneath historical fill and debris. Historical buildings, structures and districts were also documented in the project areas.

Subsequent archaeological monitoring and data recovery was conducted during AWVSRP improvement construction phases collectively called the Alaskan Way Viaduct Moving Forward Program (AWVMF). Archaeological monitoring for the [redacted] portion of the AWVMF did not identify any new significant cultural resources, but numerous features and historical artifacts associated with industry and commercial activities were noted (Casella et al. 2010). In 2011, an archaeological treatment plan was developed for the Alaskan Way Viaduct Replacement Project (AWVRP) to guide data recovery of known archaeological sites (45KI924 and 45KI958) and treatment of areas with the potential for intact archaeological properties (Schneyder et al. 2011b). Although all four archaeologically sensitive areas identified in the AWVRP overlap the EBSP APE, only two—Sensitive Areas 2 ([redacted]) and 3 ([redacted])—are within ground disturbance areas of the seawall project. Both areas have the potential to contain precontact and historical archaeological deposits. Studies continued with the data recovery excavations at 45KI924 during the [redacted] portion of the AWVMF. This site represented periods of land modification, demolition, filling, a community that occupied elevated planks above the tideflats, and industrial use between the 1890s and 1909 (Schneyder et al. 2011a).

Other recent archaeological monitoring for road improvements associated with the SR 519 Intermodal Access and South Atlantic Projects, southeast of the EBSP APE, did not identify new significant cultural resources (Mullaley et al. 2010). Artifacts encountered during the SR 519 project monitoring that were deposited as refuse between the late 1800s and the 1920s, represent mainly domestic and personal categories (Mullaley et al. 2010).

Within the past two years, King County Department of Transportation, Marine Division and Seattle City Light (SCL) have conducted projects within the EBSP APE that addressed cultural resources. The APE for the King County Marine Division's temporary moorage and maintenance barge extended [redacted] (Gehrke 2011). A remote-operated vehicle (ROV) was used to video tape the seafloor to determine if trash and debris was present (Wick 2010). Removal of this material was being considered as mitigation for the barge project. The ROV documented a pile of "several hundred bottles" as well as remnant pilings and modern trash (Wick 2010:5). Based on a review of the ROV video and a desktop survey of previous archaeological projects and historical maps and photographs, it was determined that no historic properties would be affected by the project (Gehrke 2011). SCL's project

was the relocation of a transmission line from the Alaskan Way Viaduct to an underground alignment under the Viaduct, [redacted] (Wilt 2012). During excavation of the transmission line trench and vault, two sections of a wood wall and a concrete wall were identified (45KI084 and 45KI1085). Both are discussed below in more detail.

4.3.2 Previously Recorded Archaeological Resources

Recorded pre-contact archaeological sites on the Elliott Bay shoreline near [redacted] provide information on the kinds of pre-contact archaeological sites that might occur in the shoreline and bluff environments of Elliott Bay. Data from the [redacted] Site Complex on the [redacted] (45KI428 and 45KI429) for example, demonstrate long-term pre-contact occupation of the marine littoral zone in the greater Seattle area dating back 4,500 years. The archaeological record shows a change in site function, due to a combination of rising sea level, changes in the configuration of the landform, regional changes in pre-contact subsistence-settlement pattern organization and effects of the earthquake on the Seattle Fault approximately 1,100 years ago (Larson and Lewarch 1995). Data from the [redacted] Site at the mouth of the [redacted] (45KI23) document occupations on a terrace at the margin of Elliott Bay over the past 2,000 years (Campbell 1981; URS Corporation and BOAS, Inc. 1987). The terrace was uplifted approximately 20 feet by the same Seattle Fault earthquake 1,100 years ago. The prograding delta of the [redacted] reached the vicinity of the [redacted] Site (45KI23) between 500 and 1,000 years ago, and the local habitat changed from a marine littoral setting to a river delta and riverbank riparian environment. Other pre-contact sites within Seattle are described in greater detail in AWVSRP documents (Miss and Hodges 2007; Miss and Sheridan 2010).

Ten archaeological sites have been previously identified [redacted]. These resources are summarized in Table 4-3 and shown in Figure 4-12. Four of the previously recorded sites are [redacted]; one a pre-contact/contact-period Native American site (45KI456) and the other three are historical-period sites (45KI482, 45KI1084, and 45KI1085). Site 45KI456 was recommended not eligible for the NRHP. Sites 45KI1084 (wood wall) and 45KI1085 (concrete wall) were considered not eligible for listing in the NRHP, and site 45KI482 has not been evaluated for NRHP eligibility. Sites 45KI456 and 45KI482 were removed or covered by the building construction. Other previously recorded sites, all historical resources, are [redacted] and will not be affected by the proposed project. A potential site was also located [redacted]: a possible shell midden observed on an adjacent privately-owned parcel during monitoring of the [redacted] construction project on the [redacted] (Figure 4-12) (Dugas and Robbins 2001). The four sites identified during investigations for the EBSP shown on Figure 4-12 (45KI1011, 45KI1012, 45KI1013, and 45KI1099) will be discussed in the following Chapter.

TABLE 4-3. PREVIOUSLY IDENTIFIED ARCHAEOLOGICAL SITES WITHIN 0.5 MILE OF THE APE

Site No.	Recorder/Date	Age	Description	Relation to APE
45KI456	Lewarch 1998, Lewarch et al. 1999, 2002	Pre-contact and 1880s–1890s	Baba'kwob Site: midden, human remains, trade beads. The location of this site is beneath a building	Within
45KI482	Liddle 1999a, 1999b	1880s–1900s	[redacted] Historic Site: historical debris. The location of this site is beneath a building	Within
45KI685	Lewarch and Kaeler 2003	1889–1890	Sinking Ship Areaway Site: mosaic tile floor beneath existing sidewalk	0.1 mile E.
45KI924	Shong and Valentino 2009a, Valentino et al. 2010	1895–1950	[redacted] Site: historical period refuse and structural remains	0.3 mile S.
45KI930	Gilpin and Butler 2009	Pre-1959	Historical railroad remnants	0.1 mile S.
45KI943	Shong and Valentino 2009b, Valentino et al. 2010	1900–1950	[redacted] Site: historical period refuse and structural debris	0.2 mile S.
45KI1016	Merrill 2011	1889–1904	[redacted] Site: historical structural remains and refuse	0.2 mile SE
45KI1084	Hay 2012a and Wilt 2012	1870-1920	Two sections of wood retaining wall	Within
45KI1085	Hay 2012b and Wilt 2012	1917-1923	[redacted] Concrete Wall: Concrete wall	Within
None	Dugas and Robbins 2001	Pre-contact?	Possible shell midden	100 feet NE

The following descriptions are of sites within or immediately adjacent to the EBSP APE.

4.3.2.1 Site 45KI456, Baba'kwob

Site 45KI456 was initially identified when workers exposed human remains during construction of the [redacted] along the [redacted]. The archaeological deposits were a thin midden deposit with burned matrix, shell and charcoal that was covered by fill containing historical artifacts including brick, window glass, wire nails, and bottle

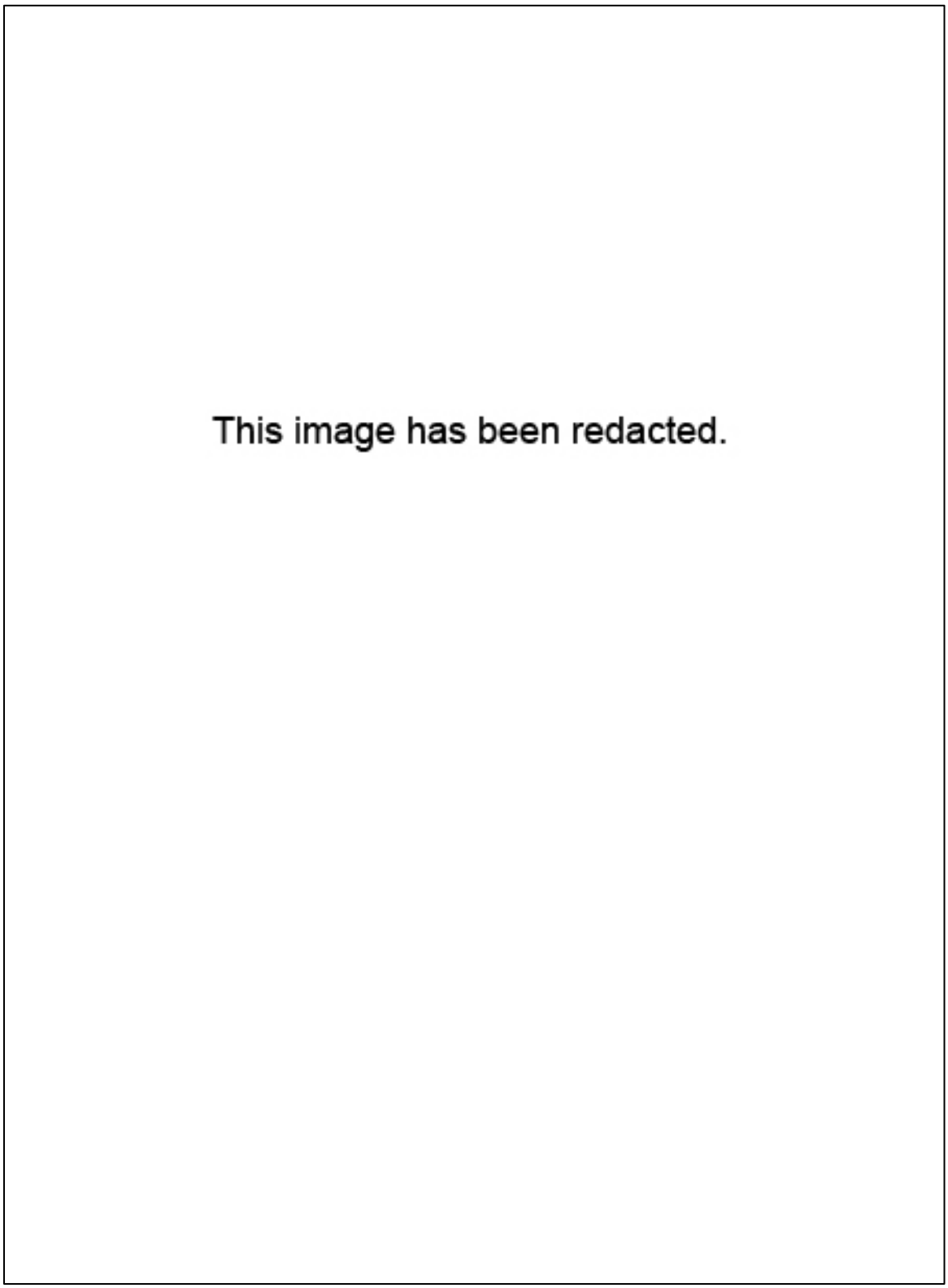

Figure 4-12. Archaeological sites in and near the project APE.

glass. The midden deposit was likely within a ravine or gulch located [redacted]. This ravine was probably filled between 1893 and 1897 (Lewarch 1998; Lewarch et al. 2002).

4.3.2.2 Site 45KI482, [redacted] Historic Site

Site 45KI482 was identified a short distance north of 45KI456, between [redacted], during the construction of the [redacted]. The site is described as the debris from inhabitants or workers of warehouses and other buildings, most notably the Galbraith-Bacon Company warehouse. Most of the artifacts (63 percent) were classified as domestic, including plates, bowls, cups, soda bottles, and clothes pins. Personal artifacts such as toys, medicine and alcohol bottles accounted for 16 percent of the collection and an equal number (9 percent) represented artifacts associated with architecture and transportation/industry (Liddle 1999b).

4.3.2.3 Possible Midden

This feature, a possible shell midden with fire-modified rock, was observed in a cut bank adjacent to and south of the [redacted], during archaeological monitoring of condominium construction. Since the feature was outside the [redacted] property, it was noted but not formally recorded and is outside the EBSP APE (Dugas and Robbins 2001).

4.3.2.4 Site 45KI1084, Wood Wall [redacted]

Historic site 45KI1084 is two sections of a historic wooden wall identified under the [redacted] (Location 1) and between [redacted] (Location 2) (Wilt 2012). The wall segments were exposed approximately [redacted] below the street surface and were composed of horizontally stacked creosote treated wood beams attached by three-quarter inch bolts or pins. Cross beams were noted at Location 1 but they were not attached to the wall. Each wall section extended to the bottom of the utility trench, at least nine feet below the street surface. The two wall segments are likely part of the same wall that was constructed between the late 1800s and early 1930s to retain fill material (Wilt 2012). The utility project that exposed this site "did not affect significant or potentially significant cultural deposits," therefore, 45KI1085 is considered not eligible for the NRHP (Wilt 2012:5).

4.3.2.5 Site 45KI1085, [redacted] Concrete Wall

Site 45KI1085, a concrete wall, is beneath [redacted] and was identified during work for the SCL utility relocation (Wilt 2012). The poured concrete wall is 29.8 feet long and 15.3 feet wide by 2 feet wide. The wall was built between 1910 and 1923 according to construction blueprints (Wilt 2012). This site "lacks integrity and does not contribute information important to the history of this part of Seattle…" and by extension was considered not eligible for the NRHP (Wilt 2012:6).

4.4 EXPECTATIONS

The intertidal zone, beach, backshore, and bluffs would have been present in the seawall vicinity prior to historic filling. The landforms in the project area harbor different potential for precontact and historical cultural materials depending on their formation history and preservation potential.

4.4.1 Precontact Archaeological Resources

In general, there is low potential for encountering precontact cultural resources in the APE. Intertidal deposits along the beach foreshore compose the natural sediment below the historic fill along most of the length of the seawall. Intertidal foreshore sediment has very low potential for pre-contact archaeological resources because people would not have occupied inundated areas. Tidal channels may have provided locations for weir or net fishing near ravine mouths that crossed the APE. Archaeological evidence of fishing in the intertidal zone would be limited to the ruins of weirs, isolated lost tools, or discarded items. Ephemeral wetlands that may have extended from the shoreline into the intertidal zone have slightly higher potential for cultural materials than the tide flat deposits because wetlands provided important food and technical resources to Native Americans. Archaeological evidence of resource procurement in this setting would also be limited to isolated lost or discarded tools that would be very difficult to find. If isolated precontact cultural materials were to be present in the foreshore, they would have high preservation potential because the intertidal environment is one of low erosion and high deposition.

Beaches, now buried below historic fill, were west of the seawall prior to historic shoreline development (Figure 4-13). Beach berms were commonly used by Native Americans for temporary camping, resource procurement, and processing. Beach berm sediments in the APE have potential to contain the archaeological structural remains, artifacts from many data classes, and features, such as hearths and pits. Older beaches with similar potential for prehistoric cultural resources could be buried deeply below historic beaches due to Holocene sea-level rise. Preservation potential on beaches is, in contrast, relatively low because these landforms undergo a high degree of erosion and reworking by waves. So, the potential for intact precontact cultural resources within beach berm deposits is tempered.

Beach backshore deposits have relatively low potential for harboring significant precontact resources. There is limited potential for isolated lost tools and discarded items to be found associated with backshore deposits. There is also some potential for remains associated with temporary camping, resource procurement, and processing along the backshore where ephemeral streams draining the uplands have carved ravines and formed small alluvial fans. The small fans could have raised portions of the backshore out of the intertidal zone, making them preferred camping locations. Preservation potential is higher on the beach backshore than on the beach berm. Sediment commonly accumulates along the protected backshore, but backshores are subject to erosion during winter storms and high water events.

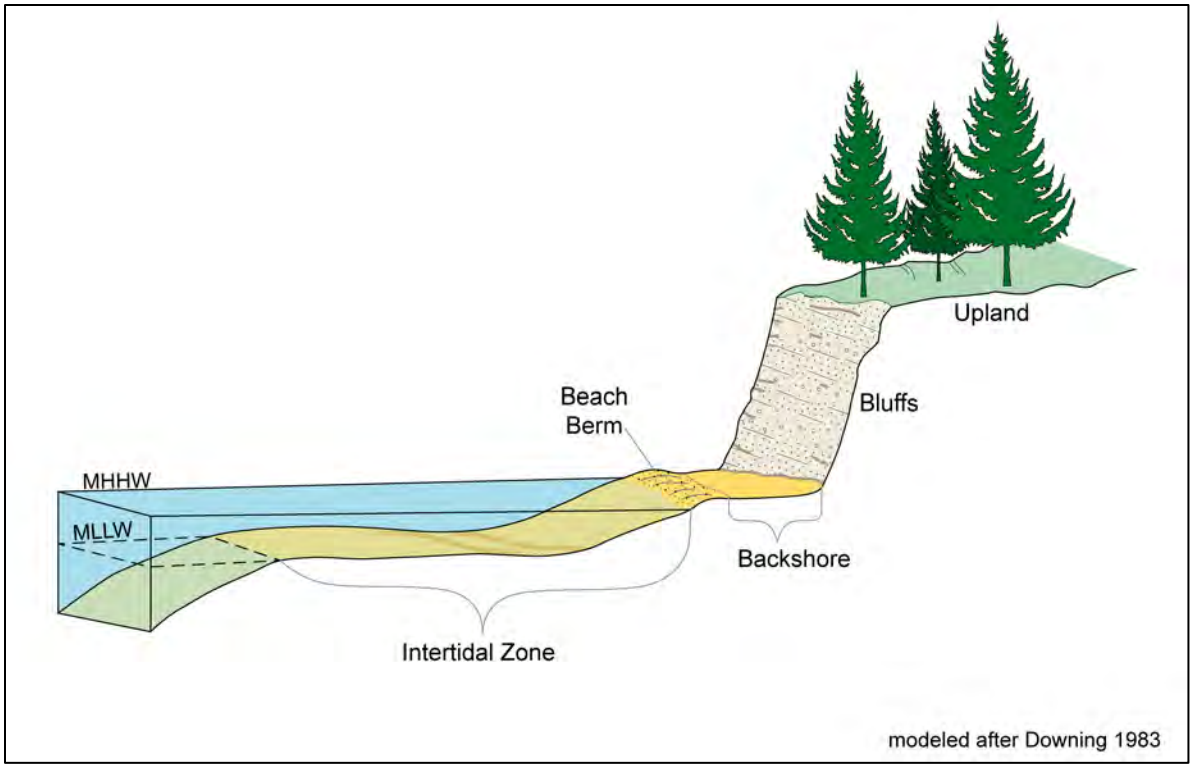

Figure 4-13. Schematic of the precontact shoreline showing bluff, beach berm, backshore, and intertidal depositional environments.

Bluffs in the APE vicinity also have low potential for evidence of prehistoric occupation because of thorough disturbance by historic development and the unlikelihood that people would have occupied very steep slopes in the past. Areas where the bluffs were not very steep or where ravines were present along the bluff face have slightly higher potential for archaeological resources because those areas provided access to the upland.

4.4.2 Historical Archaeological Resources

The naturally formed intertidal, beach, backshore, and bluff landforms in the seawall vicinity were historically buried by fill over the course of a century. The earliest fill was deposited in relatively small pockets related to single events and individual activities in the south APE. From there, fill accumulated both vertically up and horizontally to the north and west. Fill became more massive as filling activities shifted from individual efforts to larger municipal regrade and dredge projects. As a result, more recent fill found closer to the modern surface at the south end of the APE and fill in the north APE have lower potential for significant cultural materials when compared to the deeply buried early fill in the south APE.

Yesler's Wharf at the foot of what is now Yesler Way, began accumulating woodwaste and sawdust from the early mill and gradually extended west with more woodwaste, various ship ballasts, dredge spoil, and whatever materials were at hand. As a result, the fill on top of beach and intertidal sediment in the south APE has high potential for historical cultural materials associated with Seattle's early history and

artifacts within early fill layers have the potential to be linked to specific individuals and businesses. Stable temporary surfaces may be in the fill at the south end of the APE and any stable surfaces that are present would have the potential to support foundations, ruined structures, decking, or other possibly significant historical cultural materials. Cultural materials identified at the base of the historic fill on top of the tideflats and beaches in the APE would be expected to relate to industry, manufacture, commerce, trade, and possibly to residential and social development themes. Great Fire deposits related to cleanup efforts are also expected. Preservation potential of early historical cultural materials is highest at the boundary between fill and the underlying natural sediment in the intertidal and backshore environments. Early historical cultural materials in fill deposited along the beach or bluff are less likely to be preserved in primary context due to wave reworking.

Historic shoreline development slowly moved north of Yesler's Wharf and fill events became larger over time. Filling events became associated with municipal activities and infrastructure construction, instead of related to individual piers. For example, Railroad Avenue was constructed on trestles across the waterfront in 1887 and seawall construction began in 1911. Multiple large-scale regrade projects resulted in cutting down the surrounding hills and sending the sediment down the bluffs into the intertidal zone. The more recent massive fills have lower potential for stable temporary surfaces with less likelihood for encountering foundations, ruined structures, decking, or other possibly significant historical cultural materials. Cultural materials identified in the later historic fill to the north, west, and above the early historic fill would be expected to relate to transportation, government, infrastructure, and possibly to industry, manufacture, commerce, trade, residential, and social development themes. Preservation potential within the more massive fill deposits varies from low to high and depends on the specific activities that occurred at any given location.

4.4.3 Expected Cultural Materials

Typical markers of pre-contact cultural activity include discarded shell, fire-modified rock, animal bone, lithic debitage, flaked or ground stone tools, burned earth, cordage or fiber, charcoal, ash, exotic rocks and minerals, and fibrous mats or nets. There is low potential for markers of pre-contact cultural activity in the APE. Typical markers of historic activity, dating prior to the 1960s, include milled lumber, masonry features, concrete, glass, ceramic, brick, metal fragments, old bottles, nails, wire or other evidence of early historic occupation and industry. These historic markers are almost certainly in the APE. Archaeological deposits that may be in the APE and are likely to be significant include cultural resources with intact, stratified deposits or diagnostic artifacts or features that could provide chronological data or information about pre-contact Native American or historic activities. Examples of potentially significant cultural resources are: areas of charcoal or charcoal-stained soil in association with artifacts; unnatural concentrations of marine shells; human remains; prepared surfaces that suggest temporary stability; flat lying layers of brick; plastered surfaces; arrowheads, stone tool, or concentrations of stone chips; large concentrations or dumps of historic bottles, cans or other historic material; privies; fire pits or ovens; foundations or intact walls; clusters of animal bones; and industrial tools or equipment that is clearly older than 50 years. These cultural materials types address the research domains compiled for the project. Examples of cultural materials that may be in the APE and are probably not significant include pilings without attached structural wood materials, fragments of

asphalt and concrete, loose bricks, broken glass fragments or scattered pieces of broken ceramics, and concentrations of coal, cinders, lumber, wood debris, or sawdust without historic context or associated artifacts.

CHAPTER 5. IDENTIFICATION OF HISTORIC PROPERTIES

This chapter presents the results of the EBSP underwater archaeological surveys and geoarchaeological investigations and a discussion of built environment resources. The information presented for the archaeological studies is a summary of several technical reports prepared for the EBSP (Marcotte et al. 2012; Rinck 2011; Rinck and Valentino 2012; Roberts 2011). The reader is referred to those reports for more detailed information. Site inventory forms are in Appendix A. Transect maps are in Appendix B.

5.1 EBSP ARCHAEOLOGICAL STUDIES

5.1.1 Underwater Archaeological Surveys

Heavy rainfall in the Green/Duwamish River watershed in the weeks leading up to the 2011 underwater reconnaissance survey increased the amount of runoff into Elliott Bay and substantially decreased water clarity. Average visibility for divers was less than 10 feet in 2011 but as much as 15 feet the following year. The reconnaissance survey team noted evidence of disturbance from past dredging, tidal activity, and pier construction, maintenance, and removal along the length of the seawall. Potential historical materials including bricks, remnant pilings, and whiteware ceramic and glass fragments were intermixed with modern debris throughout the survey area, but were not recorded as archaeological sites. Portions of the survey area under Colman Dock (Segment 2) were not surveyed in 2011 due to depth and safety considerations (see Figure 3-1).

Safety issues were also a particular concern during the 2012 dive under Pier 62/63. This structure is owned by the City of Seattle Department of Parks and Recreation and was used for concerts and public recreation until deemed unsafe. The dive team noted numerous broken, dangling, and floating pilings under Pier 62 and as a result, a portion of the area beneath this pier was not surveyed. Viewed from the sidewalk/street level, Pier 62/63 appears to be a single, stable structure. On the underside, the piling configuration of two separate wharfs, now joined by a single deck, is apparent. The piling-free area between the docks was once open to the water and prior to the construction of Pier 63 (historically Pier 10, the Virginia Street Dock) in 1906, the north side of Pier 62 (historically Pier 9, the Gaffney Dock) was easily accessible to watercraft. The dive team identified an historical debris scatter, 45KI1099, [redacted], but did not observe remnants of older structures such as Johnson's Fish Packing or of any vessels that may have sunk near the piers (Bowden and Larson 1997; Sanborn 1893).

Pier 67, the northernmost area surveyed, is between Battery Street and Vine Street and currently occupied by the Edgewater Hotel and parking lot. This pier was considered a high probability area because the seafloor has been protected from fill episodes, dredging or other disturbance by the piers. Throughout the survey area, the dive team encountered broken and decayed pilings, scatters of wharf construction materials, riprap, and in some places, modern debris discarded from above and washed in on the tide. A few objects were noted in the riprap close to the southern boundary of the pier, including ceramic, glass, brick, and metal items. The objects were fragmented, scattered, and lighter objects appeared to have drifted beneath the wharf on the tide. None of the objects observed dated to 50 years or older. The lack of historic cultural material under Pier 67 may reflect activities or businesses that did

not leave tangible remains or conditions that did not favor preservation. Later development, such as the Edgewater Hotel, seems a more likely explanation, although, historical material could still be buried.

The final task of the 2012 underwater dive was resurvey of sites 45KI1011, 45KI1012,and 45KI1013 to confirm locations and refine boundaries and to examine content to determine age and integrity. All three sites were easily relocated, however, site 45KI1011 was farther [redacted] than mapped in 2011 (Roberts). This may have been a function of bad visibility in 2011 or a malfunctioning GPS unit, but the 2012 dive team is confident that the site initially recorded is the same site. In addition to the underwater survey of all three sites, extreme low tides allowed pedestrian survey of portions of 45KI1012 under Pier 50 and 45KI1013 between Piers 48 and 50.

A summary of the underwater sites identified in the EBSP is provided in Table 5-1,followed by a description, interpretation, and NRHP evaluation recommendation for each site.

TABLE 5-1. SUMMARY OF UNDERWATER ARCHAEOLOGICAL SITES IN THE EBSP APE.

Number	Name	Location	Project Zone	Distance From Seawall
45KI1011	[redacted] Submerged Debris Scatter (historic)	**REDACTED**		
45KI1012	[redacted] Site and Debris Scatter (historic)			
45KI1013	[redacted] Submerged Historic Scatter			
45KI1099	[redacted] Submerged Historic Debris Scatter			

Evaluation of the sites below takes into account several of the goals for the 2012 survey, including integrity and their ability to provide information about past lifeways (i.e. research potential). Integrity was determined by examining each underwater site and the surrounding area for disturbance, such as dredging, prop wash, or seawall and pier repair that would affect the intact nature of the archaeological deposits. The condition of artifacts—whole, fragments, crushed—was noted, as was location and continuity of features within the site and along the waterfront.

Minimum thresholds were established for evaluation of research potential for these sites: age of greater than 50 years had to be established and the number of artifacts useful for a single kind of analysis had to number at least 100 in order to allow valid statistical inferences. All represent waterfront use, both licit and illicit, and three of the four appear to have additional characteristics that make them useful for future research.

5.1.1.1 45KI1011

Site 45KI1011 is an historical debris scatter under [redacted]l, measuring 90 feet long north to south and 53 feet wide east to west. The depth of the site

ranges from [redacted] near the western boundary. The debris scatter is comprised of bottles, ceramics, decayed and broken pilings, and construction debris. There are four primary concentrations, three beneath the pier, and one to the south just beyond the pier (Figure 5-1):

- Concentration 1 is spatially the largest cluster, and contains the greatest number of bottles and ceramics. The cluster is 40 feet long, north to south, by 15 feet wide, east to west.
- Concentration 2 is approximately 17 feet long north to south, 8 feet wide east to west, and contains primarily whole bottles interspersed with remnant piles and construction materials.
- Concentration 3 is approximately 13 feet long north to south, 10 feet wide east to west, and is a scatter of whole bottles and ceramic wares, interspersed with construction materials and remnant piles.
- Concentration 4 is several small piles of whole bottles located just outside the pier footprint.

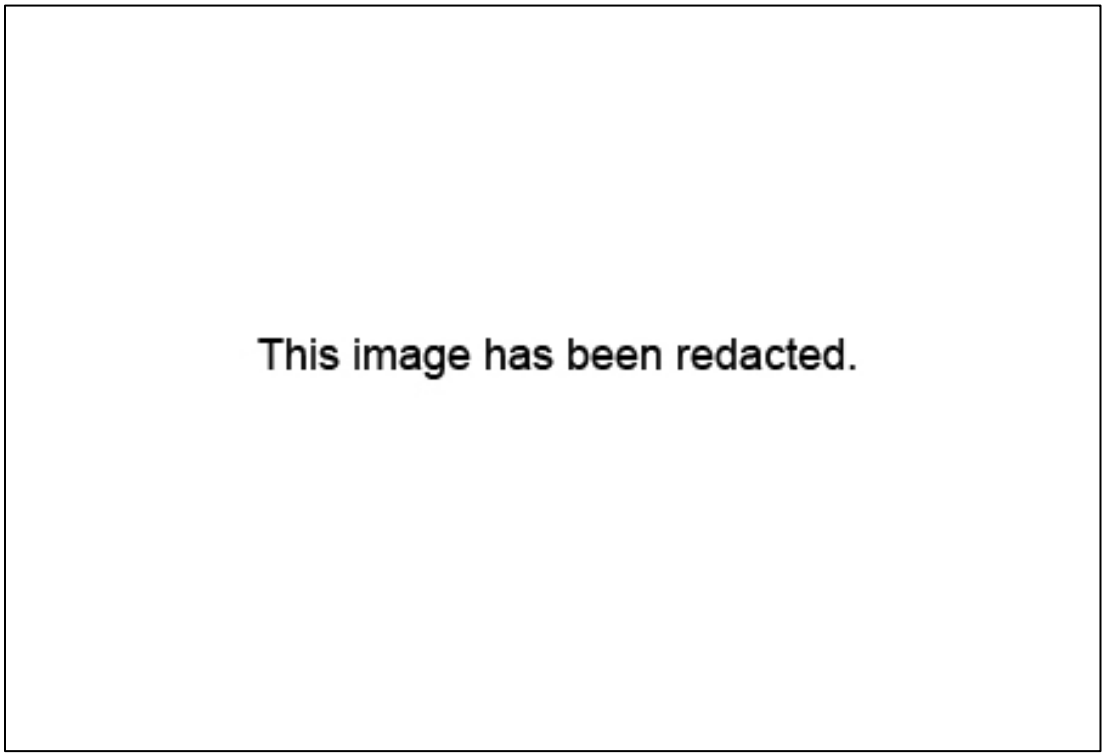

Figure 5-1. Sketch map of site 45KI1011.

The Concentrations 1,2, and 3 are located around and between modern and remnant pilings, stacked up to at least four bottles deep, and probably deeper based on partially buried bottles. Some modern debris is present at the southern site boundary near Concentration 4. Silt was estimated to be seven inches deep, but is probably deeper near the center of the site.

The bottles from 45KI1011 are primarily associated with alcohol consumption, although the small clusters in Concentration 4 contain more food containers (bottles and jars) and ceramics (Figure 5-2). Ceramics were largely white-bodied earthenware including intact bowls, saucers, creamers, and plates, as well as fragments. Several bottles in Concentration 1 were in concrete that was used to stabilize pilings. Bottle characteristics varied; however, screw top bottles were present primarily near the top of the pile, with whiskey finish bottles near the bottom. In some areas, bottles were almost completely buried in the silt, with only a portion of the finish or base exposed. Diagnostic features and maker's marks placed manufacture within the early to mid-twentieth century. Table 5-2 summarizes a select number of diagnostic artifacts that were retrieved, photographed, and returned to the site.

Figure 5-2. Debris pile located along Transect 1, demonstrating depth of bottles and ceramics, 45KI1011.

TABLE 5-2. DIAGNOSTIC ARTIFACTS AT 45KI1011.

Object	Description	Location	Date
Pressed glass cup pedestal base	Clear with gray tint, ribbed design with seams on either side to lip. Maker's mark by Bartlett Collins Glass Co. (ca. 1914-1980s). Use of maker's mark on glass tumblers ca. 1921 (Toulouse 1971:77).	Concentration 2	1920-1930s
Bottle, glass, alcohol	Dark emerald green Benedictine finish and high kick-up (Lindsey 2012:3). Embossed with crosses on either side of word 'Benedictine' on back of shoulder and raised embossed 'U' or horseshoe on anterior side, along with 'marque depose.' No federal stamp.	Concentration 1	1920-1935
Bottle, glass, beer	Dark amber, offset suck and blow on base. Maker's mark indicates manufactured by Oakland (20) branch of Owens-Illinois (Toulouse 1971:406-408).	Concentration 3	1948
Bottle, glass, alcohol	Dark amber, seam to lip, whiskey finish, and kick-up base. 'Federal law forbids...' stamp above base (ca. 1935-1964). Maker's mark indicates bottle manufactured at United Glass Limited (Scotland) (Toulouse 1971:509-513).	Concentration 4	1937-1964

Interpretation and Evaluation

The cultural materials identified at this site represent a prolonged period of discard from [redacted] It seems unlikely that Galbraith-Bacon Company's grain, hay, and building materials (lime, plaster, and cement) business would produce concentrations of alcohol bottles (Sanborn 1904; 1916) (Figure 5-3). On the other hand, boats and businesses that served the Mosquito Fleet and Puget Sound Navigation Company or perhaps the Gorst Flying Service, operating an air passenger service from the south side of the pier, may have contributed to this debris. A saloon or speak-easy likely occupied a section of the pier directly above the site, with bottles disposed of through a hole, or several holes, in the deck to conceal illegal drinking during Prohibition (1919-1933). Steve's Café, operating on the southeast corner of Pier 54 (historically Pier 3) in 1930, may have been the origin of these artifacts for a period of time (Figure 5-4). This disposal practice may have continued when Ivar Haglund leased the pier in the late 1930s, however disposal continued into the 1940s and 1950s, but likely ended when he rebuilt the pier in the 1960s, replacing the deck.

The intact nature and density of the artifacts, as well as the shape of the artifact concentrations, show that the site was not dredged nor was it the product of tidal action. Although the artifacts from this site date largely between 1920 and 1964, earlier deposits may be buried. This site has the data potential to address research questions about social activities (illegal drinking), commercial development and trade (regional trade networks and smuggling), and consumer preference. Given this research potential and the intact nature of this site, 45KI1011 is recommended eligible for the NRHP under Criterion D.

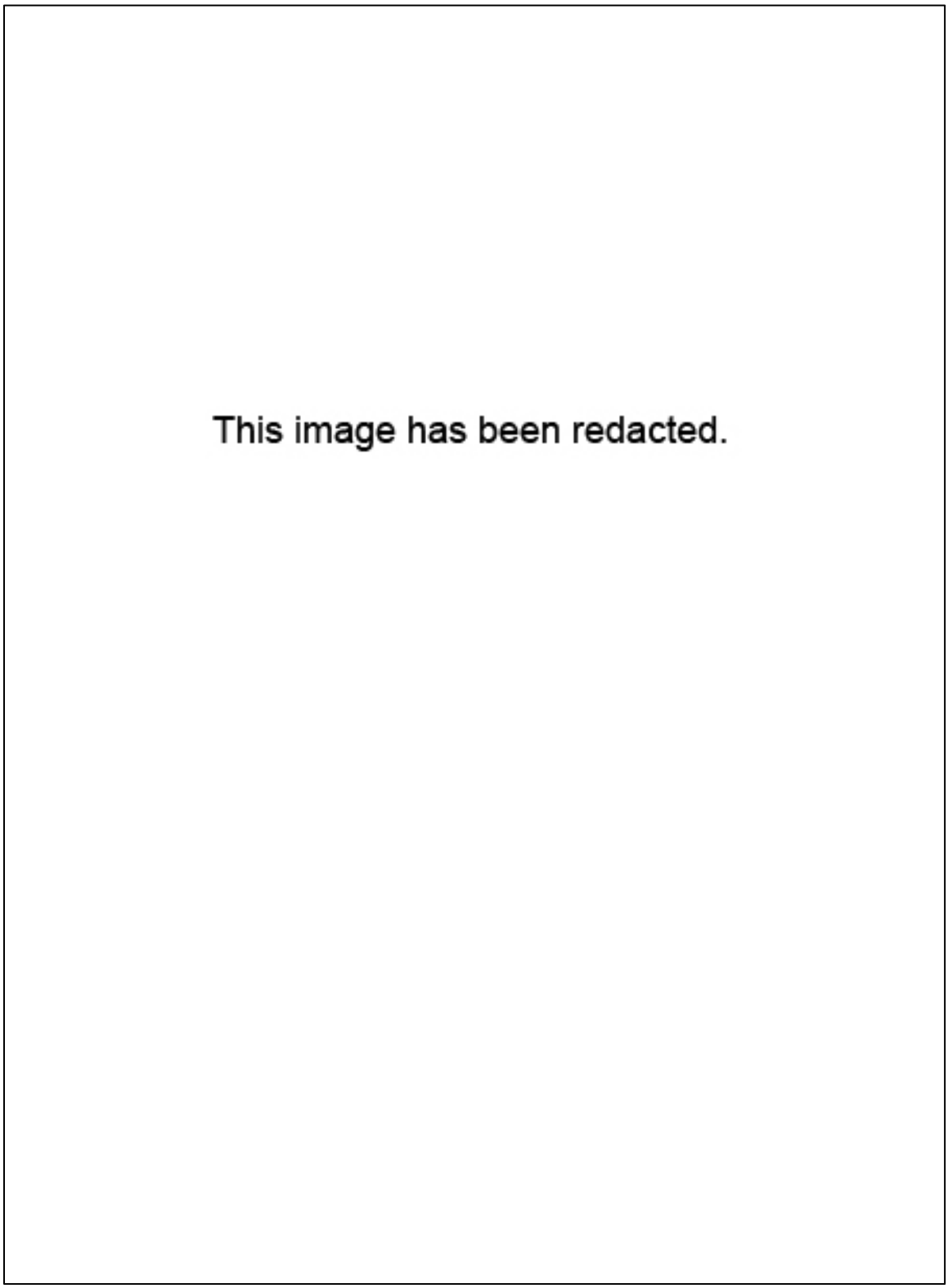

Figure 5-3. Sanborn Fire Insurance map from 1905 showing buisiness around 45KI1011.

Figure 5-4. Pier 3 (modern Pier 54) in 1937 showing Steve's Café.

5.1.1.2 45KI1012

Site 45KI1012 is [redacted]. The north-south extent of the site is 155 feet (Figure 5-5). Although most of the site is exposed at extreme low tide, it is typically submerged to a depth between [redacted] The site is a large, elongated mound of riprap, rising at least 20 feet above the surrounding seafloor that is interspersed with areas of timbers and decayed pilings, as well as isolated glass bottles, ceramics, bricks, and metal objects. The riprap is rounded, cobble sized rock that extends toward the bay and surrounds the remnant pilings from previous piers. Large, angular riprap was restricted to the seawall and appears to armor the cobble-sized riprap.

The timbers are in horizontal and transverse positions, comprised of up to four layers, and include rough cut members. No fastenings (dowels, bolts, nails, etc.) or their remains (holes, evidence of rust, etc.) were noted within the wood planking. Dimensions vary, ranging from 4 inches to 10 inches in width. The wood is visible in areas where the riprap is sparse or absent, primarily near decomposing pilings (Figure 5-6). Piling dimensions vary, ranging from 2 inches to 16 inches in height, and 6 inches to 13 inches in diameter. The decayed pilings are in an area 45 feet wide north to south, by 212 feet long east to west, with some displaying more advanced teredo worm damage. Pilings associated with this site terminate near the edge of the riprap.

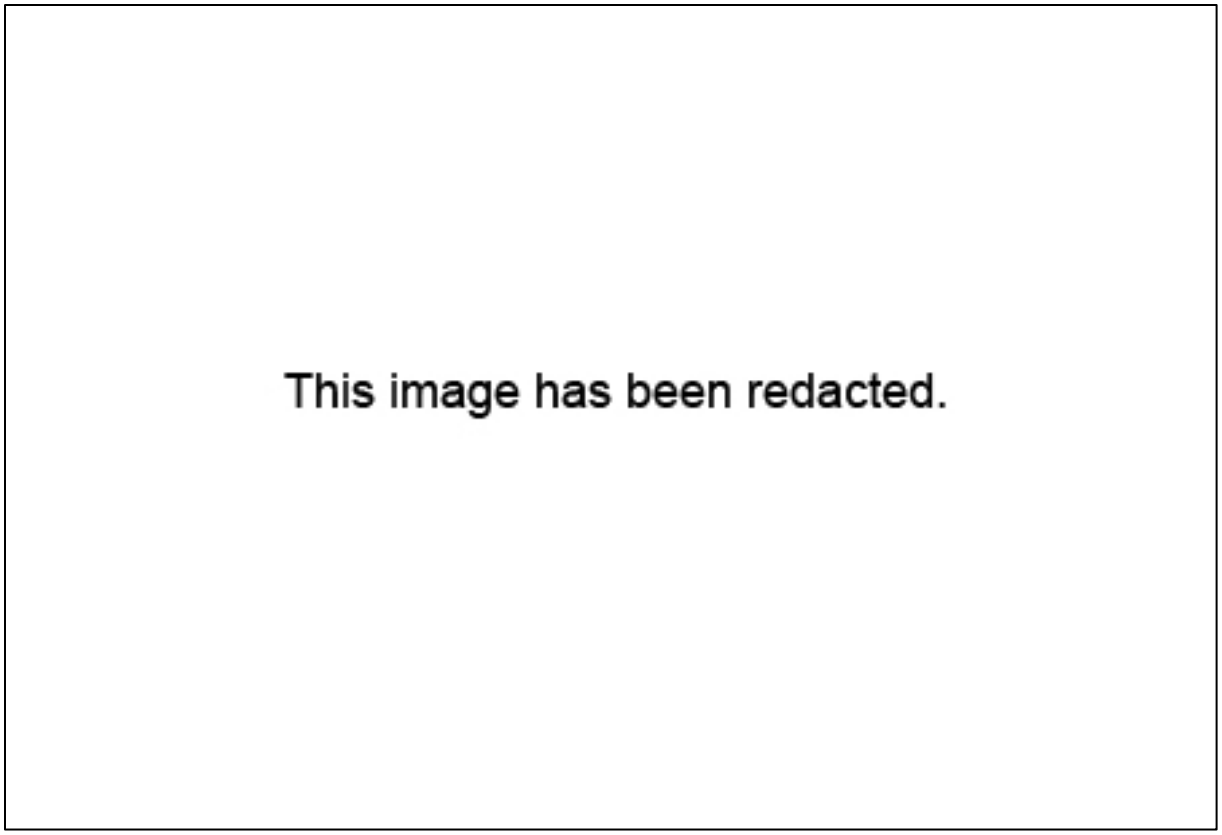

Figure 5-5. Sketch of site 45KI1012.

Figure 5-6. Overview of timbers lying beneath riprap near the west side of site, facing north (the white substance visible on the surface appears to be some type of bacteria).

Bottles observed at the site were associated with alcohol and soda consumption, as well as food storage (Figure 5-7). One soda bottle was manufactured by Pacific and Puget Sound Soda Works which was located on Yesler's Wharf from 1888-1889. The company relocated to another area of Seattle after burning in the 1889 fire. This bottle and other diagnostic artifacts are summarized in Table 5-3. A second bottle, a cobalt blue pharmaceutical bottle that probably contained "Lactopeptine," a product that treated all digestive ailments was also identified at this site (Polak 1994:187; Lindsey 2012).

TABLE 5-3. DIAGNOSTIC ARTIFACTS AT 45KI1012.

Object	Description	Date
Bottle, glass, soda	Aqua, Hutchinson style bottle with mid-1880s diagnostic features. Embossed "Pacific/&/Puget Sound Soda Works/Seattle/W.T. (ca. 1890-1906) (Polak 1994:154). Figure 5-7c	1888-1889
Bottle, glass, pharmaceutical	Cobalt, embossed with "NY Pharmacal Association" on anterior (ca. 1874-1880) (Polak 1994:187). Bottle diagnostic properties suggest manufacture ca. 1877-1880 (Lindsey 2012). Figure 5-7b	1877-1880
Bottle, glass, food store	Aqua, embossed with "Lea & Perrins/Worcestershire" on shoulder and body, crown cap with seams terminating before lip, and ghost seams. Bubbles in bottle body with offset base. Maker's mark indicates manufactured by John Duncan and Sons, New York (ca. 1880-1900) (Toulouse 1971:277).	1880-1900
Bottle, glass, alcohol	Dark olive, wine or champagne with applied champagne finish; high, kick-up with *mamelon* and bubbles in bottle body; hand or turn-molded ca. 1850 to late-1880s (Lindsey 2012). Figure 5-7a	1850-late 1880s

Interpretation and Evaluation

Site 45KI1012 is a large riprap "structure" that was likely constructed to stabilize pilings and decrease teredo worm damage beneath Yesler's Wharf in the late 1800s. As early as 1884, Yesler's Wharf [redacted] the location of site 45KI1012 (Figure 5-8). It is likely that the cobble sized riprap of 45KI1012 extends beyond the eastern site boundary, landward from the seawall, where it supported the early wharf. Yesler's Wharf burned in the Great Fire of 1889 but the replacement wharf continued [redacted] the site location. At the turn of the century, the modern configuration of Seattle's waterfront piers replaced the older wharf, but Yesler Wharf No. 2, also known as the Northern Pacific Railroad Pier No. 2 (modern Pier 51), was still at the foot of Yesler Way extending over 300 feet into Elliott Bay [redacted] of 45KI1012. The horizontal and transverse aligned timbers noted within the riprap may be the remnants of an earlier pier or a type of cribbing used to add stability to the structure (Figure 5-9).

Figure 5-7. Selected diagnostic artifacts observed at site 45KI1012.

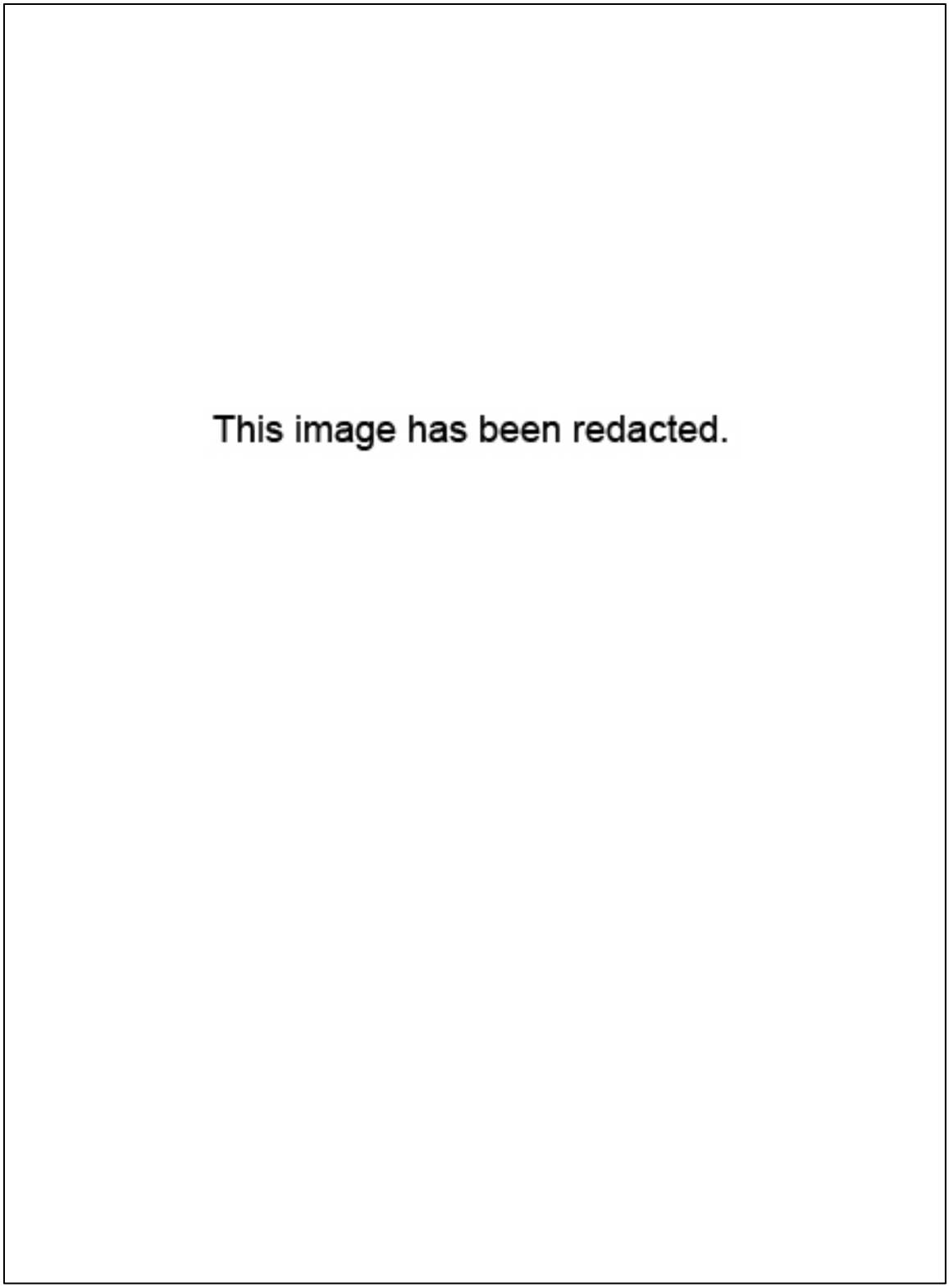

Figure 5-8. Sanborn Fire Insurance Map, 1884, showing site 45KI1012 in relation to Yelser's Wharf.

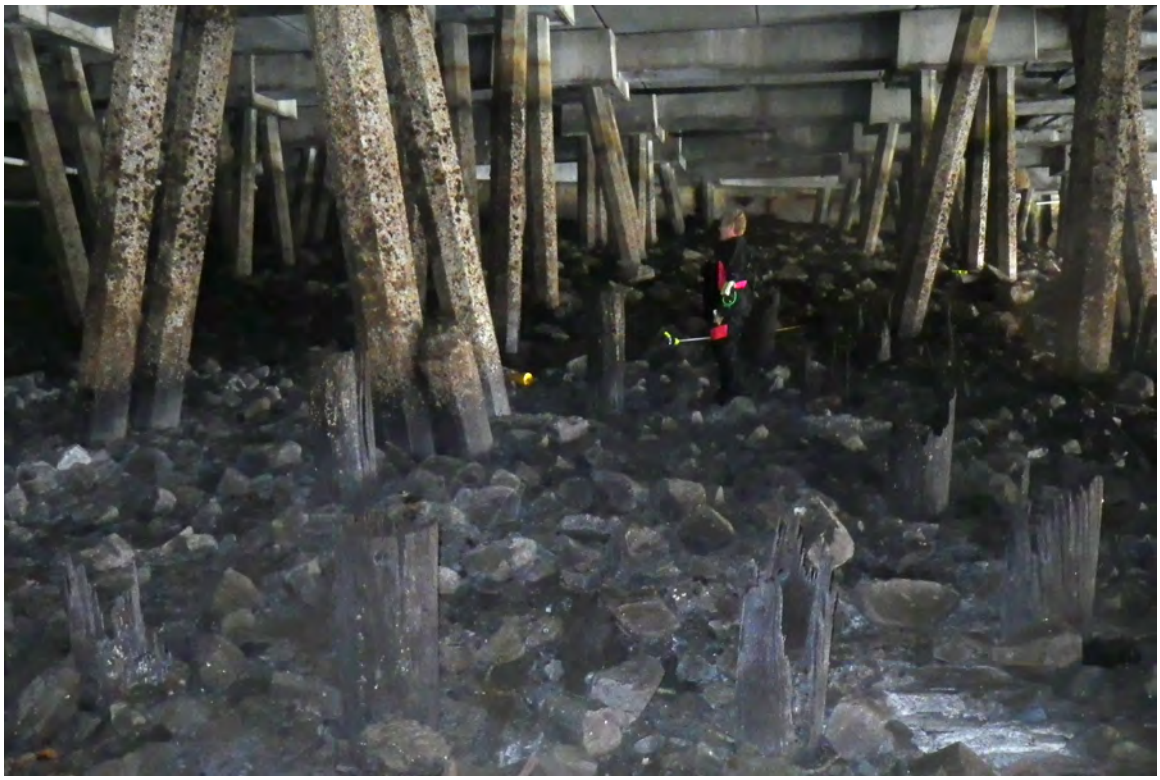

Figure 5-9. View of 45KI1012 facing east from western boundary of timbers

Yesler's Wharf defined the development of Seattle's waterfront from the 1850s to late 1880s and was perhaps the most significant pier during this time period. Site 45KI1012 retains integrity and has stratified deposits that have the potential to address questions about infrastructure development (pier construction and maintenance), consumer preference, and commerce and trade. This site has the potential to yield information important in local and regional history and is recommended eligible for the NRHP under Criterion D.

5.1.1.3 45KI1013

Site 45KI1013 is an historical debris scatter in [redacted]. Riprap at the base of the seawall extends [redacted] trapping artifacts and debris that washes in with the tide. The site extends 115 feet waterward (east-west) and 155 feet north-south, and includes four artifact concentrations (Figure 5-10).

- Concentration 1 is composed of several clusters of discarded bottles, primarily related to soda (Coca Cola) and alcohol consumption. The cluster is 60 feet long east to west, by 40 feet wide north to south. Modern trash is also present in this area, including aluminum cans, glass bottles, and a variety of other debris brought in on the tide, or discarded from Pier 50. No remnant pilings were associated with this bottle dump. Bottles associated with this scatter dated from the early to mid-twentieth century.

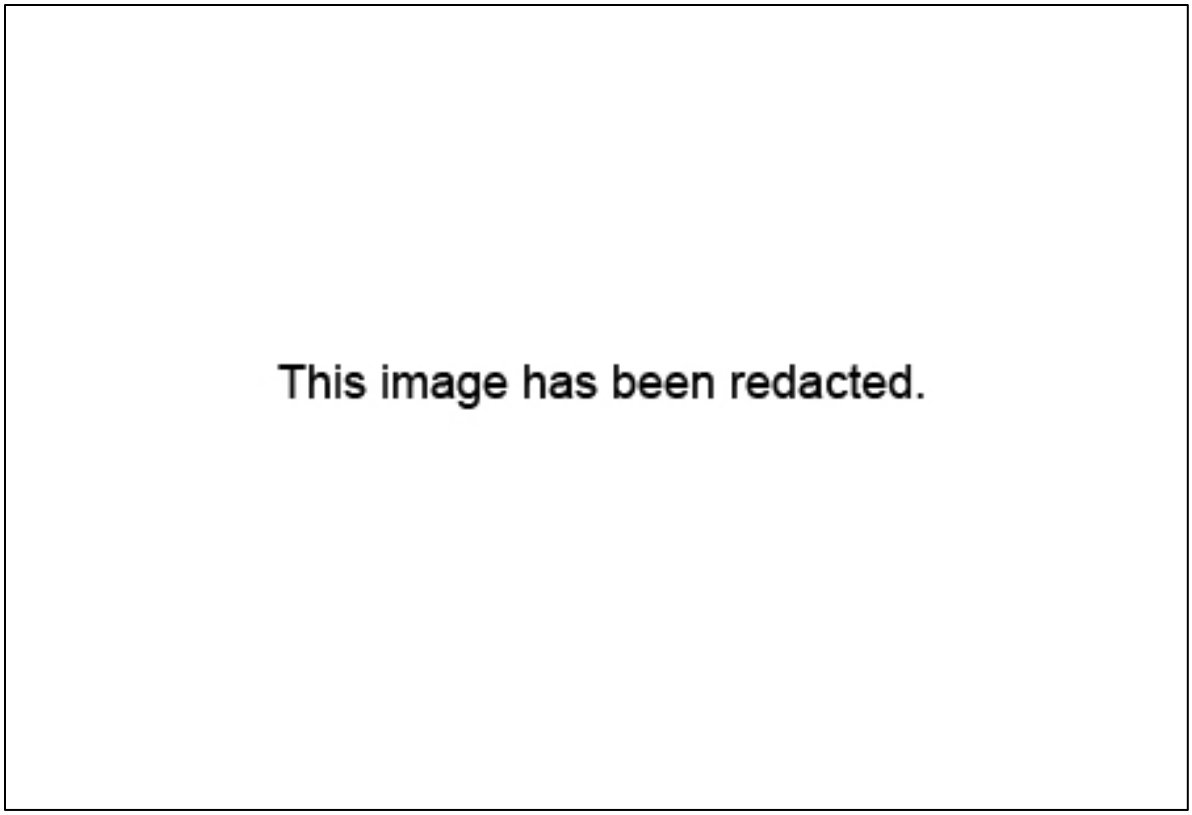

Figure 5-10. Sketch map of site 45KI1013

- Concentration 2 is approximately 50 feet long north to south, 30 feet wide east to west. The main attribute of the concentration is pressed glass tableware (Figure 5-11), but the material includes whole and broken bottles, as well as glass and ceramic fragments, found around remnant pilings. Ceramics included both decorated (hand-painted) and undecorated fragments. These artifacts were located within and on top of a layer of clear and colored glass shards. The thickness of the glass shard layer was at least two inches. Artifacts associated with this feature date from the late nineteenth to mid-twentieth century.
- Concentration 3 is approximately 15 feet long north to south, 20 feet wide east to west and is composed of a small scatter of whole bottles. This concentration also includes modern debris scattered on the surface, from the sidewalk above the seawall. Artifacts within this scatter dated to the mid-twentieth century.

Figure 5-11. Cobalt blue pressed glass serving bowl or pitcher with rosette pattern located in the western section of 45KI1013.

- Concentration 4 is at the eastern boundary of the site, [redacted]. This concentration was identified during the previous EBSP underwater survey (Roberts 2011). Dimensions of this feature are 140 feet north to south and approximately 30 feet east to west. All the artifacts recorded in 2011 could not be relocated in large part due to the abundance of algae that obscured views of the seafloor. The area is shallow and in the wake zone, so it is possible that many of these artifacts have drifted into the riprap. Artifacts identified within the riprap during terrestrial survey included glass vessel fragments, ceramics, metal objects, brick, intact bottles, and an abundance of modern debris. Artifacts identified within this concentration dated from the late nineteenth to mid-twentieth century.

The pressed glass tableware identified within Concentration 2 was present in both clear and colored forms, with a variety of different patterns and forms. The bottles were associated primarily with alcohol and soda consumption, food storage, and personal use items. Ceramics consisted of whiteware fragments, both decorated and undecorated, and appeared to be primarily tableware of the type used commercially in restaurants (commonly called hotel ware). Cut mammal (non-human) bone was noted near the eastern edge of the site, close to the riprap at the base of the seawall. Table 5-4 summarizes the diagnostic artifacts observed at 45KI1013.

TABLE 5-4. DIAGNOSTIC ARTIFACTS AT 45KI1013.

Object	Description	Location	Date
Bottle, glass, alcohol	Clear, "Dandy" flask, three-piece-mold (ca. 1821-1910s), shape of bottle popular in 1890s, continued post-prohibition (Lindsey 2012).	Concentration 2	1821-1910
Serving bowl or pitcher, glass	Cobalt pressed glass, color popular in 1880s; pattern similar to later "Roman Rosette." Twilight of American patterned glass 1900-1915 (Husfloen 1992:77).	Concentration 2	1880s to 1920s
Bottle, glass, soda	Aqua Coca Cola bottle with embossed wreath and crescent moon mark; 'Patented March 7 1922' embossed under mark. Likely bottle patent date as soda patented before this date. Possibly Hygeia Bottling Works 1905-16 based on maker's mark (large C embossed on base). Aqua color popular until ca. 1920S (Lindsey 2012)	Concentration 4	Ca. 1922
Bottle, glass, alcohol	Clear, whiskey finish, seam to top of lip (machine made); shoulder embossed with 'Federal law forbids sale or reuse of this bottle' dating bottle to ca. 1935-64 (Lindsey 2012)	Concentration 3	1935-1964

Interpretation and Evaluation

Cultural materials recorded at this site suggest a prolonged period of deposition from the mid-nineteenth to the mid-twentieth century**.** These scatters are different depositional events, occurring from earlier piers and sailing ships, possibly during different periods. For instance, Concentration 2 may be associated with the earlier Harrington and Smith Wharf (1884) or later Hatfield Wharf (1893), representing discard from the wharfs as well as docked ships, while Concentration 1 may be the result of refuse disposal from Yesler's Wharf No. 1/Northern Pacific Pier No. 1 (1905) which no longer exists (Figure 5-12). Concentration 4, originally recorded in 2011, was possibly created by discard from earlier piers before construction of the seawall, followed by continued discard after the construction of the seawall, finally culminating with an influx of tidally transported artifacts.

Prior to 1905, most of 45KI1013 was located in an open water area between wharves used for docking and/or mooring of vessels. Construction of Yesler Wharf No. 1 by 1905 covered the majority of the site until the late twentieth century. Termination of the site boundary near the riprap at the base of seawall suggests the site was buried or truncated by seawall construction in the mid-1930s. This is similar to 45KI1012 in that the site may extend landward from the seawall.

Site 45KI1013 contains intact deposits and, like 45KI1012, has the potential to contribute to our knowledge about the development of Seattle's waterfront. Data may answer questions about the changes in use and business/industry in this area, including the Harrington and Smith wharf, Yesler Wharf No. 1, and Northern Pacific wharves, as well as provide insight into the lives of people who worked on the wharves. This site is therefore recommended eligible for the NRHP under Criterion D.

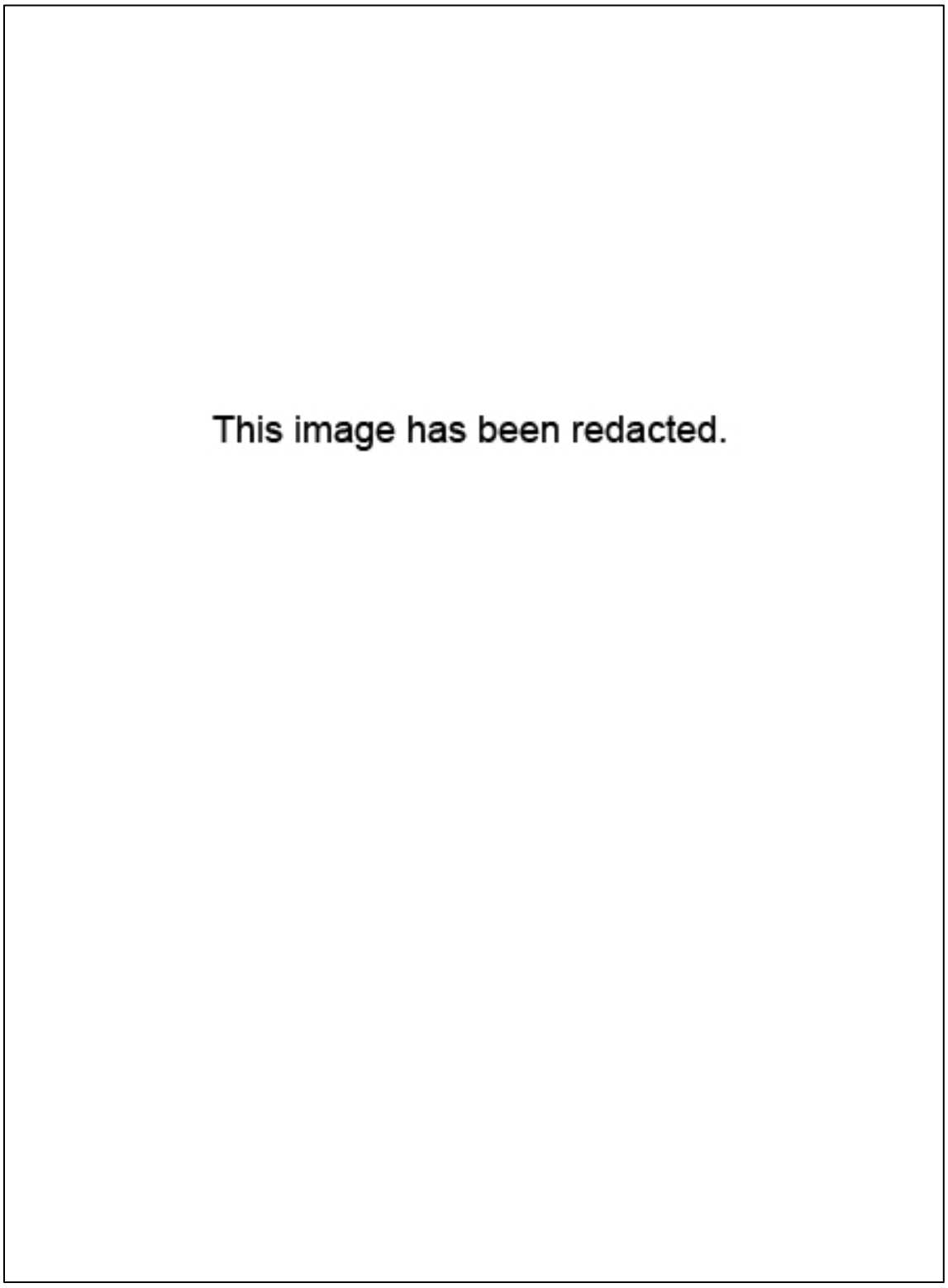

Figure 5-12. Sanborn Fire Insurance Map, 1893, showing site 45KI1013 in relation to wharves and piers.

5.1.1.4 45KI1099

Site 45KI1099, an historical debris scatter [redacted] and extends 230 feet east to west by 60 feet north to south, at its widest point. Most of the site follows the [redacted] except for a small scatter of glass and ceramic vessels near the [redacted]. Although not located [redacted], the smaller scatter is comprised of similar artifacts that date to the same time period. The depth of the site ranges from approximately [redacted] near the western boundary of the site (Figure 5-13).

The 45KI1099 debris scatter includes intact bottles, ceramic tableware, brick, metal objects, remnant pilings, and construction debris, interspersed with modern trash (Figures 5-14). The modern cultural materials are located primarily [redacted], although lighter objects (i.e. aluminum cans), likely transported by tidal currents, were also observed near the center of the site. Vessel types include food containers (jars and bottles), and patent medicine and alcohol bottles with a variety of finishes. Ceramics were primarily white earthenware in the form of cups and broken plates.

The densest accumulation of material is within an "alley" [redacted]. No historical artifacts were located north of the "alley," and artifact densities gradually decrease to the south of the "alley" where the site extends [redacted]. The distribution of debris suggests that the artifacts were discarded along the [redacted] before the two piers were joined sometime after 1950 and the removal of the railroad trestle that separated the piers (Shea and Boswell 2011).

This image has been redacted.

Figure 5-13. Sketch map for site 45KI1099.

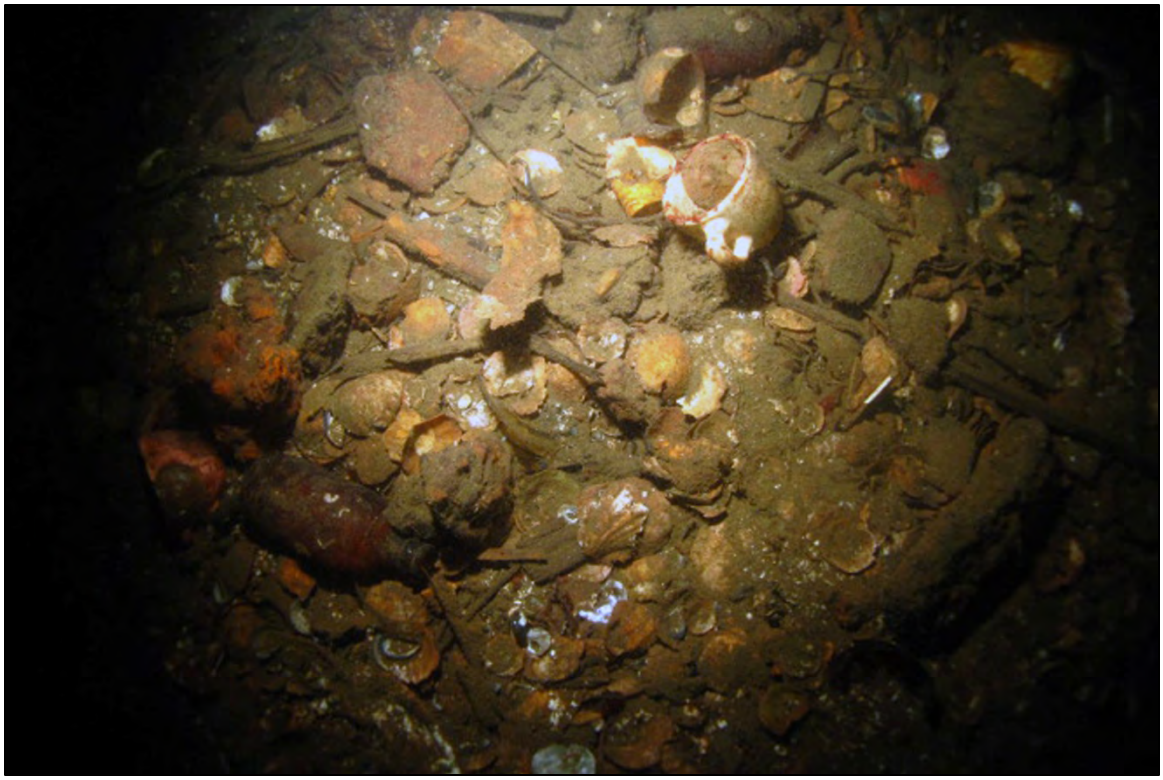

Figure 5-14. Southern section of site beneath Pier 62 showing typical debris; facing N-NE.

Cultural materials with diagnostic features were primarily bottles manufactured in the late nineteenth to mid-twentieth century, indicating a prolonged period of disposal from a series of wharves constructed above the site. Table 5-5 summaries a selection of diagnostic artifacts from 45KI1099.

TABLE 5-5. DIAGNOSTIC ARTIFACTS AT 45KI1099.

Object	Description	Date
Bottle, glass, alcohol	Clear square, "Jim Beam" embossed on shoulder, with whiskey finish. "Federal law forbids…" stamp indicates ca. 1935-1964. Offset suck and blow on base. Maker's mark by Glenshaw Glass, Pennsylvania, adopted 1932 (Toulouse 1972:211-213).	1934-1964
Bottle, glass, shoe blacking	Clear, screw top finish, maker's mark is Hazel Atlas, Wheeling West Virginia (Toulouse 1972:239-242).	1920-1964
Bottle, glass, condiment	Clear, crown top, with maker's mark by Fairmount Glass Works, Indiana (Toulouse 1972:200-202).	1920-1933
Bottle, glass, pharmaceutical	Dark amber, proprietary finish, offset seam at shoulder, bubbles and straw marks in body, offset seam on base, blown in mold (Lindsey 2012).	ca. 1880-1915

Interpretation and Evaluation

Based on historical Sanborn maps, the site area was largely in open water until about 1910. By this time, an expanded Gaffney Dock/Pier 9 (modern Pier 62) and its northern neighbor the Virginia Street Dock/Pier 10 (modern Pier 63), [redacted] 45KI1099 site area (Figure 5-15). The Northern Pacific Railway spur between the docks provided access to and from pier warehouses and docked boats, as well as the water for refuse disposal.

The intact nature of the artifacts identified [redacted] indicates that this area was not dredged in the past. Secondary transfer of glass and ceramic artifacts via tidal influence is unlikely given the site's long-term coverage by overhead piers. Temporally diagnostic attributes of bottles and ceramics, and historical map, date this site from the early to mid-twentieth century. Site 45KI1099 is a relatively small, debris-thin scatter and would likely not yield important information on local history. It is recommended not eligible for the NRHP.

5.1.1.5 NRHP Evaluation Summary

Three of the four underwater sites are recommended eligible for the NRHP. Table 5-6 provides a summary of these evaluations.

TABLE 5-6. SUMMARY OF NRHP EVALUATION RECOMMENDATIONS FOR UNDERWATER SITES.

Site	Name	Zone	Time Period	NRHP Eligible	NRHP Criteria
45KI1011	[redacted] Submerged Debris Scatter (historic)	3	1920-1965	Yes	D
45KI1012	[redacted] / Debris Scatter	2	1877-1900	Yes	D
45KI1013	[redacted] Submerged Historic Scatter	1	1850-1964	Yes	D
45KI1099	[redacted] Historic Debris Scatter	4	1850-1964	No	N/A

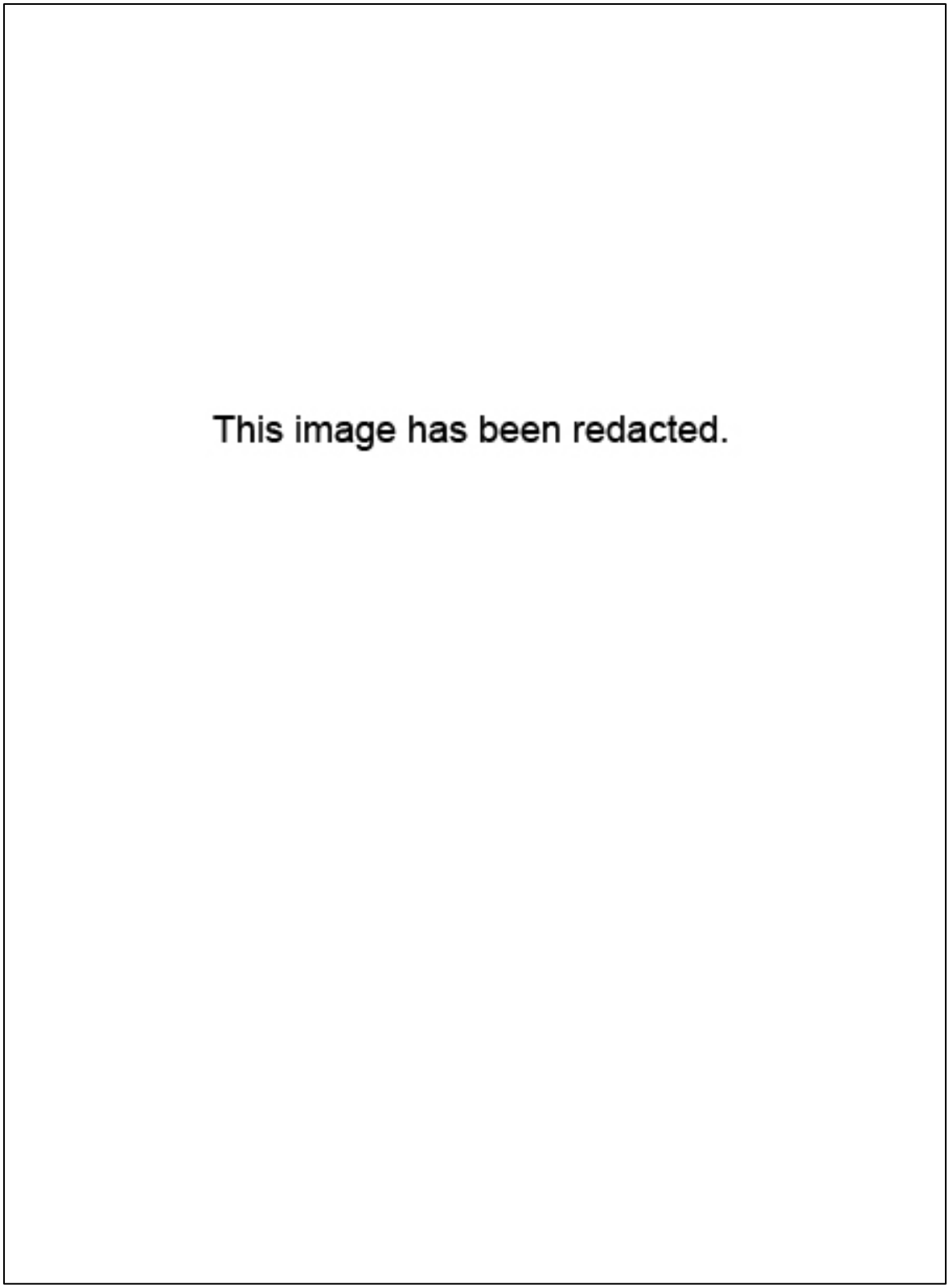

Figure 5-15. Railroad map, 1916 showing piers and railroad spurs in relation to site 45KI1099.

5.1.2 Geoarchaeological Studies

Two geoarchaeological studies have been completed for the EBSP. The first study is a desktop assessment completed in order to summarize available existing information and to define gaps in the existing geotechnical and geoarchaeological data (Rinck 2011). The second study presents the results of the technical field investigation in areas defined as gaps during the desktop assessment (Rinck and Valentino 2012).

5.1.2.1 Existing Data Analysis

This section summarizes the stratigraphy of the APE based on analysis of borelogs from 45 previously drilled geotechnical and geoarchaeological cores that were reviewed during the initial desktop assessment (Rinck 2011; Shannon and Wilson, Inc. 2010) (Figure 5-16). Other previously completed borings in the project vicinity were also consulted during the analysis to formulate expectations, but were not directly referenced. Detailed lithologic and historical data for each core presented in Rinck (2011) will not be repeated here. Three well-defined strata, designated from bottom to top as Pleistocene, Holocene, and historic fill, are in the APE (Figure 5-17).

The basal Pleistocene assemblage includes a mix of glacial and non-glacial sediments dating to the Vashon and pre-Vashon glacial periods. Deposits belonging to the Pleistocene were found below an average of about 39 feet below the surface (fbs), though depth to Pleistocene sediments ranged from about 20 to about 60 fbs, depending upon the corresponding borehole's distance from the historic shoreline. Depth to the Pleistocene-aged deposits increases to the west. The bounding contact between the Pleistocene and the overlying Holocene assemblages was usually well-defined by the geotechnicians that logged the cores. The topography of the Pleistocene boundary is generally flat and smooth, with just a few rises at CB-21B (S. Washington Street), SB-11 (Union Street), SB-19 and SB-20 (Blanchard Street), and SB-31 (Broad Street). A deep drop to the top of the Pleistocene at CB-103 may represent an old ravine or embayment between Madison and University Streets. A second, smaller ravine may be represented by the steep drop off in topography of the Pleistocene boundary at EB-06B at Cedar Street. The lithostratigraphy of the Pleistocene sediments will not be discussed because Pleistocene sediments pre-date the arrival of humans in the region.

The Holocene-aged depositional units include beach (Gsz and Sgz) and intertidal (Sz, Szc, fSz, Zs, Zcs, Zc, and Cz) deposits. These are usually found between an average of about 30 and 40 fbs, but can range from 14 and 63 fbs. Intertidal deposits are generally found overlying beach sediments, none of which contained archaeological materials as logged by the geotechnicians. Beach deposits are potentially present between S. Washington and Madison Streets, between University and Stewart Streets, and between Battery and Broad Streets. Intertidal deposits dominate the naturally deposited sediment between Madison and University Streets, as well as between Stewart and Battery Streets. This is probably because these portions of the APE were inundated as part of Elliott Bay for a longer period of time compared to those areas located closer to the historic shoreline.

Fill is at the surface in all 45 borings, between an average of 0 and about 30 fbs. The fill is mainly composed of Concrete capping layers of Sand and Gravel, but layers of Clay, Cinders, Wood, and Sawdust are also recorded as depositional units within the fill. The fill is deepest south of University

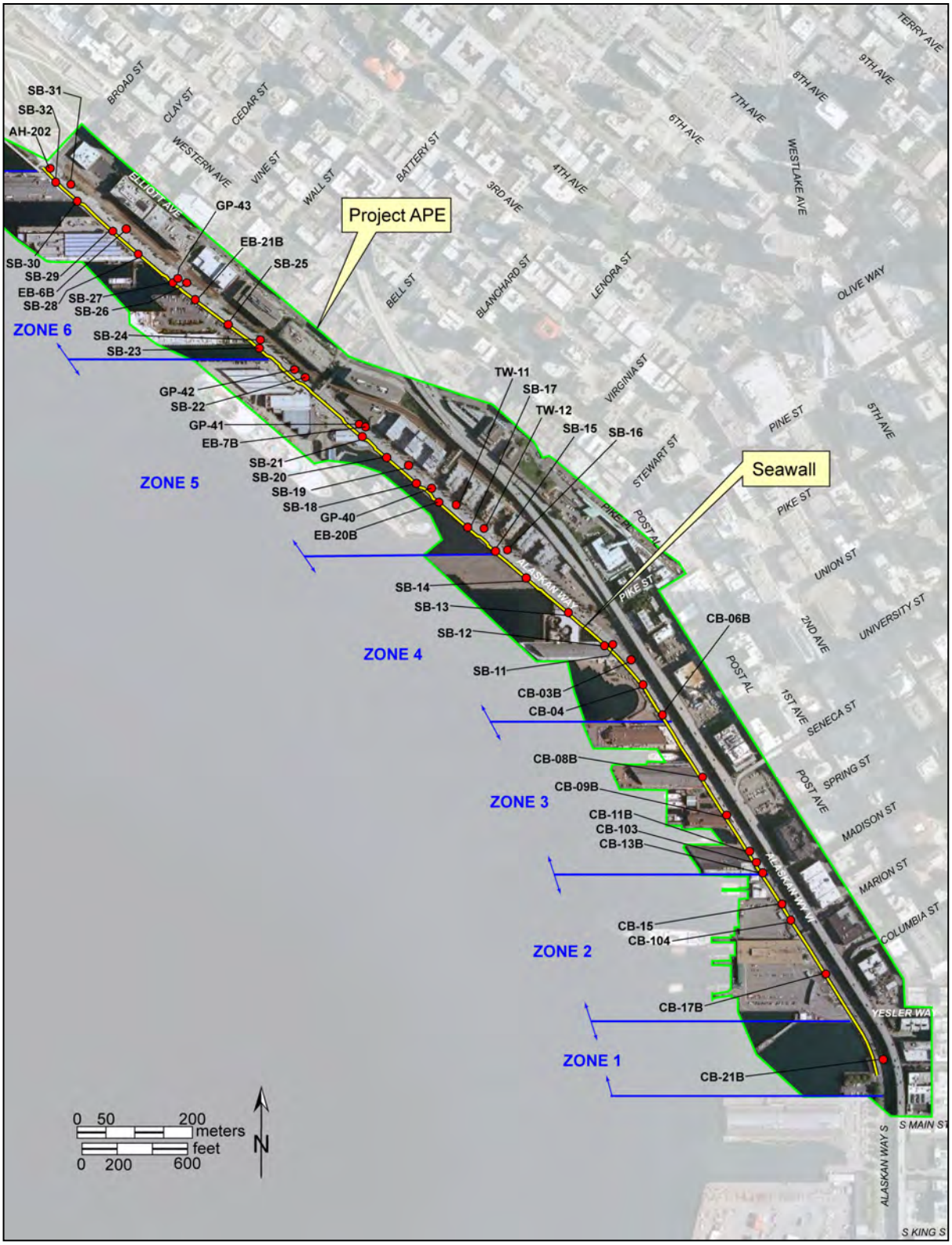

Figure 5-16. Locations of previously drilled borings used during the initial desktop assessment.

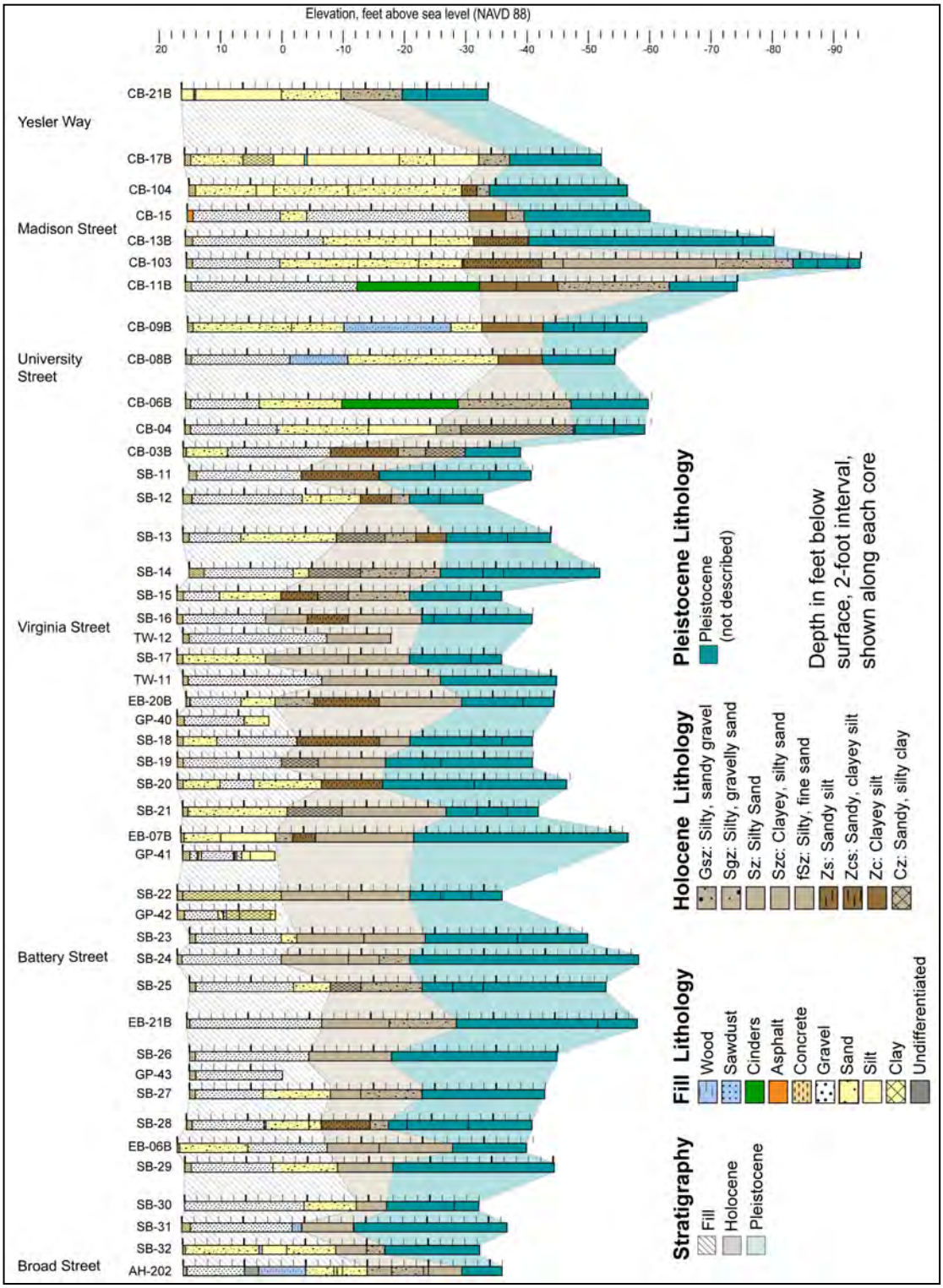

Figure 5-17. Cross-Section showing the Stratigraphy and Lithology of Previously Drilled Cores in the APE.

Street, becomes very shallow in the central APE, and deepens slightly north of Battery Street. Clay deposits are near Columbia Street at CB-17B and near Bell Street at SB-22 and GP-42 (Figure 5-18). Mass deposits of Cinders, Wood and Sawdust are between Marion and Pike Streets and between Battery and Broad Streets, concentrated towards the base of the fill (Figure 5-19). The remainder of the sandy and gravelly fill does not usually contain artifacts, which may be a product of the methodology of seawall construction, or the result of the majority of borehole logging being completed by geotechnicians that did not include archaeological data on their borelogs. The existing core data, in association with the historic record, suggests the potential for encountering buried cultural materials is highest [redacted]. Additional data concerning the individual depositional units identified in the cores are in Rinck (2011).

The previously collected core data helped form the existing stratigraphic framework used across the APE, as well as assisted in more specific landform reconstructions. For example, historic beach and intertidal sediments were identified below the fill in many of the borings, but no direct evidence of pre-contact cultural resources is present. Older Holocene-aged beach deposits buried below the historic beach and intertidal deposits were also identified. Although these deposits lacked evidence for cultural resources, knowledge of their vertical and horizontal distributions on the APE helps determine where there is potential for buried prehistoric archaeological materials. The existing core data also provided information on where historic cultural resources might be identified in the APE.

Data Gaps

After analysis of the existing geotechnical data was complete, gaps in information were assessed. Data gaps were identified where there was a substantial distance between existing cores in areas where fill contained a high percentage of cultural materials and where there was a general absence of geotechnical data. The data gap locations summarized in Table 5-7 were combined with information from the historic record to determine the potential for preserved archaeological materials where sufficient data was absent. Research determined there are specific areas along the seawall with high potential for cultural materials within the data gaps based on the activities that occurred in those areas, as well as the post-depositional histories of those locations (Figure 5-20).

Collection of continuous solid cores was recommended as the field strategy to address the data gaps and identify historic properties within the APE. This field strategy considered the magnitude and nature of the project, the nature and extent of potential effects on historic properties, and likely nature and location of historic properties within the APE (36CFR800.4(b)(1)). Thirty-three core locations were selected based on the historical activities that occurred there, the post-depositional history, and reasonable feasibility of drilling in the selected location (Figure 5-21). The proposed borehole locations included testing the fill for historical archaeological materials, as well as beaches that existed at the time of Euroamerican contact and a select number of buried beaches for Native American archaeological materials. The proposed depths of excavation usually ended at the boundary between fill and intertidal Holocene deposits, with a few cores extending into the Holocene-aged sediments to test buried beaches at greater depths.

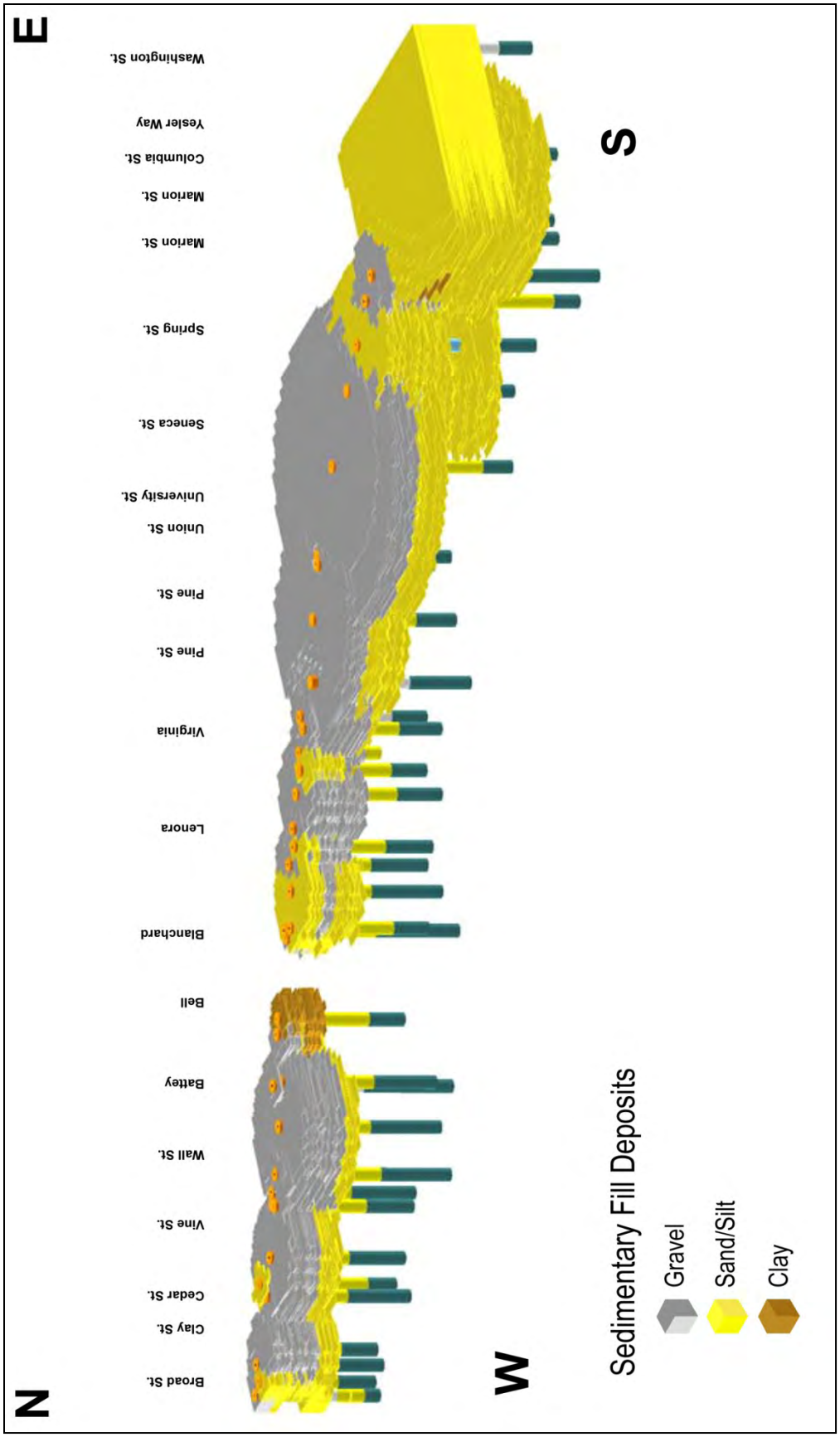

Figure 5-18. Three-dimentional model of the sedimentary fill deposits in the APE, showing Sand dominating the fill in the southern APE, while gravels overlying sand is to the north; based on existing geotechnical data.

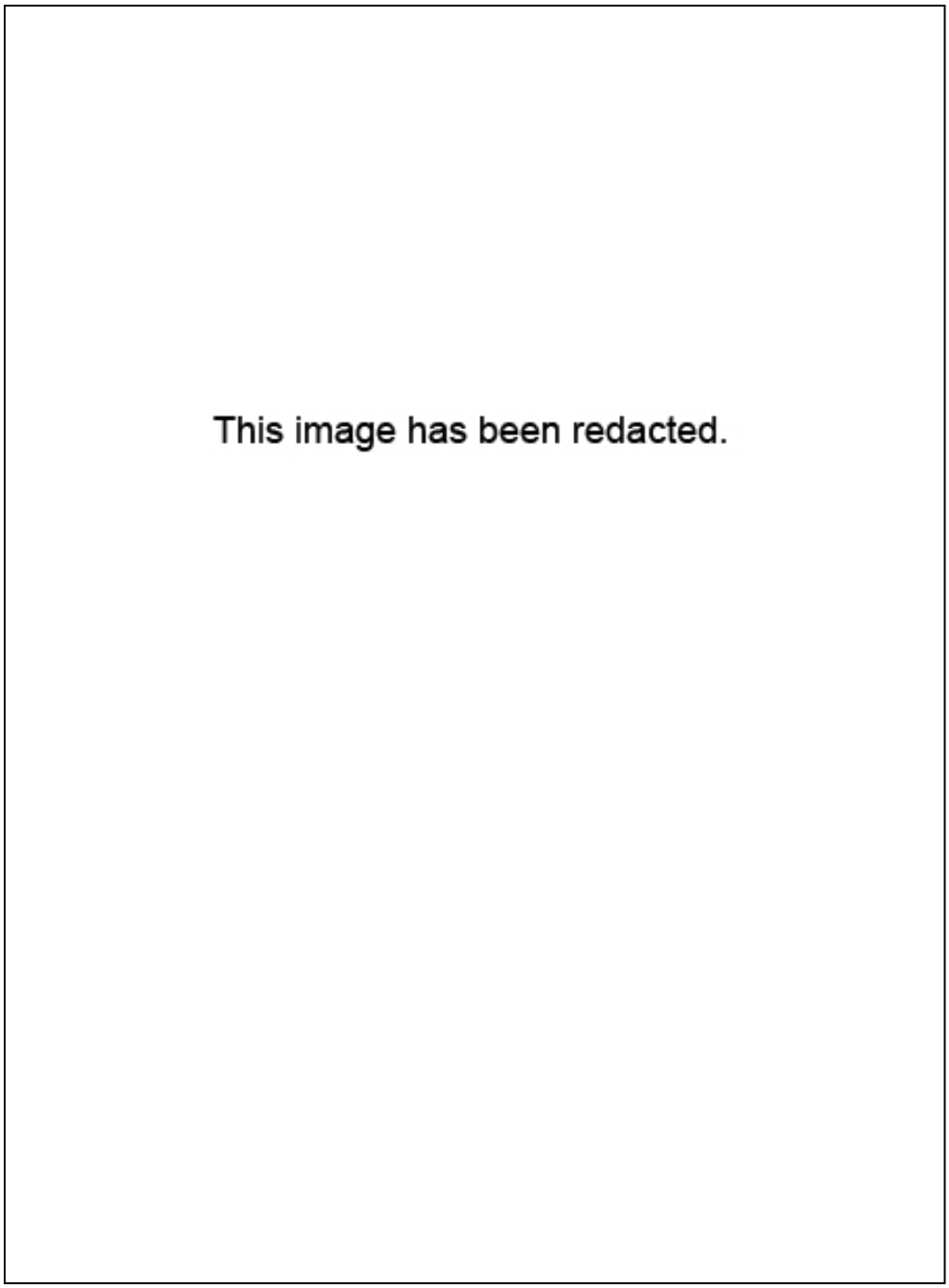

Figure 5-19. Archaeological deposits within the fill, showing thick Wood and Cinders layers in the southern APE; based on existing geotechnical data.

TABLE 5-7. HISTORIC LOCATIONS, EVENTS, AND RESEARCH DOMAINS EXPECTED IN SUB-SURFACE DEPOSITS IN THE 14 DATA GAPS.

Locations	Historical Locations & Event	Expected Research Domains	Zone
1	Buried beaches Ballast Island Ethnographic camps, c. 1890 Yesler's Wharf, 1854-1905 Harrington & Smith's/ Hatfield Wharf, 1883-1900 Great Fire, 1889 Boathouses, pre-1889 SLS&E Terminal, 1887-1889	Pre-contact Ethnographic Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	1 and 2
2	Buried beaches Colman Dock, 1882-1912 West Seattle Ferry, c. 1890-1905 Great Fire, 1889	Pre-contact Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	2
3	Buried beaches Fire Station, 1889-1905 Seattle Coal Bunker Dock, 1889-1905 Great Fire, 1889 Commercial Dock, 1889-1905	Pre-contact Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	2
4	White Star Dock, 1893-1901 Great Fire, 1889 Galbraith Bacon & Co. Inc., 1905-1935	Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	3
5	Arlington Dock, 1902-1935 Great Fire, 1889 Merchant's Dock, 1891-1905	Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	3
6	Arlington Dock, 1902-1935 Great Fire, 1889	Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	3
7	Railroads crossing the tideflats, 1887-1905 Boathouses, c. 1880s-1905 The shipping industry, 1893-1935	Transportation Industry and Manufacturing Commerce and Trade Government	4

Locations	Historical Locations & Event	Expected Research Domains	Zone
8	Schwabacher Brother's and Co. Dock, 1889-1935 Great Fire, 1889	Transportation Industry and Manufacturing Commerce and Trade Government	4
9	Buried beaches Squatters' community, 1880s The fishing industry, 1880s-1935 Seattle Coal and Transportation Co. Wharf, 1872-1877	Pre-contact Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	4
10	Buried beaches The fishing industry, c. 1880s-1935 Gaffney Dock, 1902-1935	Pre-contact Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	4
11	Railroads crossing the tideflats, 1887-1905	Transportation Government	5
12	Buried beaches Boathouses, 1890s Bell Street Terminal, 1914-1935	Pre-contact Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	5
13	Buried beaches Railroads crossing the tideflats, 1887-1935 Boathouse, 1880s-1890s The shipping and fishing industries, 1912-1935	Pre-contact Transportation Industry and Manufacturing Commerce and Trade Government	6
14	Buried beaches Railroads crossing the tideflats, 1887-1935 Roslyn Coal Co. Wharf, 1902-1916 American Can Co. Wharf, c. 1916-1935 Seattle, Lakeshore and Eastern Wharf, c. 1893-1935 Coffman's Wharf, c. 1893-1935 Ainsworth and Dunn Wharf, 1901-1935	Pre-contact Transportation Industry and Manufacturing Commerce and Trade Residential and Social Government	6

*See Figure 5-20 for data gap locations

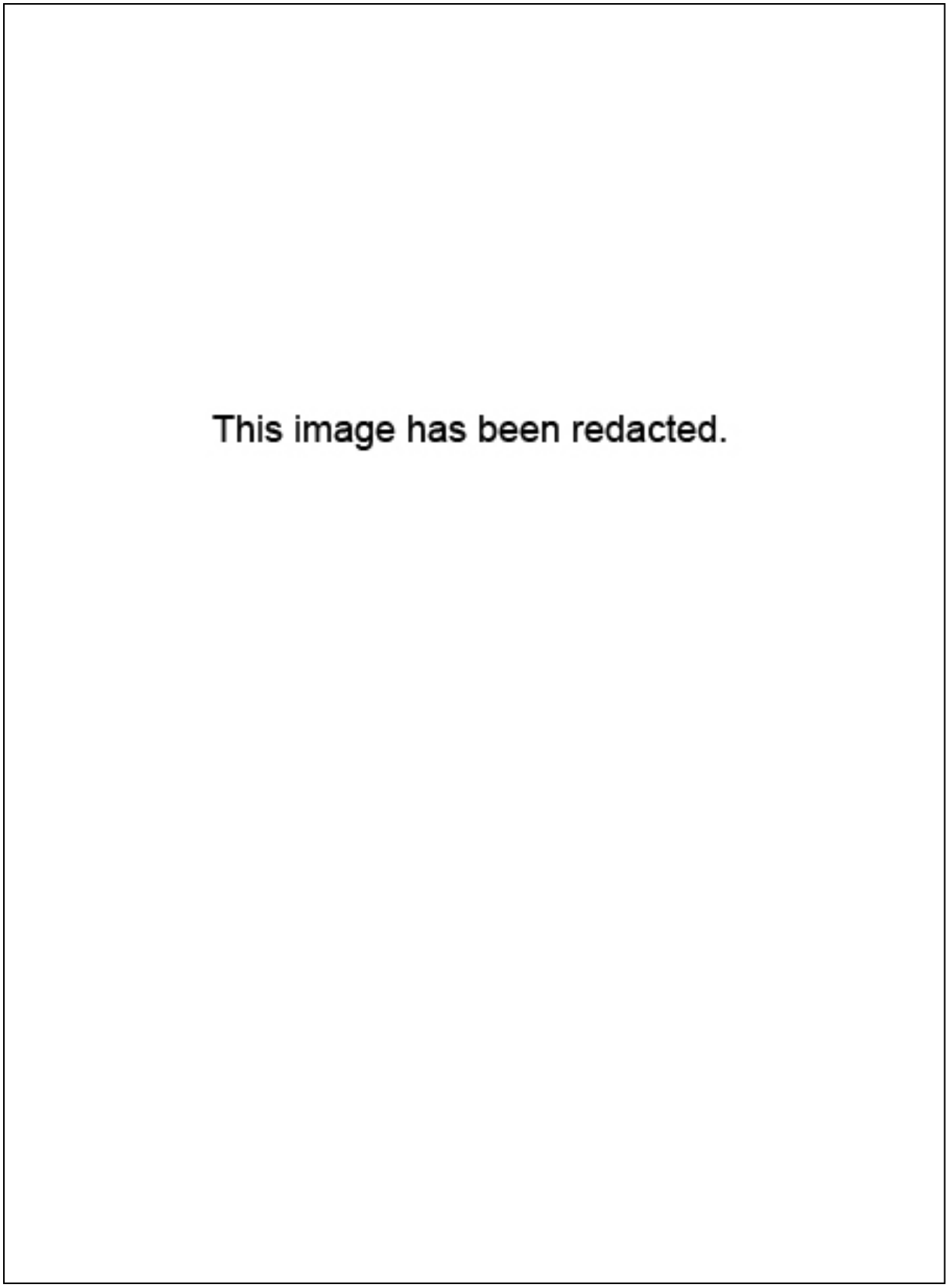

Figure 5-20. Data gaps with potential for buried cultural resources (see Table 5-1 for data gap descriptions).

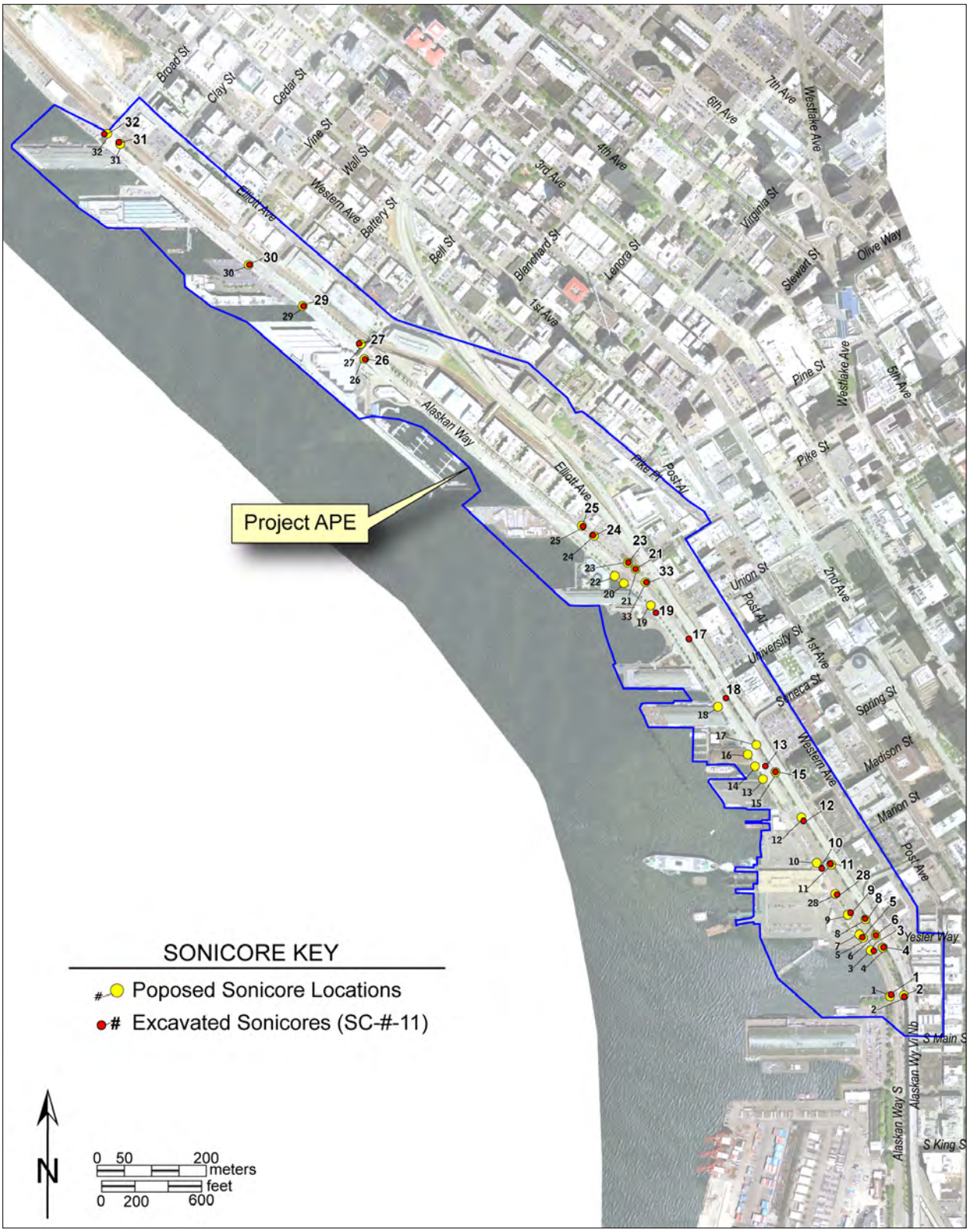

Figure 5-21. Proposed sonicore locations based on the initial desktop assessment and locations of cores drilled during the EBSP geoarchaeological investigation.

5.1.2.2 Field Study Results

A total of 28 sonicores were drilled and 1,042.5 linear feet of core were logged and sampled for archaeological processing during the field component of the geoarchaeological investigation (Rinck 2012). Pleistocene deposits, Holocene sediment, and historic fill were once again present in the APE (Figure 5-22). The individual depositional units identified in the historic fill and Holocene sediments within the sonicores are further defined and described in detail by construction zone in the Results of the Archaeological Field Study Technical Memorandum (Rinck and Valentino 2012). The new geoarchaeological data will also be presented by construction zone. A summary is in Table 5-8.

The basal Pleistocene assemblage includes a mix of glacial and non-glacial sediments dating to the Vashon and pre-Vashon glacial periods and was encountered in eight of the new boreholes (Rinck and Valentino 2012). Deposits dating to the Pleistocene were found below an average of 42.4 feet below the surface (fbs), though depth to Pleistocene sediments ranged from about 36 feet in Zone 6 to 69 feet in Zone 3. Depth to the Pleistocene-aged deposits generally increases to the west as distance to the historic shoreline increases. The bounding contact between the Pleistocene and the overlying Holocene sediments was usually well defined. The Pleistocene sediments will not be analyzed because they pre-date the arrival of humans in the region.

The 28 Holocene-aged depositional units identified during the most recent round of sonicoring include beach and intertidal foreshore deposits. These are usually found below an average of 28 fbs, but were as shallow as an average of 19 fbs in Zone 5 and as deep as an average of 47 fbs in Zone 3. The base of the Holocene deposits averages 42.4 fbs. Intertidal deposits are generally found overlying the older beach sediments. Beach deposits are within all six zones, though Zones 3 through 5 are dominated by intertidal deposits. This is because Zones 3, 4, and 5 were inundated as part of the intertidal foreshore of Elliott Bay for a longer period compared to those zones located closer to the historic shoreline.

Fill is between an average of 0 and 28 fbs within the EBSP APE. The fill is generally composed of concrete, capping thick layers of sand and gravel interbedded with thinner, less common units. Discrete deposits within the fill include those belonging to the industrial deposits (Wood, Sawdust, Lumber, Charcoal and Cinders units), sedimentary fill (Gravel, Sand, Silt and Clay units), building materials (Concrete, Brick and Asphalt units), and other groups (Undifferentiated fill and Voids). Wood, lumber and sawdust deposits are often found near the base of the fill in Zones 1 and 2. Cinders and charcoal were recorded together in Zone 3. Detailed analysis of the sonicore results, discussed by construction zone, allowed SWCA to identify areas with potentially significant cultural materials in the APE by comparing the results to the historic record and existing geotechnical information presented above.

Cultural materials were recovered from 25 of the 28 new sonicores with a total artifact recovery of 2,813 (2,054 of which are native shell). All archaeological materials recovered were classified according to material type: ceramic, faunal, glass, metal, other and wood. A detailed artifact catalog with specific provenience information and a detailed discussion of the artifacts is in Rinck and Valentino (2012). Dateable materials include hand-manufactured glass bottles (pre-1915), the main spring of a .38 Colt automatic (ca. 1902), a bottle of Murray & Lanman Florida Water (unisex cologne ca. 1890), Lydia E. Pinkham's Vegetable Compound (for female complaints ca. 1890), and a Pond's brand cold cream jar

(ca. 1920). These and other non-datable artifacts, such as milled wood and ceramics, are tangible evidence of early historic settlement in Seattle.

Zone 1

Zone 1, at Pioneer Square, contains data from four sonicores and one previously completed boring (Figure 5-23). The Holocene stratum is dominated by gravelly sand with varying amounts of silt and Gsz deposits, inferred to represent a coarsening upwards beach environment. Gravelly beach sediments signal a former shoreline with potential for preservation of cultural material under certain rare, but possible conditions. Finer-grained sediments, such as Zs and Zsg units, are representative of either an intertidal depositional environment or colluvium from the bluffs that are now buried below fill east of the seawall. The silty sediments are interbedded with the beach deposits. The average depth to the top of the Holocene deposits is 27.6 fbs and the bottom of the Holocene sediments is an average of 39.3 fbs in Zone 1, but can be as deep as 46 fbs. The potential for encountering prehistoric cultural materials increases to the east.

Zone 1 also contains nine discrete units in the historic fill that extends to an average of [redacted]. Concrete or Asphalt are at the surface in four of the five cores drilled in Zone 1, and Sand and Silt deposits compose most of the fill below the Concrete. Other common deposits include Wood, Sawdust and Lumber between [redacted] that are probably associated with early historic filling from Yesler's Mill. A few of the Wood deposits are vertical pilings that were cored through. The Sand units that are interbedded with the Wood, Sawdust and Lumber deposits contain shards of hand-manufactured beverage bottles that pre-date 1915. Deposits of Undifferentiated Fill are common[redacted]. The Undifferentiated Fill units are probably associated with the filling of Railroad Avenue during or after construction of the southern seawall. No obvious stable surfaces were identified in the Zone 1 fill, though flat-lying Lumber deposits could represent the remnants of planking or decking among pilings. Sonicores [redacted] were drilled very near Ballast Island, shown on historic maps as early as 1881 just [redacted]. Although no evidence of ballast was identified in the cores analyzed for this report, other sonicores completed along the existing seawall did find large gravels, exotic stones, and brick fragments, evidence of the island between about [redacted] (Huber et al. 2010). Native Americans used Ballast Island and the beach at [redacted] for camping. There is potential for evidence of camping within the beach and lowermost historic fill deposits along the existing seawall in Zone 1.

The majority of cultural materials in Zone 1 came from [redacted], including brick fragments, a piece of a ceramic insulator, two shards of a milk-glass cosmetic jar, a hand-manufactured bottle, coal, flat glass, lumber markers, bottle glass, and most of a men's nailed left boot. Artifacts found within the Wood deposit associated with Yesler's Mill in [redacted] include a minimum of six hand-manufactured glass bottles, a stoneware crock rim, two pieces of thin porcelain, and brick between [redacted]. A single piece of flat (window) glass was recovered from a Sand deposit interbedded with Yesler Mill debris between [redacted] in the same core. The artifacts that were recovered within the Wood layer are likely the result of activities at the store, cookhouse, and other ancillary facilities at Yesler's Mill. The regrade spoils in [redacted] contained a shard of a turned bottle (ca. 1850-1915) and 14 pieces of milled wood between [redacted], as well as a piece of milled wood (Lindsey 2011).

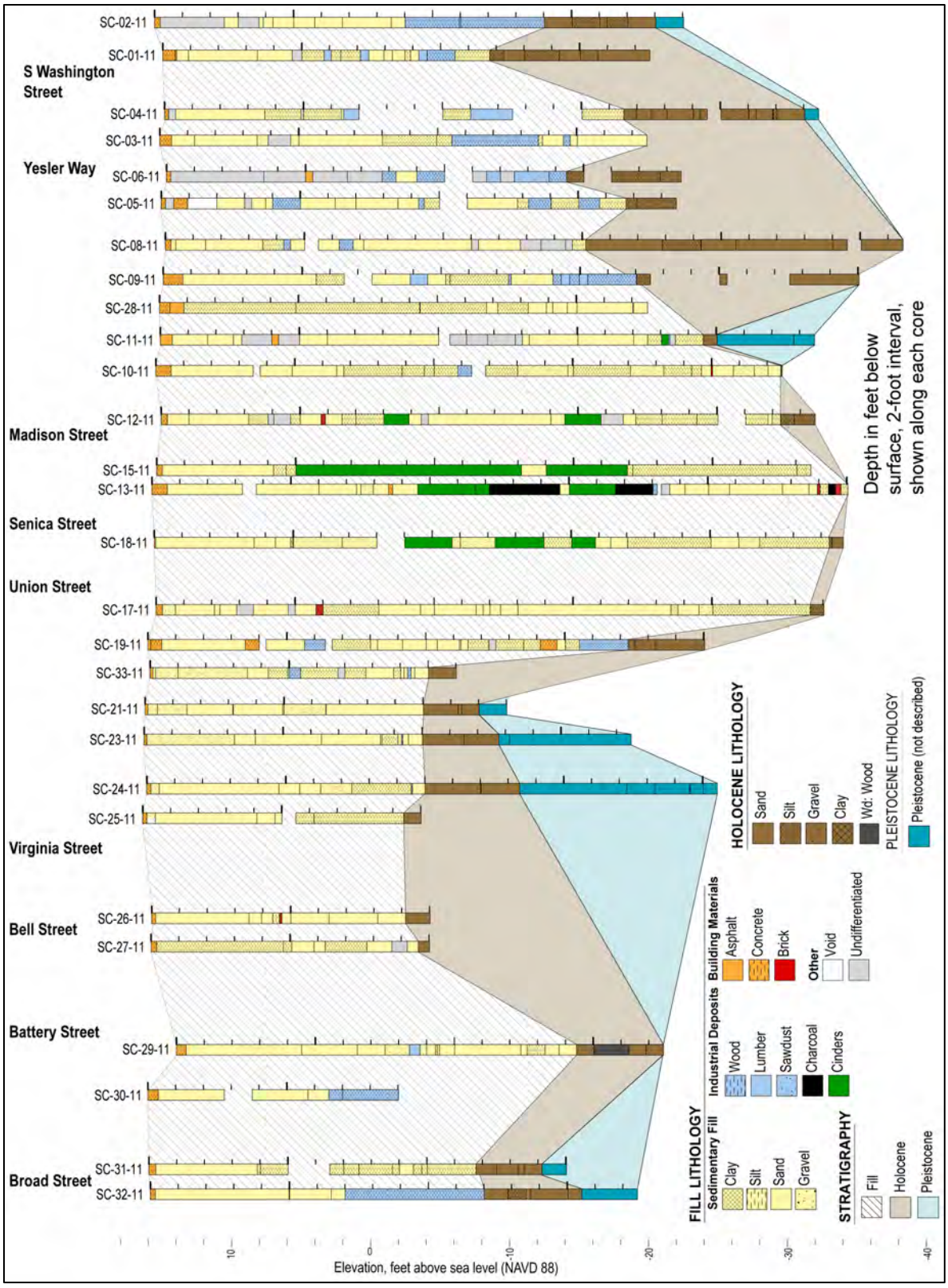

Figure 5-22. Cross-section of the stratigraphy and lithology observed in the EBSP sonicores from south to north along the APE.

TABLE 5-8. SUMMARY OF SONICORE RESULTS AND EXISTING DATA BY ESBP ZONE.

Zone	Average Depth of Fill Stratum (fbs)	Fill Comments	Cultural Materials in Fill	Average Depth of Holocene Stratum (fbs)	Holocene Comments	Cores Included in Analysis
1	27.6	**REDACTED**		39.3	Beach deposits dominate Zone 1. Both historic and buried beaches were sampled. No cultural materials were identified. The APE is west of the historic shoreline.	SC-02-11* SC-01-11* CB-21B SC-04-11* SC-03-11*
2	39.2			49.25	Beach deposits transition into intertidal sediments towards the northern end of Zone 2. Deeply buried beach deposits were sampled and no cultural materials were identified. There is a stable intertidal historic surface identified at the base of the fill near Madison Street at about 40 fbs.	SC-06-11* SC-05-11* SC-08-11* SC-09-11* CB-17B SC-28-11* SC-11-11* SC-10-11* CB-104 CB-15 SC-12-11*
3	47.4			68.9	Intertidal deposits are thick and fine-grained in Zone 3. Previously drilled borings show deeply buried beaches are in Zone 3, but none were tested with archaeological sonicores. No Pre-contact or Ethnographic cultural materials were identified.	CB-13B CB-103 CB-11B SC-15-11* SC-13-11* CB-09B CB-08B SC-18-11* CB-06B
4	24.1			27.8	The Holocene	SC-17-11*

Zone	Average Depth of Fill Stratum (fbs)	Fill Comments	Cultural Materials in Fill	Average Depth of Holocene Stratum (fbs)	Holocene Comments	Cores Included in Analysis
					deposits in Zone 4 are thick and fine-grained. Buried beach deposits are limited, none of which were sampled during the current investigation. No Pre-contact or Ethnographic cultural materials were identified.	CB-04 SC-19-11* CB-03B SB-11 SC-33-11* SB-12 SC-21-11* SC-23-11* SB-13 SC-24-11* SC-25-11* SB-14 SB-15 SB-16
5	19			38.7	Intertidal deposits compose the majority of the Holocene sediments. Just one buried beach deposit was recorded, but it was not sampled during the current investigation. No Pre-contact or Ethnographic cultural materials were identified. The APE is west of the historic shoreline.	TW-12 SB-17 TW-11 EB-20B GP-40 SB-18 SB-19 SB-20 SB-21 EB-07B GP-41 SC-26-11* SC-27-11* SB-22 GP-42 SB-23 SB-24 SC-29-11*
6	23.8			35.7	Holocene deposits coarsen in Zone 6, consisting of beach and upper foreshore units. These were sampled in two sonicores drilled in	SB-25 SC-30-11* EB-21B SB-26 GP-43 SB-27 SB-28

Zone	Average Depth of Fill Stratum (fbs)	Fill Comments	Cultural Materials in Fill	Average Depth of Holocene Stratum (fbs)	Holocene Comments	Cores Included in Analysis
					Zone 6, but no cultural materials were identified.	EB-06B SB-29 SB-30 SB-31 SB-32 SC-31-11* AH-202 SC-32-11*

Note: * New sonicores drilled for this EBSP study.

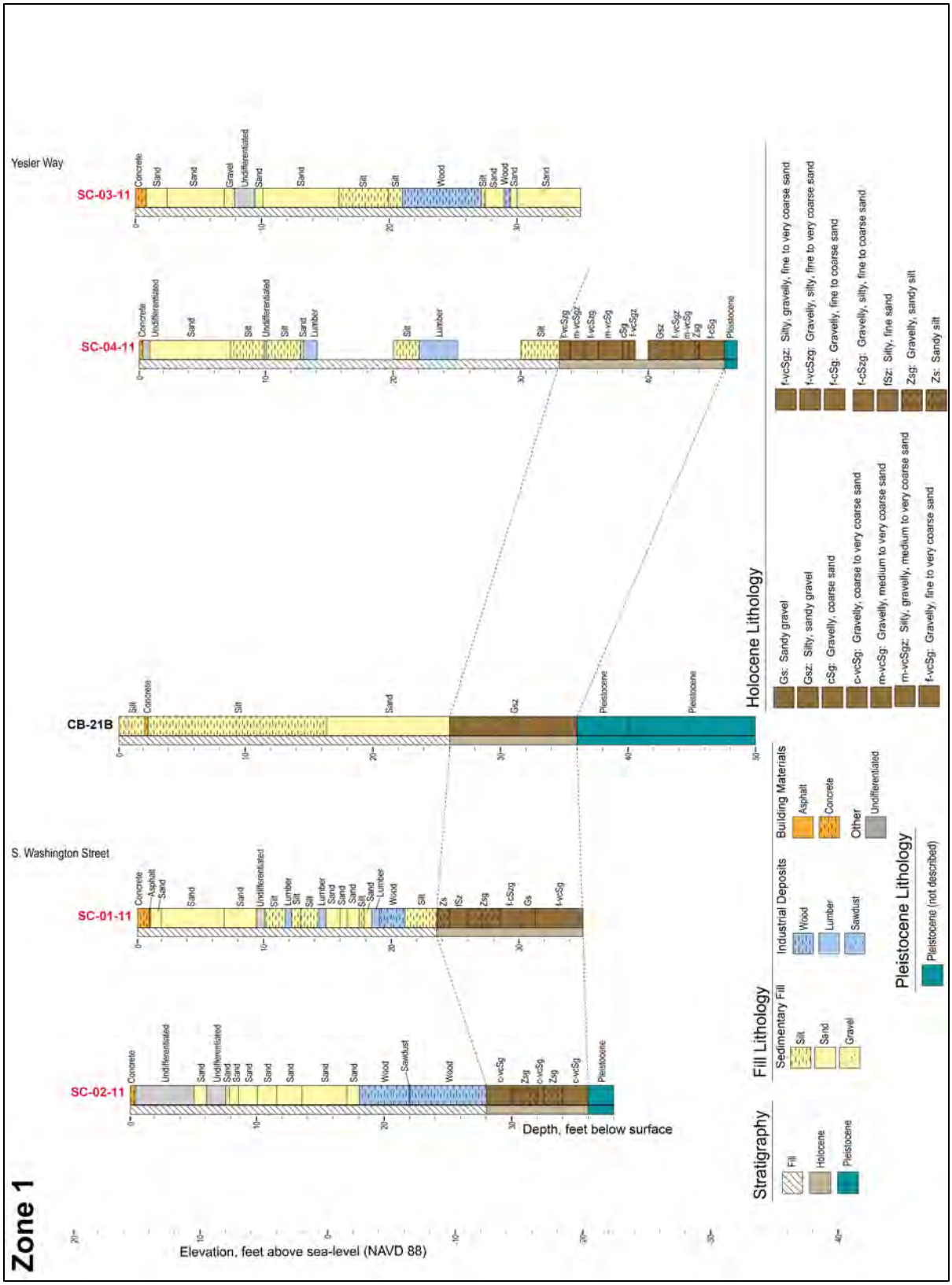

Figure 5-23. Zone 1 cross section compiled from existing geotechnical borelogs and sonicores drilled for the EBSP.

Zone 2

Zone 2, at the Ferry Terminal, contains data from eight sonicores and three previously completed borings (Figure 5-24). The average depth to the top of the Holocene stratum in Zone 2 is 39.2 fbs and the Holocene sediments extend to an average of 49 fbs. The top of the Holocene stratum was encountered at a minimum of 29 fbs and a maximum of 48 fbs, extending as deeply as 55 fbs. The Holocene stratum is dominated by Gsz and Gzs deposits, inferred to represent a beach berm depositional environment from 34 to 55 fbs. Other, slightly finer-grained beach deposits in Zone 2 include f-vcSgz, f-vcSzg, m-vcSg, and m-cSg units, and beach foreshore deposits in Zone 2 are f-mS, fSz, Zsg, Zs, Zso, Zcs, Z, Zo, and Zc units that all overlie the beach berm deposits. The finer-grained deposits represent a transgressive sequence representing a vertical and lateral shift from a beach environment to an intertidal or estuarine environment that may be due to Holocene sea-level rise or tectonic subsidence, also seen in Zones 3, 5, and 6.

Zone 2 also contains 13 discrete units in the historic fill, which extends to an average of 39 fbs. Concrete and/or Asphalt are at the surface in all 11 cores in Zone 2, and Sand and Silt deposits compose most of the fill below the Concrete. Wood, Sawdust, and Lumber deposits are found in high quantities in the southern half of Zone 2, usually between [redacted]. These are part of the early historic fill placed by Yesler surrounding his mill. The majority of the Wood, Sawdust, and Lumber deposits are mill waste. Some of the Wood and Lumber layers may be flat-lying planking or decking. The fill at [redacted] contains far less industrial material compared to the stratified fill at [redacted], and the Sedimentary Fill deposits in the central portion of Zone 2 are also slightly thicker, looser, and wetter compared to the Sand and Silt deposits to the north and south. Undifferentiated Fill deposits are found throughout Zone 2. An intact historic intertidal surface that would have been exposed at low tide and inundated at high tide in [redacted] between [redacted] contained a peanut shell and barnacle and mussel shells. Intertidal deposits are well-preserved in [redacted] at similar depths. The northern extent of the early seawall and the southern extent of the later seawall meet at Madison Street, at the northern end of Zone 2, where these intertidal deposits are preserved.

Artifact bearing regrade deposits were observed in the fill in cores [redacted] in Zone 2. A piece of cut rubber and three pieces of milled wood were between [redacted] 1. A common red brick was at [redacted] yielded seven brick fragments and a piece of slag between [redacted] contained the main spring of a .38 Colt automatic (ca. 1902) at a depth of [redacted] Other artifact-bearing deposits in the fill in Zone 2 include Brick, Gravel, Lumber, Sand, Silt, and Undifferentiated Fill. Artifacts recovered include four pieces of metal wire in [redacted]; coal and milled wood in [redacted]; brick, unknown porcelain vessel fragments, earthenware tile, bottle shards, nails, a lumber pencil and sewer pipe in [redacted] brick, coal and lath in [redacted]; brick in [redacted]; and a piece of a ceramic plate, a piece of lead, and a brick fragment in [redacted] contained a pig bone between [redacted] and peanut shells were from [redacted] at an intact intertidal surface in [redacted]

Zone 3

Zone 3, known as the Central Pier zone between Madison and University Streets, contains data from three sonicores and six previously completed borings (Figure 5-25). The average depth to the top of the

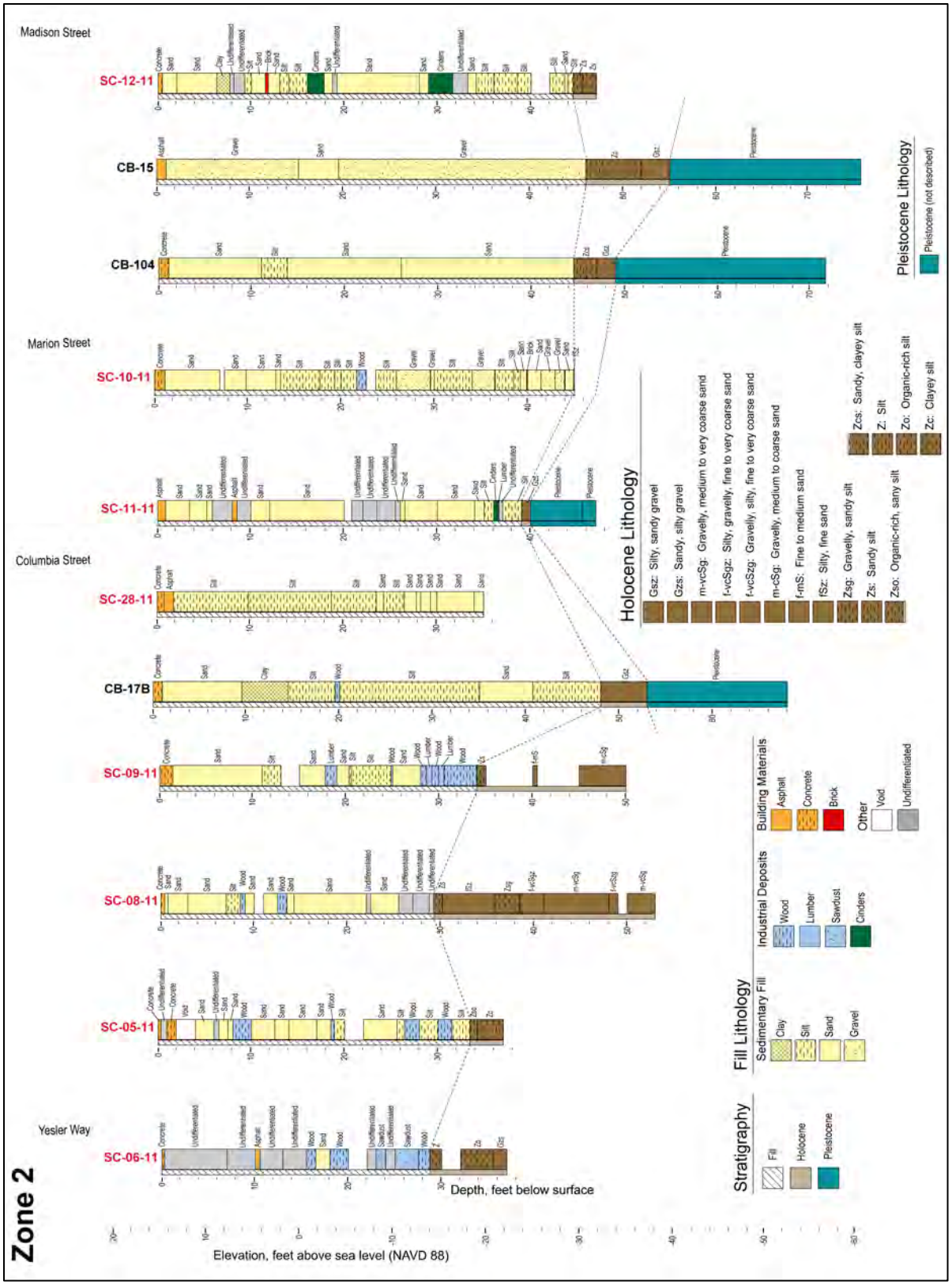

Figure 5-24. Cross section of Zone 2 compiled from existing geotechnical borelogs and sonicores drilled for the EBSP.

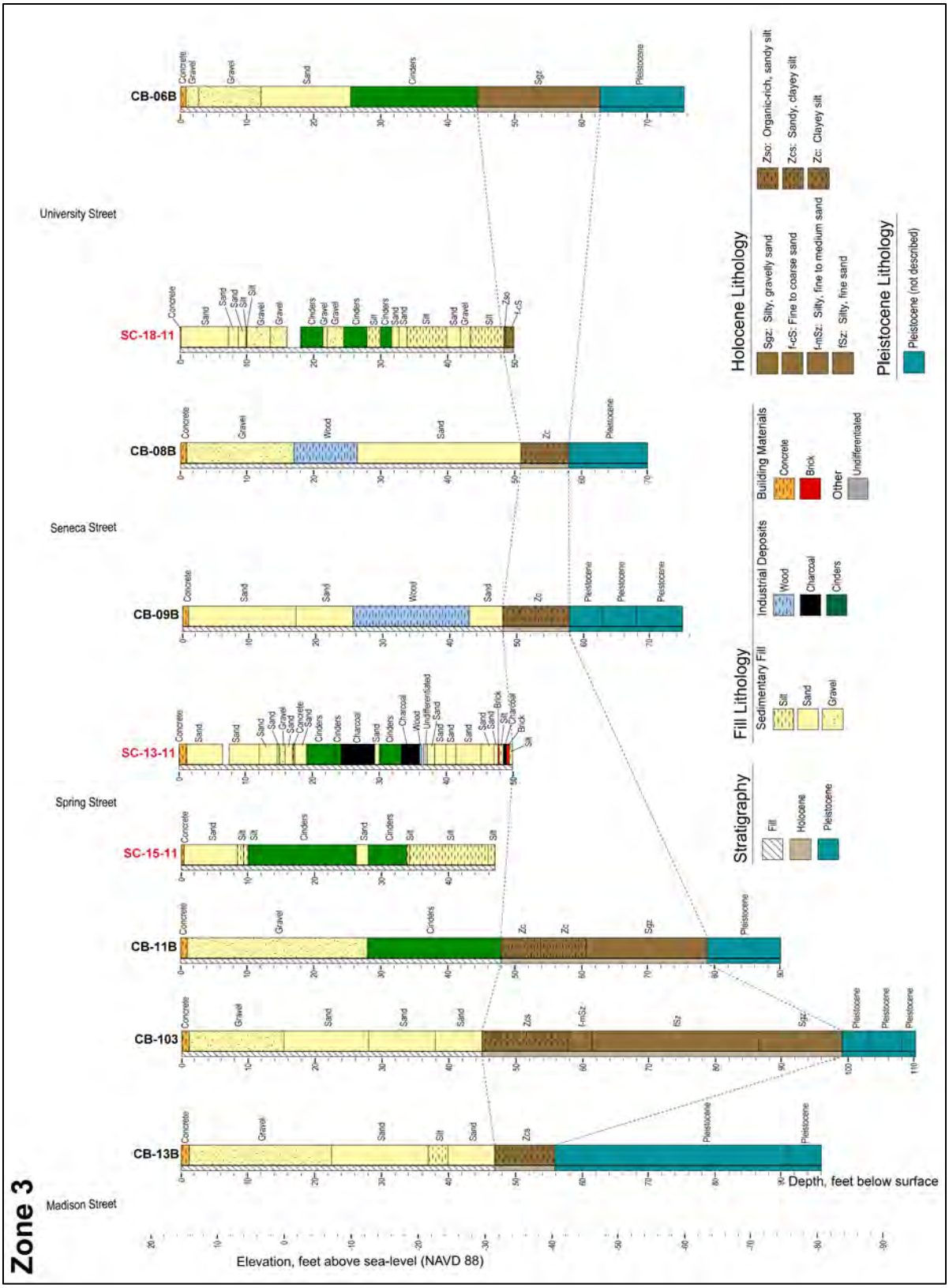

Figure 5-25. Cross section of Zone 2 compiled from existing geotechnical borelogs and sonicores drilled for the EBSP.

Holocene stratum in Zone 3 is 47 fbs and the average extent of the Holocene stratum is 69 fbs, the deepest in the APE. In Zone 3, the bottom of the Holocene stratum was recorded as deep as 99 fbs by geotechnicians. Zone 3 Holocene deposits generally consist of Zc and Zcs units that overlie f-mSz, fSz and Sgz units. Other deposits in Zone 3 include Zso and f-cS units. The silty deposits are inferred to represent an intertidal depositional environment and the underlying sands represent a beach and foreshore environment. The beach deposits are usually below about 58 fbs, but were encountered as shallowly as 44 fbs. Beach deposits are absent in CB-13B, CB-09B and CB-08B, where intertidal deposits directly overlie Pleistocene sediments. The variability in the Holocene stratum implies that Zone 3 was a relatively active part of the shoreline when considering shoreline processes and deposition. In general, the stratigraphy follows the same transgressive trend seen in Zone 2 that was probably caused by sea-level rise or subsidence. The deep beach deposits in Zone 3 were not tested using the sonicores during this investigation. Although the potential for encountering pre-contact cultural materials within the buried beach deposits is relatively low, there is some potential and any materials identified within the beach deposits would likely be deemed significant.

Zone 3 also contains nine discrete units in the historic fill that averages 47 feet in depth. Concrete is at the surface in all nine cores and massive Sand and Gravel deposits compose most of the fill below the Concrete. Layers of Brick and Undifferentiated Fill are also present, but are thinner and far less common in Zone 3. The Sedimentary Fill layers in Zone 3 contain many inclusions compared to the "cleaner" Sedimentary Fill found elsewhere in the APE. Here, wood chips, cinders, metal, roots, brick, slag, shells, glass, rubber, concrete and asphalt are within Gravel, Sand and Silt units. The "dirtiness" of the Zone 3 Sedimentary Fill could indicate an early fill date, a certain fill source, or a specific relation to the particular historical activities that took place between Madison and Union Streets. For example, boathouses were known to have occupied the southern end of Zone 3. Thick Wood deposits were recorded by geotechnicians at [redacted]. Charcoal and Cinders deposits are also common in Zone 3, especially around [redacted]. The Wood at [redacted] may be related to the pilings and planking supporting Railroad Avenue or the surrounding wharves, such as the Merchant's Dock or the H. W. Baker and Co. Wharf. The Industrial Deposits at [redacted] may be related to the collapse of the White Star Dock in 1901. The thick deposit of Cinders at [redacted] may be related to the coal bunker and steamship loading area for cargo from the Chicago, Milwaukee and St. Paul Railroad. The same Cinders deposit could also be related to the collapse of the Arlington Dock, which stood just south of CB-06B prior to 1892. Alternatively, all the Cinders and Charcoal deposits in Zone 3 may be due to the cleanup efforts of the Great Fire of 1889, during which people scraped up rubble and fire debris and pushed it off the docks into Elliott Bay. The top of one such Cinders deposit is at [redacted] (Figure 5-26).

The majority of cultural materials in Zone 3 came from a Cinders deposit that is probably evidence of the 1889 Great Fire. The artifacts from [redacted] include common red brick, ceramic insulators, a stoneware bottle, sewer pipe, hand-manufactured bottle fragments, chimney (lamp) glass, thick flat glass, bottle fragments of unknown manufacture, a jar liner, fabric, a leather belt piece, slag and milled wood. Two of the hand-manufactured bottles have identifiable trademarks. One is the remains of a Murray & Lanman Florida Water (unisex cologne) bottle and the other is a shard from a bottle of Lydia E. Pinkham's Vegetable Compound. The vegetable compound was intended to relieve "female complaints"

Figure 5-26. Cinders unit in the historic fill from between [redacted]

and contained approximately 20 percent alcohol, as was common of medicines during the late 1800s. In addition to providing a temporal marker for the deposit, these bottles represent Seattle's participation in the market economy rather than its reliance on locally-prepared medicines from a neighborhood pharmacy. Artifact-bearing regrade spoils that contained brick fragments and flat glass were identified in [redacted]. The remaining artifacts found in Zone 3 that did not come from the fire deposit or regrade spoils include common red brick, thick flat glass, and slag in [redacted] in two Sand deposits at depths of [redacted]; and two pieces of brick and flat glass in a Silt layer in [redacted].

Zone 4

Zone 4, near the Seattle Aquarium, contains data from seven sonicores and eight previously completed borings (Figure 5-27). The average depth to the top of the Holocene stratum is 24.1 fbs, and it extends to an average of 28 fbs. The boundary between the fill and the underlying Holocene stratum was encountered at a minimum of 12 and as deeply as 47 fbs. The maximum extent of the Holocene stratum in Zone 4 is 63 fbs, and Pleistocene sediments were encountered as shallow as about 24 fbs. The Holocene deposits consist of sediments deposited on the beach and in an intertidal setting. The beach deposits are dominated by Gsz and gravelly sand layers. Buried beach deposits in Zone 4 are at Union Street, the Pike Street Hill Climb, and north of Pine Street. The Gsz deposits were encountered around the Pike Street Hill Climb between 20 and 25.5 fbs. Finer-grained sediments, including Cz, Zcs, and Zs deposits, are representative of an intertidal depositional environment. The intertidal sediments are found both above (from 18 to 31 fbs) and below (from about 40 to 63 fbs) the beach sands in the southern half of Zone 4. Intertidal deposits are between about 20 and 28 fbs in the northern half of Zone 4, generally overlying beach and foreshore deposits.

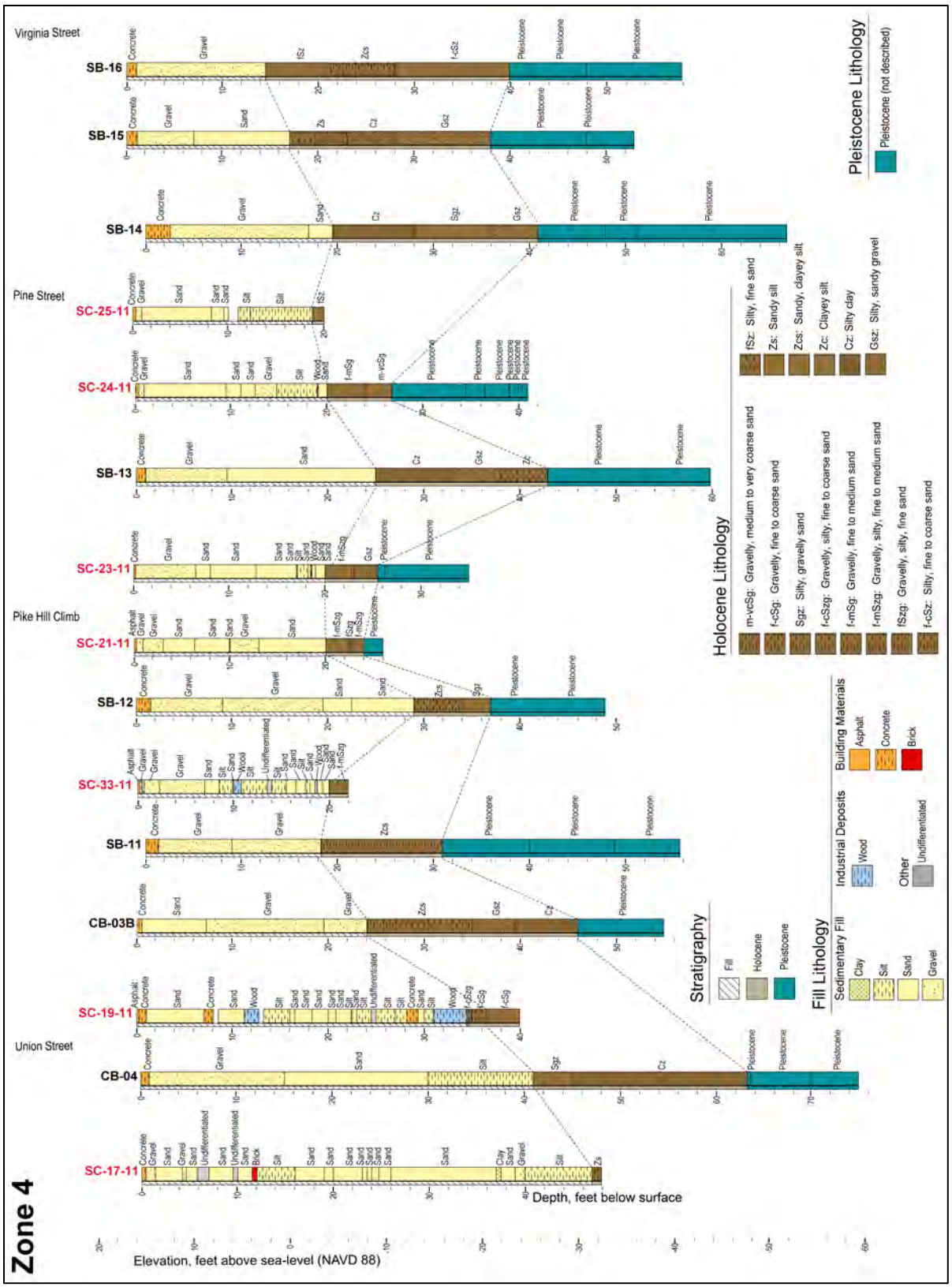

Figure 5-27. Cross section of Zone 4 compiled from existing geotechnical borelogs and sonicores drilled for the EBSP.

Zone 4 also contains nine discrete units in the historic fill, recorded between an average of [redacted]. Concrete or Asphalt is at the surface in all the cores, and Sand, Silt and Gravel deposits compose most of the remainder of the fill. Crumbled Brick is in [redacted]. A thick Wood deposit in [redacted] may be a buttress piling. Other, thinner Wood deposits are at [redacted] A thin bed of black, organic-rich, fine sand with woody debris and shell fragments is in [redacted] (Figure 5-28). The Sand deposit is overlain by shredded woody debris that may have accumulated along the historic shoreline. Another set of Silt, Wood, and Sand deposits between [redacted] may also represent the historic intertidal surface in Zone 4 near the Pike Street Hill Climb. Although these deposits represent a stable surface, there are no associated artifacts. The stable intertidal surface and underlying beach gravels between about [redacted] have potential for cultural materials. Cultural materials relating to the Seattle Coal and Transportation Company wharf at Pike Street, squatters' camps on the beach between [redacted], or the small fish company piers that once stood between Pine and Virginia Streets would probably be [redacted].

Figure 5-28. Thin bed of sand with woody debris and shell fragments in [redacted]

Artifacts in the fill in Zone 4 generally came from depositional units of Sand. For example, Sand units between [redacted] contained hand-manufactured bottle shards and bottle fragments of unknown manufacture. Sand units from [redacted] included hand-manufactured bottle glass, weathered bottle fragments of unknown manufacture, coal and milled wood. Deposits of Sand and Silt at [redacted] contained brick fragments, hand-manufactured bottle glass, flat glass, and unknown manufacture bottle fragments. Sand layers between [redacted]

[redacted] included flat glass, an unknown glass vessel, and lath and wood waste. Sand from [redacted] contained a hand-manufactured bottle, flat glass, slag and a piece of rusted metal. Sand between [redacted] contained flat glass and unknown glass vessel shards. Sand between [redacted] in the same core contained lath. In [redacted], Silt and Undifferentiated Fill deposits between [redacted] contained brick fragments, sewer pipe, a brass shaving, and part of a hand-manufactured bottle, and Sand, Silt, and Wood deposits in [redacted] yielded a cut mammal bone, a woman's shoe upper, coal and lath.

Zone 5

Zone 5, along Bell Harbor, contains data from three sonicores and 15 previously completed borings (Figure 5-29). The average depth to the top of the Holocene stratum is 19 fbs and the Holocene stratum extends to an average of 39 fbs. Holocene sediments were first encountered as shallowly as about 14 fbs in SB-17 and EB-20B, and as deeply as 29 fbs in SC-29-11. The boundary between the Holocene and Pleistocene strata varies from 34 to 45 fbs across Zone 5. The Holocene stratum is dominated by f-mS, Sz and f-mSz deposits, inferred to represent a beach face environment. Units of Szc and fSz are also foreshore deposits. In the southern half of Zone 5, deposits of Cz and Zcs overlie the beach face units between 14 and 34 fbs. The Zs and Zcs units are representative of a lower foreshore or intertidal environment. The superposition of finer-grained tide flat deposits overlying coarser-grained foreshore deposits represents the transition from a beach environment to an intertidal environment, possibly caused by Holocene sea-level rise or subsidence. The beach would have been further to the east at the base of the bluffs just prior to Euroamerican contact.

Zone 5 contains nine discrete units in the historic fill that is an average of [redacted]. Concrete is at the surface in all 18 cores, capping massive layers of Sand and Gravel that contain fragments of wood, cinders, brick and concrete. The relatively stratified fill between [redacted] could correlate with the location of a houseboat or historic shacks on waterfront. It is more likely the bedded Sand, Gravel, Silt, Wood, Brick and Clay units represent sluiced fill episodes deposited during seawall construction near Bell Street, railroad tunnel construction, or the early regrades based on the absence of artifacts and the shallowness of the fill. The GP cores may have also been logged by detail-oriented geotechnicians, producing a record more similar to the geoarchaeological logging of SC-26-11 and SC-27-11. One core, [redacted], may contain evidence of potentially significant cultural materials perhaps associated with the shacks and camps that once lined the beach at [redacted]. The evidence consists of various edible shellfish (barnacles, clams, mussels, crab, scallop and Olympia Oyster) that do not occur together in nature recorded between 18.75 and 24.75 fbs in SC-29-11.

Artifact-bearing regrade spoils were in Zone 5 between [redacted] The former contained a common red brick fragment and a piece of milled wood, while the latter had a single piece of granite. Other artifacts from [redacted] consisted of brick fragments, lath, and metal strapping in Sand deposits between [redacted] and [redacted]. Sand and Undifferentiated Fill sediments in [redacted] contained a lug brick and pieces of common red brick. Thick Sand deposits between [redacted] contained brick, a crock fragment, flat glass, fabric, a piece of granite and lath, and 12 pieces of lath were in a Gravel unit between [redacted]

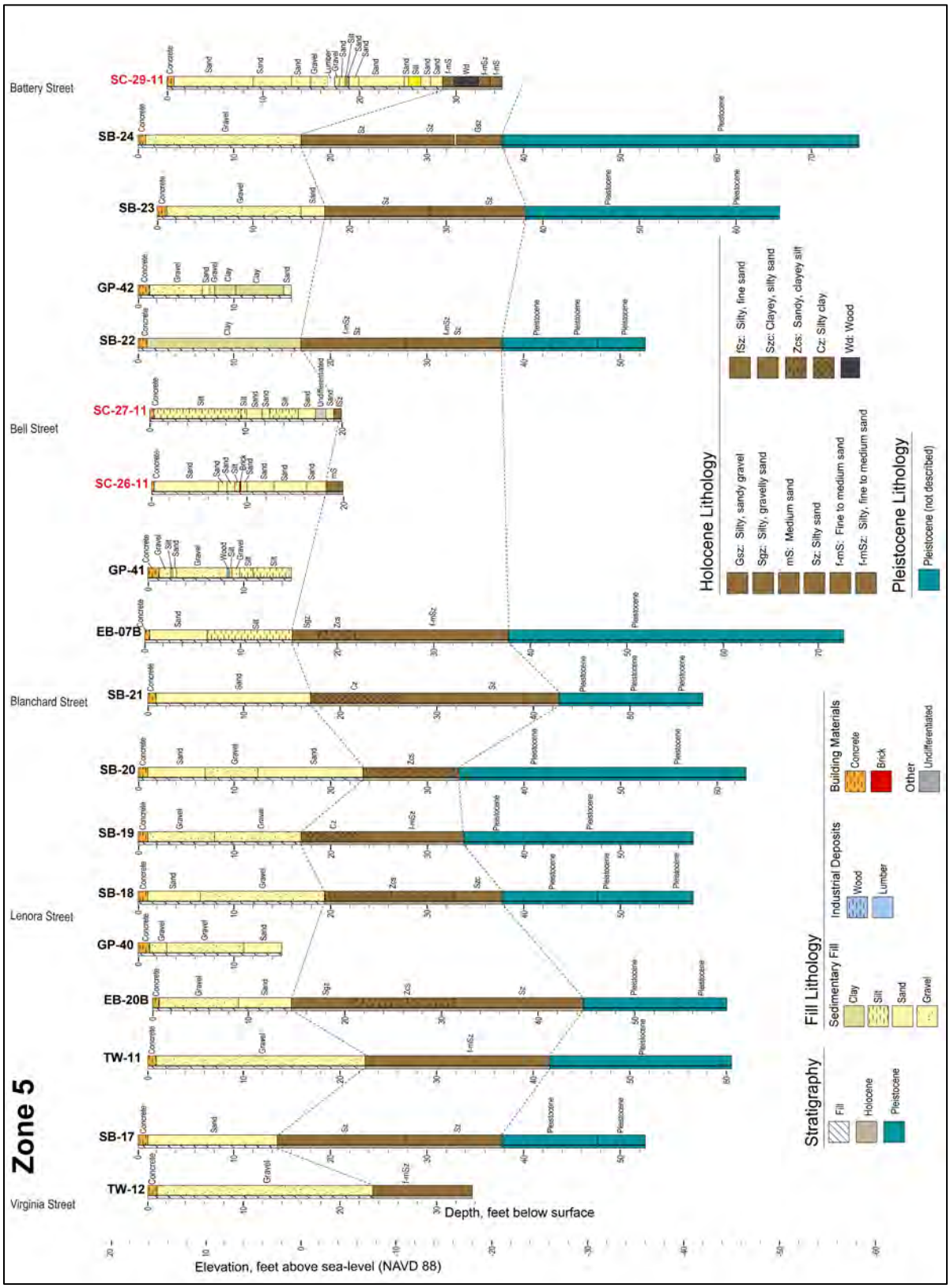

Figure 5-29. Cross section of Zone 5 compiled from existing geotechnical borelogs and sonicores drilled for the EBSP.

Barnacles, clams, mussels, crab, scallops and Olympia oyster shells were also found in a Sand deposit in [redacted] These species do not naturally exist in the same environment and indicate human consumption, which implies human habitation of the shoreline just prior to historic filling.

Zone 6

Zone 6 contains data from three sonicores and 12 previously completed borings (Figure 5-30). The average depth to the top of the Holocene stratum is 24 fbs and it extends to an average of 36 fbs. The fill and Holocene boundary was encountered at a minimum of 19.5 fbs and a maximum of 30 fbs. The boundary between the Holocene and Pleistocene strata is a minimum of 28 fbs and maximum of 45.5 fbs. The Holocene deposits in Zone 6 is dominated by fSz and f-cSz deposits, inferred to represent a beach foreshore environment. Other foreshore deposits include f-cS, f-mS and f-mSz deposits. In archaeological sonicores SC-31-11 and SC-32-11, these were organic-rich and interbedded with shell fragments. Upper foreshore beach and berm deposits composed of Sgz, f-vcSgz and Sgz deposits are also in Zone 6. Finer-grained Szc and Zs deposits represent a transition from the foreshore of the beach to an intertidal environment that is clearly represented by overlying Zcs and Cz deposits.

Zone 6 also contains seven discrete units in the historic fill, which extends to an average of [redacted] Concrete is at the surface in all 15 cores in Zone 6 with the exception of SB-30. Gravel and Sand deposits compose most of the fill below the Concrete. Silt and Wood deposits dominate over the thinner Sand and Gravel layers at the north end of the APE, along with Undifferentiated Fill. The Silt and Wood units may be related to a mill that occupied the wharf just north of Wall Street in the 1890s. A thin deposit of Wood at about [redacted] is probably decking. A wood piling with steel structural tie-rod was encountered in [redacted]. The wood and decking at about [redacted] may be associated with the relieving platform of the seawall that was built on pilings. A large piece of sheet metal was at [redacted] below a Silt deposit that also contained a slab of granite. The metal and granite may also relate to the seawall structure, possibly the northern extent of the portion constructed in 1935. Interestingly, the fill is often more gravelly above about 13 fbs and is more sandy below about 13 fbs, representing two periods or two different sources of fill. The sandy fill likely predates seawall construction. In general, the Sedimentary Fill in Zone 6 contains abundant wood debris, wood chips, organics, cinders, brick, and shell fragments.

Cultural materials in Zone 6 were limited. Wood layers between [redacted] included common red brick and two pieces of a steel tie-rod associated with the seawall. Pieces of non-diagnostic metal which may have originated from a mill on a former wharf in the vicinity were in a Silt deposit between [redacted]. Two pieces of a Pond's brand cold cream jar (ca. 1920) were recovered from a Sand deposit in [redacted]

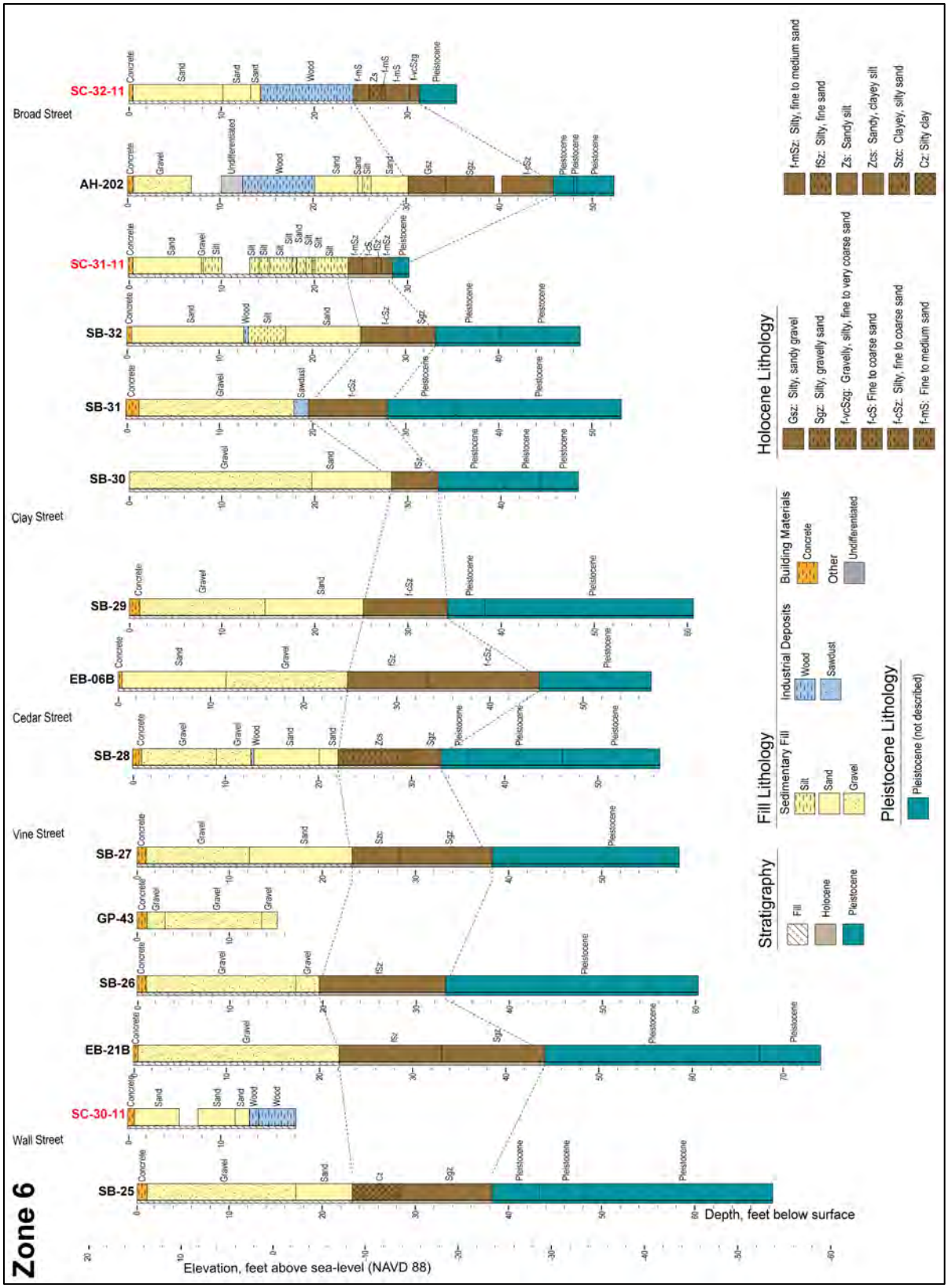

Figure 5-30. Cross section of Zone 6 compiled from existing geotechnical borelogs and sonicores drilled for the EBSP.

5.1.2.3 Geoarchaeological Studies Discussion

The study of formation processes is critical to understanding the context of archaeological materials (Stein and Farrand 2001; Wood and Johnson 1978). Site formation processes are used to generate histories of artifacts based on physical sequences of archaeological deposits and their surrounding sediments. Since formation processes operate in both the natural and cultural realms, a site formation history should include identifying and interpreting the archaeological materials in terms of transport and transformation by human activities, as well as the effects of post-depositional processes (Schiffer 1987). The specific history and function of the cultural materials within the historic waterfront fill may vary widely across space and time as the natural and cultural setting of the Seattle shoreline changed.

5.1.2.3.1 Holocene

Using sonicores to identify buried Holocene landforms has aided in understanding the formation history of the APE. No evidence of pre-contact archaeological resources was encountered within the identified buried landforms during sonicoring; however, early historic stable surfaces with potential for harboring ethnographic period materials were identified. The shoreline features around Elliott Bay carry different potential for pre-contact archaeological resources. Most of the buried landforms identified in the EBSP APE are part of the nearshore environment, which includes the intertidal zone, the beach, the backshore and the bluffs. The intertidal zone (low-tide terrace) includes the beach foreshore. The backshore includes storm berms, scarps and colluvium from the bluffs (Johannessen and MacLennan 2007). A model created from the project data shows the depositional environments identified in the Holocene stratum along the APE (Figure 5-31). Many of the areas indicated as beaches were sampled for cultural materials during this investigation. The beach deposits are usually buried under finer-grained intertidal sediments that were deposited along the lower foreshore after higher sea levels stabilized later in the Holocene. There is potential for buried precontact archaeological resources to be associated with old beach deposits; however, the potential of encountering precontact resources in old beach deposits in the ESBP is relatively low.

5.1.2.3.2 Fill

The results of EBSP sonicoring and analysis of the previously drilled geotechnical cores has also illustrated patterns in the historical fill along the APE. For example, similarities and differences between the fill used behind the early and later seawall during their construction, as well as the change in fill from stratified to more massive over time, were identified. Patterns in association of particular depositional units with one another, such as Wood, Lumber, and Sawdust, as well as Coal and Cinders units, were also recognized. Specific deposits that relate to hydraulic fill deposition and regrading activities were also identified during sonicoring.

Primary fill [redacted] is associated with the early economic development of Seattle, dating to the operation of Yesler's Mill. A few of the fill deposits may be directly related to specific events and activities, like the Great Fire of 1889 and the First and Second Avenue regrade projects. The fill contains more massive units with fewer cultural materials [redacted]. Domestic refuse (shellfish) collected from [redacted] may be a primary deposit reflecting the social and residential history of a particular community that occupied the waterfront periphery.

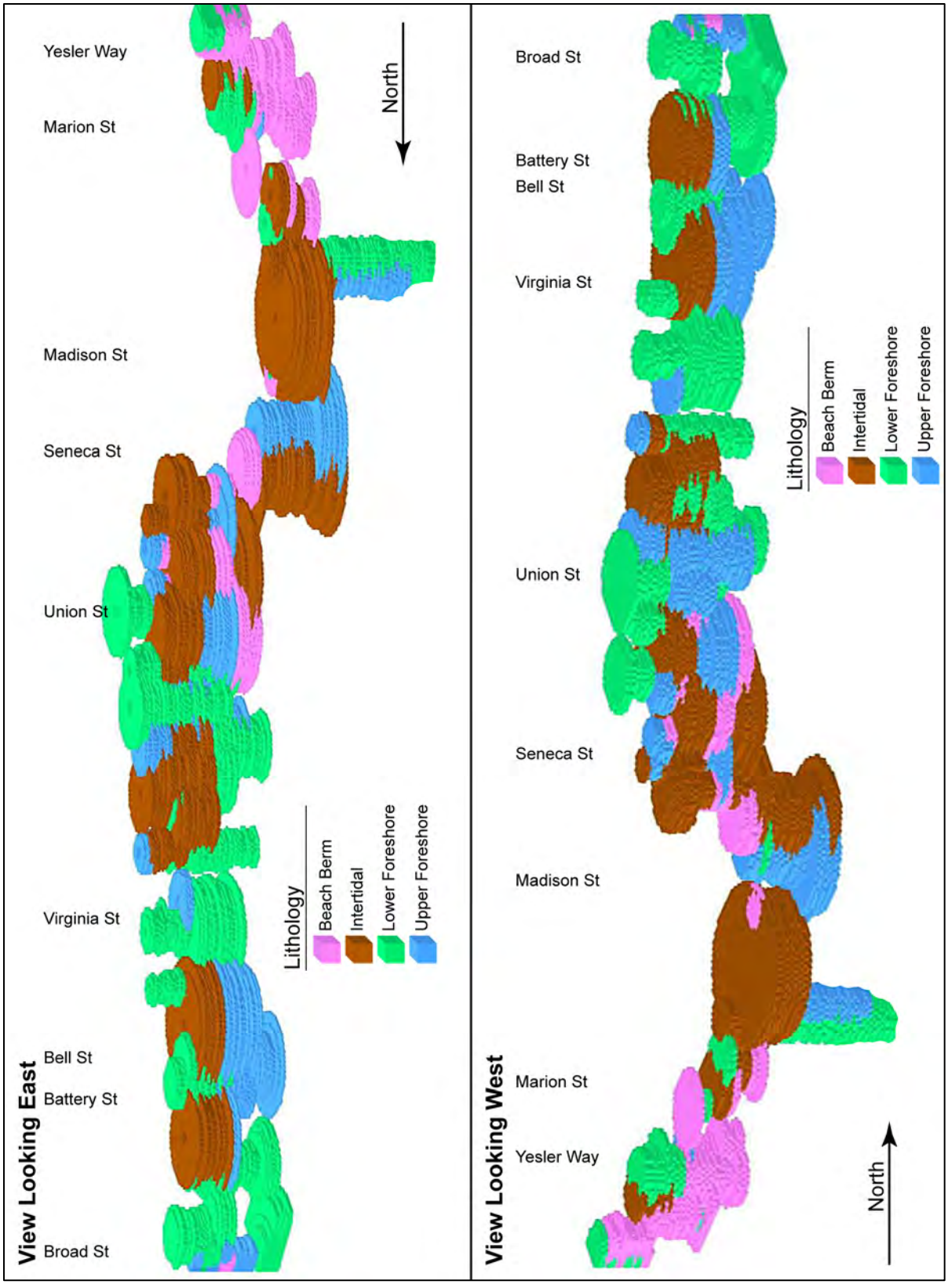

Figure 5-31. Three-dimensional model of the Holocene sub-environments.

Pilings, concentrations of wood planks and milled lumber, and artifacts related to commercial and industrial enterprises on piers and wharves are present in primary deposits near [redacted].

There is a clear distinction in the lithology og the fill above and below about 10 to 13 fbs behind the 1916 concrete gravity seawall and the later timber relieving platform seawall. Updated three-dimensional models of the historic fill within the APE exhibit the major differences between the northern and southern APE (Figure 5-32). In general, both the northern and southern fill do not exhibit a higher degree of vertical variability after the deposits become subaerial. The absence of a shift in vertical variability from sub-tidal to subaerial fill may be because seawall construction began just as the fill in the APE became subaerial. The higher degree of vertical variability in the southern APE fill surrounding what was once Yesler's Mill may be evidence that the quick development there superceded seawall construction and the area was supra-tidal before seawall construction began.

To the south, the fill above 10 fbs consists mainly of "dirty" Sand and Undifferentiated Fill units below Concrete or Asphalt layers. These units overlie sets of Wood, Sawdust, and Lumber units interbedded with Sedimentary and Undifferentiated Fills. Other than the Sedimentary Fill, Undifferentiated Fill, and sets of Wood, Sawdust and Lumber units, there are just a few thin beds of Cinders south of Madison Street below about 10 fbs. North of Madison Street, the upper approximately 13 fbs usually contains thick Gravel units below the Concrete that is ubiquitous across the surface of the entire APE. Sand and Silt units are below the Gravel deposits. In Zone 3, the Sand and Silt deposits are replaced with sets of Cinders and Charcoal units interbedded with Sedimentary Fill and some Wood. Other than the Sedimentary Fill, Wood, and sets of Cinders and Charcoal units, there are just a few thin beds of Undifferentiated Fill, Concrete, and Brick north of Madison Street below about 13 fbs. In general, the historic fill north of Madison Street exhibits less vertical and horizontal variability compared to the fill to the south.

The foot of Bell Street is the location of a slight exception to the typical fill sequencing. Here, a double-walled bulkhead using concrete sheet pile tied with steel rods was built in 1914 for the Bell Street Terminal. Each end of this existing structure was fit with a timber pile-supported cellular concrete frame to match up with the northern seawall during its construction 20 years later. The fill at Bell Street in Zone 5 contains more Silt units and a higher degree of vertical variability than compared to the fill behind the remainder of the northern seawall. Thick Clay deposits were also recorded in the geotechnical cores drilled just north of Bell Street.

Regrade spoils differ from hydraulic spoils based on how they were processed. Hydraulic fill used water to loosen and move sediment, and regrading used excavators to remove and transport fill. Most of the hydraulic fill identified in the APE was recorded as relatively thick Sand units, although a few cores contained thin Silt units also attributed to sluicing-type activities. The hydraulic-fill deposits generally thicken to the north, especially in Zone 5. Materials found within samples of hydraulic fill were predominantly shell, small milled wood fragments, and small brick fragments. A single piece of flat glass, a small bottle fragment, two pieces of metal strapping, two pieces of granite, and two pieces of fabric were also present. These materials are probably the result of debris transported within spoils to the waterfront. Relatively homogeneous regrade spoils were also common throughout the APE.

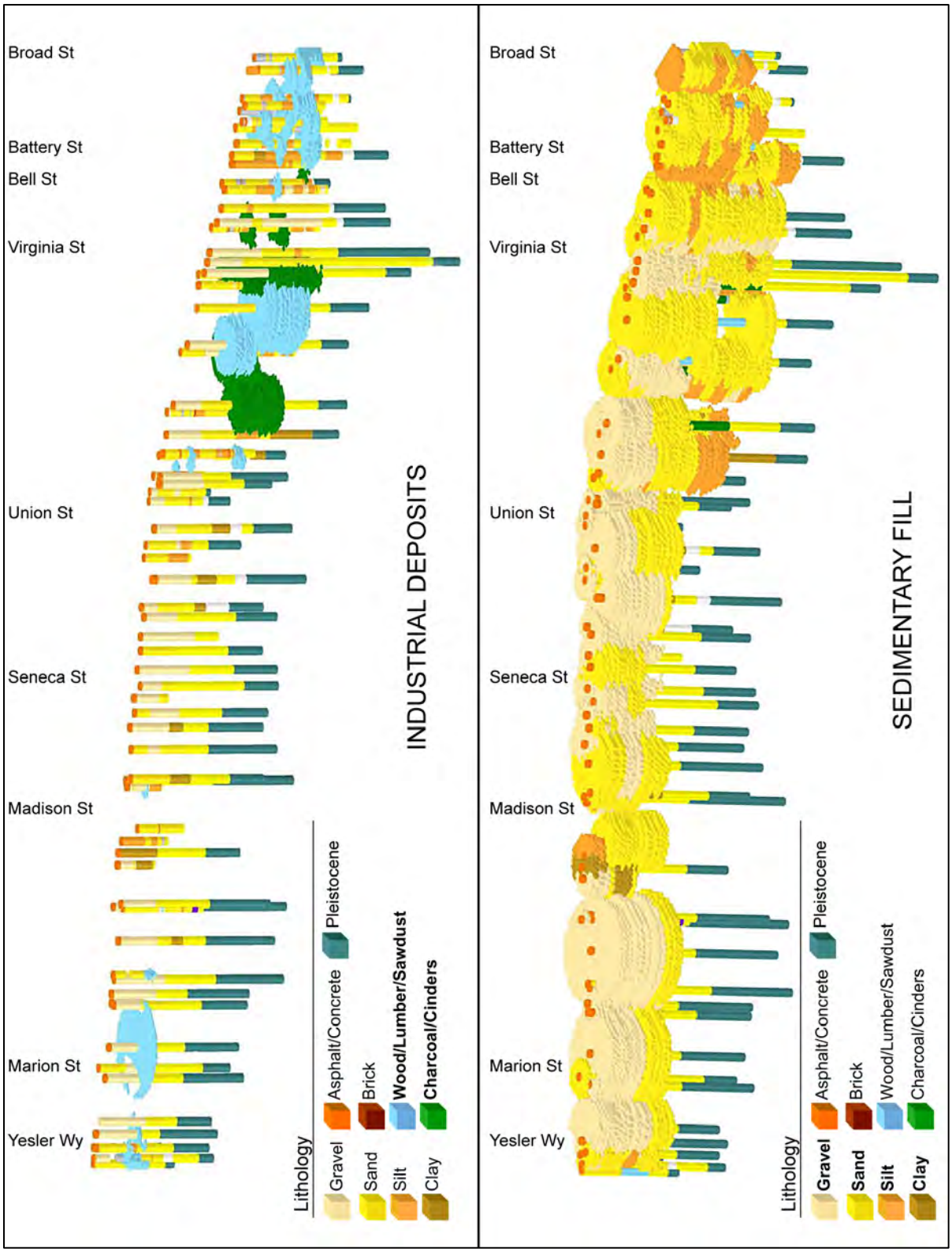

Figure 5-32. Three-dimensional model of the Industrial Deposits and Sedimentary Fill recorded along the seawall.

Samples of regrade spoils yielded milled wood and a turned bottle (ca. 1850–1915), cut rubber, brick and flat glass, and the main spring of a .38 Colt automatic (ca. 1902). The two datable artifacts recovered in the regrade spoils suggest that the regrade material is from the First or Second Avenue regrade projects that took place from between 1898 and 1903 (Lange 1999). No particular sequencing was identified from the distribution of the hydraulic fill or regrade spoils, which lack integrity and association.

5.1.2.3.3 Research Domains

The five historic research domains developed for the AWVSRP research design provide a framework for interpreting the historical materials identified in the APE (Miss et al. 2007a). Three of the five research domains—industry and manufacturing, commerce and trade, and residential and social themes—were well represented in the APE.

Industry and Manufacturing

Evidence of early industry and manufacturing was encountered throughout the southern part of the APE. Evidence of Yesler's Mill comes from lumber pencils, one of which was recovered in a dense wood deposit associated with work at the mill, alongside sawdust deposits, small pieces of bottle glass, some anthracite coal, an electrical insulator, and red brick fragments that are evidence of the ancillary facilities at the mill such as the cookhouse and general store. A brass shaving was recovered in [redacted]. Sanborn maps show the Schwabacher Bros. & Co. Wharf at this location from 1888–1905, and the shaving may have been produced from any number of machining processes. Pieces of milled wood, hand-manufactured bottle fragments, sewer pipe, brick pieces, a crock shard, and flat (window) glass, which may be a remnant of a building on the wharf, were found with the shaving. These deposits retain integrity and are associated with the first industry in Seattle. Coal was recovered in Zones 2 and 4 in small quantities that are not of sufficient quantity to represent a stockpile. These small deposits could be the result of tidying up shops and sweeping debris into the water. Brick, ceramic tile, flat glass, a lumber pencil, nails, and an unknown ceramic vessel shard were identified in fill at the Colman Dock, and milled wood, a piece of slag, and a peanut shell were found within regrade spoils in Zone 2 near a Coal Bunker that was on the Fire Boat Slip. Other brick and glass debris were found near The Harbor Master's Pier and the White Star Dock in Zone 3, the Seattle Coal and Transport Dock and the Columbia Canning Company in Zone 4, and the Arlington Dock in Zones 3 and 4. There is potential to encounter additional industry- and manufacturing-related artifacts in fill [redacted] where docks and wharves have protected artifacts and materials that were either intentionally or accidentally deposited under the structures, such as at Stone and Barnett's Wharf, Ocean Dock and Colman Dock. Several core locations proposed for this area had to be abandoned during the course of the project to avoid impacting the existing structural sidewalk.

Commerce and Trade

Cultural materials relating to themes of commerce and trade were identified in the APE. When first settled, British presence in the region was strong and supply was through Victoria or Fort Vancouver. Dependence on American goods shipped into Seattle to be distributed increased through time, especially after settlement of the border in 1846. No materials dating to British trade routes were

recovered in the EBSP cores. Instead, the collected artifacts illustrate Seattle's participation in the market economy, including patent medicines, cosmetics and foodstuffs. For example, identification of patent medicines such as Lydia E. Pinkham's Vegetable Compound and nationally-advertised cosmetics including Pond's Cold Cream and Lanman & Murray's Florida Water demonstrates how the public participated in mass consumption instead of relying on local products. A second example is the peanut shell and a pig bone that were found at the Fill and Holocene interface in Zone 2. The recovery of these items in the upper-Holocene sediments represents the introduction of Euroamerican foodstuffs during the ethnohistoric period. Stable intertidal surfaces, such as at [redacted], harbor potential for additional commercial and trade-related materials associated with the ethnohistoric period and the first Euroamericans to settle Seattle.

Residential and Social

Artifacts associated with residential and social activities were recovered during coring, but the numbers of residential and social-related cultural materials were far fewer than those related to industry, manufacturing, commerce, and trade. This is a direct result of the APE being located along a railroad right-of-way that provided access to industrial and transportation facilities as opposed to a residential neighborhood. Three product-identifiable bottles were recovered, including a bottle of Murray & Lanman's Florida Water, Lydia E. Pinkham's Vegetable Compound, and Pond's Cold Cream. The Florida Water was a common, unisex perfume that is still manufactured today and cannot be ascribed to a particular racial, social or ethnic group (Fike 1987:244). The product underwent an aggressive marketing campaign during the late 1800s, from when the bottle is likely to date. The Vegetable Compound was produced between 1873 and 1906 and, based on popular advertisements, the Pond's jar likely dates to the 1920s (Fike 1987:85). The Florida Water and Vegetable Compound were recovered in a Cinders deposit associated with the 1889 fire in Zone 3. Therefore, they are not likely reflective of localized activity. Barnacles, clams, mussels, crab, scallops and Olympia oyster shells were found in Zone 5. These species do not naturally exist in the same environment and indicate human consumption. A common red brick was found in the same sample as the shellfish, and a piece of a terra-cotta crock encountered between [redacted] indicates that the shellfish are a result of Euroamerican or ethnographic rather than pre-contact Native American consumption since filling activities had begun before the shellfish were discarded.

The highest potential for encountering early historic and ethnohistoric residential and social materials is where comparatively dense artifact concentrations were found near Ballast Island between 10 and 18 fbs and on the sawdust fill near Yesler's Mill between [redacted]. Sonicores that encountered a stable intertidal surface, such as [redacted], also harbor potential for additional residential and social-related materials associated with the ethnohistoric period and the first Euroamericans to settle Seattle. These specific deposits will be discussed further in Section 5.1.3.3.4.

Government, Infrastructure, and Transportation

Fewer cultural materials relating to government, infrastructure, and transportation themes were identified in the APE. Historical government services included the installation of utilities, filling of the waterfront, and maintenance of the tide-flat area. Utilities along the APE included wooden sewer and water lines, power and telephone poles, sidewalks, and curbs. These structural remains, though interesting, are not significant archaeological materials because their lack of context. Their relationship to the overall expansion and operation of business and residency of the waterfront is important. For example, the municipal provision of utility services and the progression of their design may be able to shed further light on development of the waterfront. Evidence of infrastructure improvements in the sonicores include the electrical insulators found in Zones 1 and 2, in-situ sewer pipe identified in Zone 2, fragments of sewer pipe in Zones 3 and 4, and tie-rods in Zone 6. Material evidence of transportation networks were pieces of disked wood representing Railroad Avenue and old docks and wharves including Yesler's Wharf in Zones 1 and 2, the Colman Dock in Zone 2, and a boat building wharf in Zone 6.

Specific deposits relating the industry, manufacturing, commerce, trade, residential, and social themes in the APE all have potential for significant cultural materials based on three particular preservation and formation scenarios. The first includes the early presence of docks and wharves [redacted] that may have protected artifacts and materials associated with Industry and Manufacturing that were either intentionally or accidentally deposited under the structures, such as Stone and Barnett's Wharf, Ocean Dock and Colman Dock. The second situation relates to Commercial and Trade-related artifacts that are likely to be encountered on stable intertidal surfaces such as those found at [redacted]. These surfaces are archaeologically important because they harbor potential for Commercial and Trade-related materials associated with the ethnohistoric period and earliest period of the settlement of Seattle. Third, Ballast Island and the sawdust fill near Yesler's Mill in the [redacted] provide the highest potential for encountering early historic and ethnohistoric residential and social materials. Additionally, those stable intertidal surfaces mentioned above also have potential for residential and social-related materials associated with the ethnohistoric period and the first Euroamericans to settle Seattle.

5.1.2.3.4 Potential for Archaeological Resources in the APE

Pre-contact archaeological resources were not identified in the APE during geoarchaeological field investigation, but historical cultural resources were found. Potential for yet undiscovered identifiable pre-contact cultural resources is generally limited to beach berm and backshore deposits buried below the fill and is relatively low in the APE. Potential for significant cultural materials in the fill is more complex.

The geoarchaeological sonicoring has helped to formulate expectations about archaeological data types within the fill in the APE and is complemented by the historic research. Five areas along the seawall have higher potential for yielding significant cultural materials based on the lithostratigraphic framework defined in the existing borings and new sonicores, the identified cultural materials, the known activities that occurred, and the post-depositional histories of those locations. Table 5-9 describes the five

settings with potential for significant cultural materials in the APE. They are industrial deposits, supra-tidal fill surfaces, historic beaches, well-preserved boundaries between the fill and Holocene strata, and buried beach settings. Although no archaeological properties were identified during the sonicoring, the five contexts deemed to have potential for significant cultural materials should be considered during any future identification efforts.

TABLE 5-9. SETTINGS WITH POTENTIAL FOR SIGNIFICANT CULTURAL MATERIALS.

Setting	Reasoning
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Interbedded industrial deposit settings are common within the fill of Zones 1, 2 and 3. The first area with potential for buried cultural materials in the APE consists of the highly-stratified fill [redacted]. Here, the fill is expected to contain remnants of early historic industry and manufacturing, transportation, and commerce and trade. Cinders and Charcoal layers commonly found interbedded between [redacted] also represent an area with potential for significant cultural materials dating to the 1889 fire. The Cinders and Charcoal deposits are discrete and contain diagnostic artifacts. At [redacted], the top of the Cinders unit was supra-tidally deposited so that it created a surface that may have been utilized after the fire cleanup was complete. Although no melted items were recovered within the Cinders, there is potential for them to exist within this deposit. Where the fill is not dominated by interbedded industrial deposits, supra-tidal surfaces are settings with other areas that have potential for cultural materials. For example, Ballast Island, shown in Zone 1 just west of the beach [redacted] on historic maps as early as 1881, was identified in previously drilled sonicores between about [redacted]. Another example is the diverse shellfish indicative of Euroamerican consumption that were recovered from a supra-tidal surface in the Zone 5 fill between [redacted]. The character of this deposit suggests other evidence of commercial or residential food preparation may also exist in the vicinity.

Historic beaches and intertidal surfaces at the boundary between the fill and the Holocene strata are common in Zones 1, 2, and 4. A stable intertidal surface at the base of the fill at the [redacted] in Zone 4 has potential for cultural materials because the stratigraphic interface at about [redacted] represents an environment experiencing active deposition of sediment instead of an erosional

environment that is common along Puget Sound beach faces. The deposition in this area may be due to sluicing to form the Pike Street Hill Climb, longshore drift cells, a landslide, or foreshore topography. The natural beach deposits between [redacted] below the interface at the [redacted] also have potential for buried cultural materials. A second stable surface was identified at the base of the fill near [redacted] in Zones 1 and 2, but the fill that is directly east of the [redacted] was not tested due to the presence of a wide structural sidewalk. It is difficult to determine the probability for cultural materials associated with the stable intertidal surface that may extend to the west below the seawall.

Buried beaches also represent stable landform surfaces that would have been utilized by humans, so they are considered settings with potential for significant cultural materials. A buried-beach setting is between about [redacted] below the Zone 1 historic fill near [redacted]. Another buried beach was identified between [redacted] in Zone 3 between about [redacted]. The areas in buried beach settings have potential for historic, ethnographic, and pre-contact cultural materials, though erosion associated with Holocene sea-level rise tempers the risk of affecting intact properties.

5.1.2.3.5 Preservation Potential

The preservation potential of any cultural materials associated with the identified buried Holocene landforms is dependent on the specific sub-environment the cultural materials were deposited in and the particular depositional history of that exact location. For example, beaches were commonly occupied by Native Americans, but a high rate of beach erosion and reworking during the Holocene due to sea-level rise has often caused poor preservation of any sites within the buried beach deposits. A large earthquake occurred about A.D. 1100 in the Puget Lowland (Bucknam et al. 1992). Buried archaeological materials may be preserved within beach deposits if they were buried quickly after seismic subsidence, though wave base scour in the intertidal zone tempers the preservation potential. The burial of beach deposits by landslides also increases their preservation potential. Intertidal deposits that accumulate slowly over time in bedded fashion have high preservation potential, but unlike beaches, were not occupied by pre-contact people. Native Americans did use the tideflats for fishing, and weirs may be preserved. In general, the probability of encountering precontact archaeological properties in the EBSP APE is low.

Areas where cultural materials that pre-date the seawall may be expected to be preserved where docks have long been present (Figure 5-33). The docks along the waterfront were originally oriented perpendicular to the shoreline. As the city expanded, a waterfront plan was needed to allow for dredging and easier access to the shoreline. Many docks were demolished and new docks were constructed at an acute angle to the shoreline between 1905 and 1912. The water areas between the newly organized docks were then dredged. Therefore, portions of the project area that would not have been dredged during this re-orientation would presumably be where docks dating both prior to and after 1912 stood.

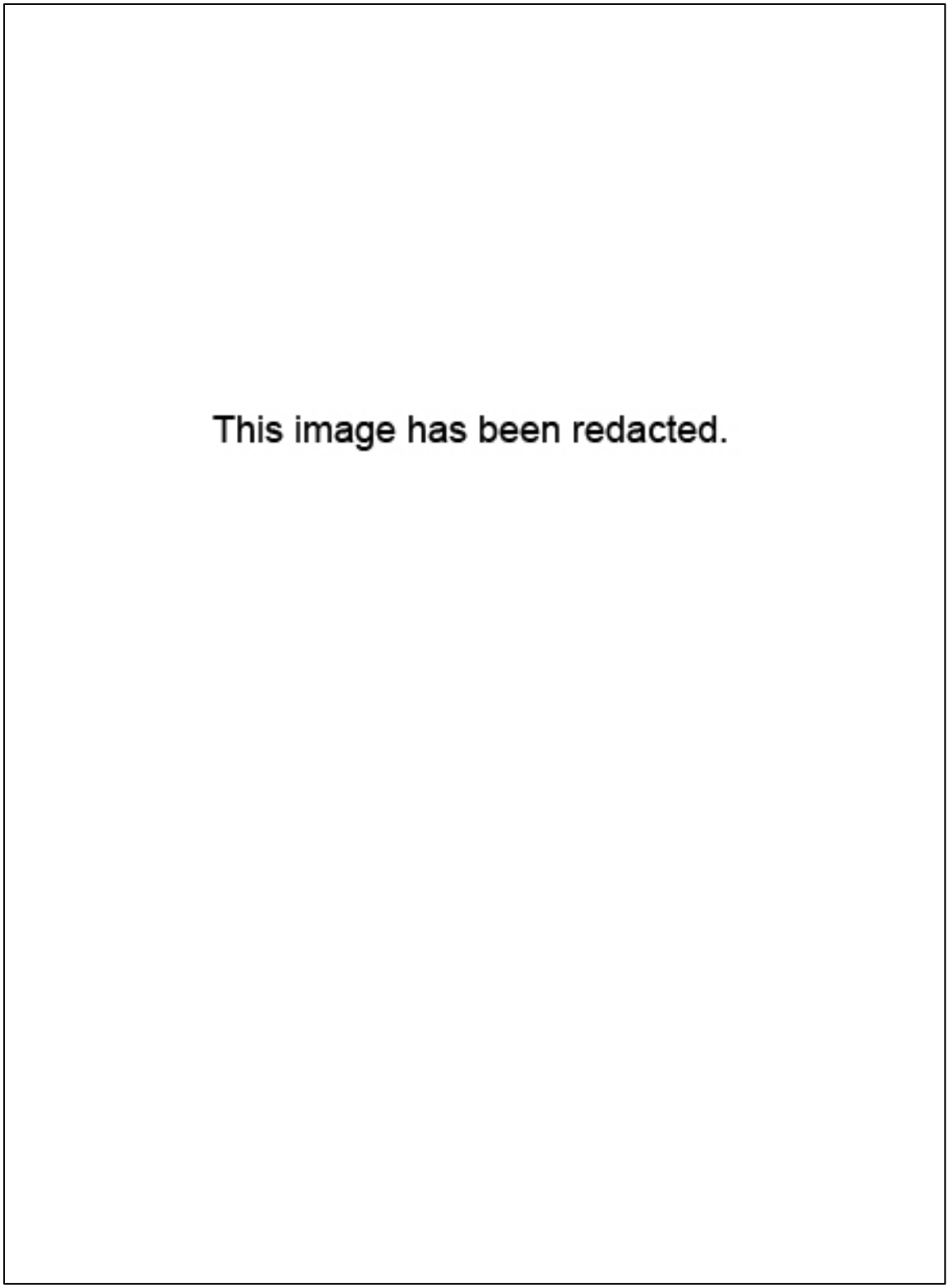

Figure 5-33. EBSP APE showing the overlap between 1894 and 1916 piers, as well as archaeological sites recorded during the underwater portion of EBSP fieldwork.

Five areas determined to have potential for significant cultural materials are located where piers of the 1894 and 1916 waterfronts overlapped. These are Ballast Island, the [redacted] These areas should be considered to have high preservation potential where not disturbed by construction of the existing seawall. A graphic representation of areas with high potential for buried cultural resources with good preservation potential is also below (Figure 5-34).

5.2 BUILT ENVIRONMENT RESOURCES

Multiple studies and reports were used to collect and refine information about historical buildings and structures in the EBSP APE. Of particular importance was the work performed previously for the AWVSRP and the AWVRP, including the Historic and Cultural Resource technical memoranda and discipline reports for the 2004 Draft EIS (Sheridan 2004), the 2006 Supplemental Draft EIS (Sheridan 2006) and the 2010 Supplemental Draft EIS (Miss and Sheridan 2010). The City's comprehensive survey of downtown properties (City of Seattle 2007–2008) was a major source of information for assessing the significance of previously recorded historical buildings and structures, as well as NRHP districts in the APE. Other useful documents were the City's context statement for the waterfront (Thomas Street History Service 2006) and the updated NRHP nomination for the Pioneer Square-Skid Road Historic District (Link 2007). Particularly important was an illustrated history of the waterfront (Dorpat 2006).

There are 32 historical buildings and structures and portions of two NRHP districts in the APE. Seven of these resources were updated as part of the EBSP (Appendix A). Table 5-10 and Figure 5-35 show the historical buildings and structures within the APE that were built in 1963 or earlier. Figure 5-35 also shows the two NRHP districts that are within and adjacent to the APE. Properties are listed generally from south to north and west to east. Eligibility for Seattle landmark designation is only an opinion; this can be confirmed only by the Seattle Landmarks Preservation Board.

5.3 TRADITIONAL CULTURAL PROPERTIES

There are no known traditional cultural properties (TCPs) within or immediately adjacent to the APE. Ethnographic, ethnohistoric, historical and other recent studies have discussed the occupation and use of the tidelands and surrounding area by Indian peoples (Miss and Sheridan 2010; Miss and Hodges 2007). The USACE continues to consult with the Suquamish Tribe and Muckleshoot Indian Tribe regarding potential TCPs and other issues. The City is also coordinating with these and other Tribes.

5.4 SUMMARY OF ARCHAEOLOGICAL RESOURCES

Access to cultural resources in the EBSP APE is restricted by depth, groundwater, existing infrastructure, utility and transportation-service requirements. Therefore, the identification of cultural resources within the proposed area of ground disturbance was addressed primarily through the geoarchaeological and geotechnical coring program and the two underwater archaeological surveys. As a result, three new archaeological sites and eight areas with potential for significant cultural resources were identified.

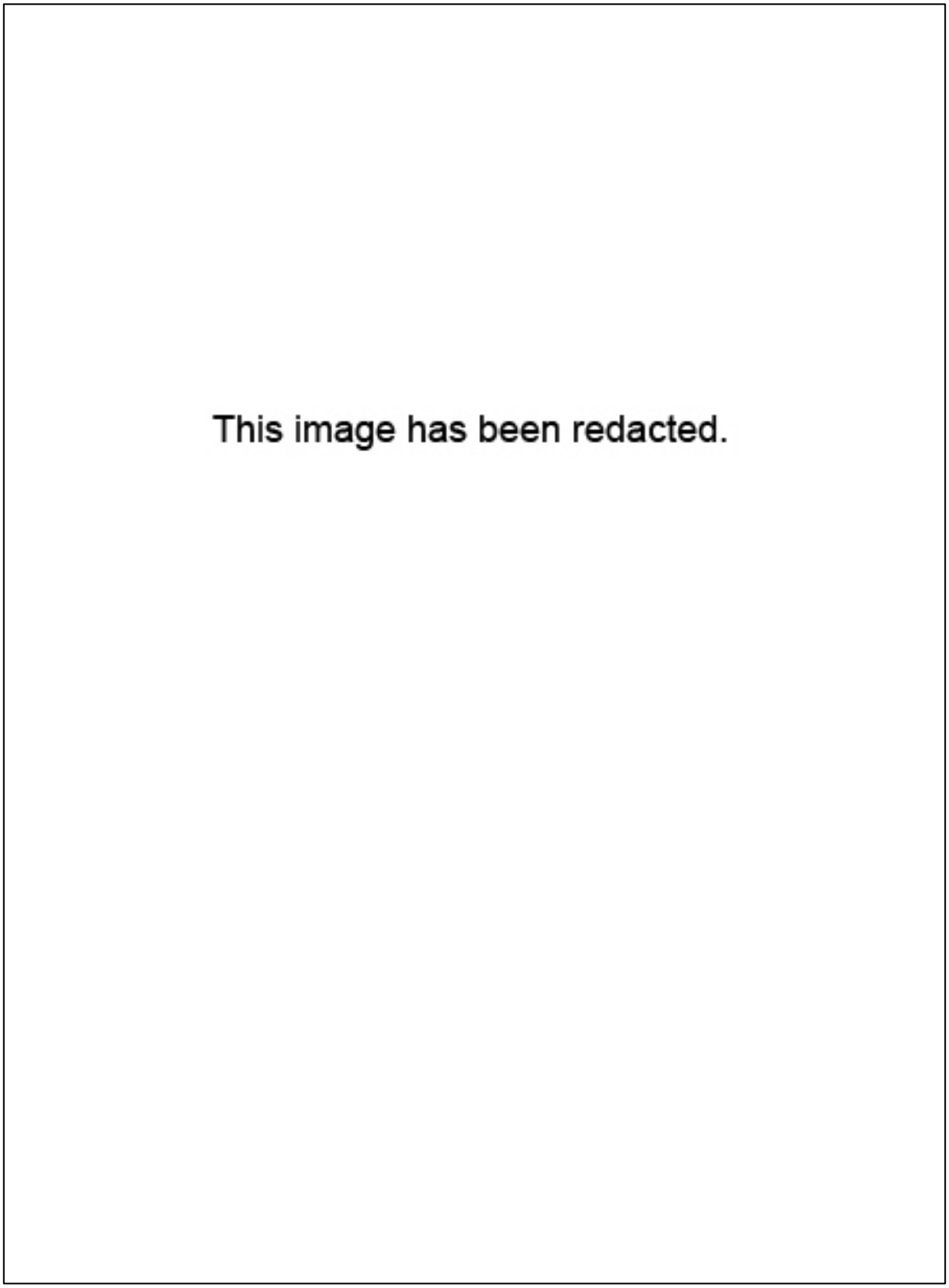

Figure 5-34. Areas with potential cultural resources (see Table 5-8).

TABLE 5-10. SURVEYED PROPERTIES WITHIN THE APE (ID KEYS TO FIGURE 5-36).

ID/ DAHP No.	Address	Current Name (Historic Name)	NRHP Status	Local Designation	WISAARD Survey Name /Date
H1/ 17-02219	Alaskan Way	Elliott Bay/Alaskan Way Seawall	Eligible NRHP (Holter 2009)	None	AWV Tunnel 2009
H2/ 17-02209	Alaskan Way/ Battery Street	Alaskan Way Viaduct and Battery Street Tunnel	Eligible NRHP (DAHP 2001)	None	HAER 2009
H3/ 17-06292	S. Main Street to Bell Street	Burlington Northern Railroad Tunnel (Great Northern Railway Tunnel)	Eligible NRHP (Holter 2009)	None	AWV Tunnel 2009
H4/ 45KI129	Foot of S. Washington Street	Washington Street Boat Landing Pergola	NRHP	PSPD	NA
H5	1 Yesler Way	One Yesler Building (Bedford Hotel)	PSHD	PSPD	PSHD 2004
H6	619 Western Avenue	Western Building	PSHD	PSPD	PSHD 2004
H7	61 Columbia Street	Polson Building	PSHD	PSPD	PSHD 2004
H8	801 Alaskan Way	Piers 52/53 (Colman Dock)	Not eligible (DAHP/ WISAARD 2005)	None	Seattle Multi-Modal Ferry Terminal 2005
H9	809 Western Avenue	Commuter Building Garage (Mutual Creamery)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H10	815 Western Avenue	Commuter Building (Turner and Pease/Carstens Building)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H11	925 Alaskan Way	Fire Station No. 5	Eligible NRHP (Holter 2009)	None	AWV Tunnel 2009
H12	911 Western Avenue	Maritime Building	Eligible NRHP (Holter 2009)	None	AWV Tunnel 2009
H13	1001 Alaskan Way	Pier 54 (Northern Pacific Railroad 3/Galbraith Dock)	Eligible NRHP (Holter 2009)	SL	AWV Tunnel 2009
H14	1101 Alaskan Way	Pier 55 (Northern Pacific Railroad 4/Arlington Dock)	Eligible NRHP (Holter 2009)	SL	AWV Tunnel 2009

ID/ DAHP No.	Address	Current Name (Historic Name)	NRHP Status	Local Designation	WISAARD Survey Name /Date
H15	1201 Alaskan Way	Pier 56 (Frank Waterhouse Dock)	Eligible NRHP (Holter 2009)	SL	AWV Tunnel 2009
H16	1203-1207 Western Avenue	(Olympic Warehouse)	NRHP	SL	NA
H17	51 University Street	Pacific Net and Twine (Pacific Marine Supply)	Eligible NRHP (Holter 2009)	SL	AWV Tunnel 2009
H18	1301 Alaskan Way	Pier 57 (John P. Agen's Dock/ Milwaukee Dock)	Eligible NRHP (Holter 2009)	SL	AWV Tunnel 2009
H19	1319 Western Avenue	Seattle Steam (Mutual Light and Heating Company)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H20	55 Union Street	Shurgard Storage (Diamond Ice & Storage Company)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H21	1414 Alaskan Way	Market Square (Schwabacher Warehouse No. 2)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H22	1426 Alaskan Way	Bakun Building (A.C. Frye Company)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H23	1483 Alaskan Way	Pier 59/Seattle Aquarium (Pier 8/Ainsworth & Dunn Pike St. Wharf)	Not Eligible (Holter 2009)	SL	AWV Tunnel 2009
H24	1401 Western Avenue	Antique Warehouse (G.J. Callahan Warehouse)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H25	1501 Western Avenue	Madore Building (Frank L. Green Company)	Not eligible (Holter 2009)	None	AWV Tunnel 2009
H26	1507 Western Avenue	Fix Building	Eligible (Holter 2009)	Eligible SL	AWV Tunnel 2009
H27	Pike Place	Main Arcade Pike Place Market	PPMHD	PPMHD	NA
*H28	2411 Alaskan Way	Edgewater Hotel	Not eligible	None	Elliott Bay Seawall 2011 (attached)

ID/ DAHP No.	Address	Current Name (Historic Name)	NRHP Status	Local Designation	WISAARD Survey Name /Date
*H29	2501 Elliott Avenue/ 10 Wall Street	Mars Hill School (Skyway Luggage)	Not eligible	None	Elliott Bay Seawall 2011 (attached)
*H30	2501 Elliott Avenue/ 11 Vine Street	Vine Street Storage (Booth Fisheries)	Not eligible	None	Elliott Bay Seawall 2011 (attached)
*H31/ 17-02426	2611 Alaskan Way	Pier 69 Port of Seattle (American Can Company, Pier 69)	Not eligible	None	Elliott Bay Seawall 2011 (attached)
*H32	2601 Elliott Avenue	Real Networks (American Can Company)	Not eligible	None	Elliott Bay Seawall 2011 (attached)
*H33/ 17-02421	2801 Alaskan Way	Pier 70 (Pier 14/Ainsworth & Dunn Wharf)	Not eligible	None	Elliott Bay Seawall 2011 (attached)
*H34	2815 Elliott Avenue	Old Spaghetti Factory (Ainsworth & Dunn)	Eligible NRHP	None	Elliott Bay Seawall 2011 (attached)

Notes: NRHP – National Register of Historic Places; PPMHD – Pike Place Market Historic District;
PSHD – Pioneer Square Historic District; PSPD – Pioneer Square Preservation District (local); SL – Seattle landmark
*Updated during the Elliott Bay Seawall Project.

Figure 5-35. Historic properties within the APE (number keys to Table 5-10).

5.4.1 Recorded Archaeological Sites

Eight archaeological sites are in the EBSP APE and three of them were documented during this study. Table 5-11 summarizes the sites, showing that three are recommended eligible for the NRHP. The eligible sites will be discussed further in Chapter 6 - Assessment of Effects.

TABLE 5-11. NRHP SUMMARY OF IDENTIFIED ARCHAEOLOGICAL SITES IN THE EBSP APE.

Site No.	Description	NRHP Status
45KI456	Baba'kwob Site: midden, human remains, trade beads	Recommended not eligible
45KI482	[redacted] Site: historical debris	Not evaluated
45KI1011	[redacted] Submerged Debris Scatter	Recommended eligible
45KI1012	[redacted] Site	Recommended eligible
45KI1013	[redacted]bmerged Historic Scatter	Recommended eligible
45KI1084	Wood Wall under the [redacted]	Recommended not eligible
45KI1085	Concrete Wall	Recommended not eligible
45KI1099	[redacted] Submerged Historic Debris Scatter	Recommended not eligible

5.4.2 Potential for Undiscovered Archaeological Sites

Data from geoarchaeological and geotechnical coring are well suited to the identification of landforms and sediments that may host archaeological sites, including buried beaches, intertidal zones and surfaces within fill. The geoarchaeological sonicores completed for this project have allowed for further refinement of eight areas where there is potential for significant pre-contact or historic archaeological material in the APE that are listed in Table 5-12 (Rinck 2011, Rinck and Valentino 2012). The sonicores were useful to narrow both the vertical and horizontal areas with potential for significant archaeological material as well as verifying that the remainder of the APE has low potential for buried cultural material.

TABLE 5-12. AREAS WITH POTENTIAL CULTURAL RESOURCES WHERE EFFECTS MIGHT OCCUR.

Area	Potential Resource	Expected Depth
[redacted]	Historical cultural materials related to early industry, manufacturing, transportation, commerce, and trade	[redacted]
[redacted]	Ethnographic cultural materials	[redacted]
[redacted]	Pre-contact cultural materials	[redacted]

Area	Potential Resource	Expected Depth
[redacted]	Historic cultural materials related to commerce and trade	[redacted]
[redacted]	Pre-contact cultural materials	[redacted]
[redacted]	Discrete deposits and diagnostic artifacts	[redacted]
[redacted]	Early historic cultural materials related to commerce and trade, as well as Pre-contact cultural materials	[redacted]
[redacted]	Historical cultural materials related to commercial or residential food preparation	[redacted]

Ballast Island near the [redacted] in Zone 1 was identified at relatively shallow depths between [redacted] in previously-drilled sonicores completed at the south end of the APE (Huber et al. 2010). Ballast from vessels was unloaded in this location beginning in the 1870s and soon was so thick that it became known as Ballast Island. It was a popular stopping point for many Indians of the region. Although no evidence of occupation was encountered in cores drilled in the vicinity of Ballast Island, a high probability remains for encountering such evidence.

In Zone 3, three sonicores drilled for the geoarchaeological study encountered layers of cinders and charcoal. At the [redacted] there was a large coal bunker for the Seattle Coal and Iron Company constructed some time after the 1889 fire. Additionally, a dock for the Alaska steamship service, the White Star Line, was at the foot of [redacted] until its collapse in 1901. The cinders and charcoal could have been deposited from boiler cleaning of ships docking at the White Star dock, from the Seattle Coal and Iron Company, or from the trains which passed along Railroad Avenue.

Sonicores also encountered several areas within the EBSP APE where native Holocene and early historic beach sediments are present: in Zone 1, buried beach deposits were encountered beneath the historic fill at [redacted]; and, at the north end of Zone 2, a stable historic shoreline was noted at [redacted]. Buried beach deposits were identified [redacted] in Zone 3, and a stable intertidal surface and underlying natural beach was identified at the base of the historic fill at the [redacted] in Zone 4. Although no archaeological properties were identified in association with these landforms, there is still potential for undiscovered significant cultural materials to be present in those areas.

In general, the project area south of Madison Street has more stratified historic fill, suggesting a punctuated and rapid historic development. The data also suggests that the south end of the project (primarily in Zones 1, 2 and 3) has more potential for significant cultural materials than the north end of the APE.

CHAPTER 6. ASSESSMENT OF EFFECTS AND MITIGATION

There are three archaeological sites and 18 buildings and structures in the EBSP APE that are listed in or eligible for listing in the NRHP (see Tables 6-1 and 6-2, and Figure 6-1). The project will have an effect on these historic properties if it changes the characteristics that qualify the historic properties for inclusion in the NRHP. The effect is adverse if it diminishes the integrity of such characteristics. Alterations to a significant building, structure, or historic district's location or setting were analyzed using the Secretary of the Interior's Standards for Historic Rehabilitation to determine the degree to which the alterations would affect the resources historic significance.

To determine the direct and indirect construction effects on historic properties, the type, extent (length of time and area) and intensity of temporary effects (such as reduced access) caused by the project were identified. The extent to which they could affect the condition of the historic properties was analyzed based on experience with previous activities and events that have caused similar effects. Specific project alternatives are summarized in Chapter 1. In general, however, effects to historic properties from Alternatives A, B and C are similar and are addressed in more detail below.

TABLE 6-1. EFFECTS ON ARCHAEOLOGICAL SITES WITHIN THE APE.

Site No.	Description	NRHP Eligibility	Effect Alternative A	Effect Alternative B	Effect Alternative C (Preferred Alternative)
45KI456	Baba'kwob Site: midden, human remains, trade beads	Recommended not eligible	No effect	No effect	No effect
45KI482	[redacted] Site: historical debris	Not evaluated	No effect	No effect	No effect
45KI1011	[redacted] Submerged Debris Scatter	Recommended eligible	No adverse effect	No adverse effect	No adverse effect
45KI1012	[redacted] Site	Recommended eligible	Adverse effect	Adverse effect	Adverse effect
45KI1013	[redacted] Submerged Historic Scatter	Recommended eligible	Adverse effect	Adverse effect	Adverse effect
45KI1084	Wood Wall under the [redacted]	Recommended not eligible	No effect	No effect	No effect
45KI1085	Concrete Wall	Recommended not eligible	No effect	No effect	No effect
45KI1099	[redacted] Historic Debris Scatter	Recommended not eligible	No effect	No effect	No effect

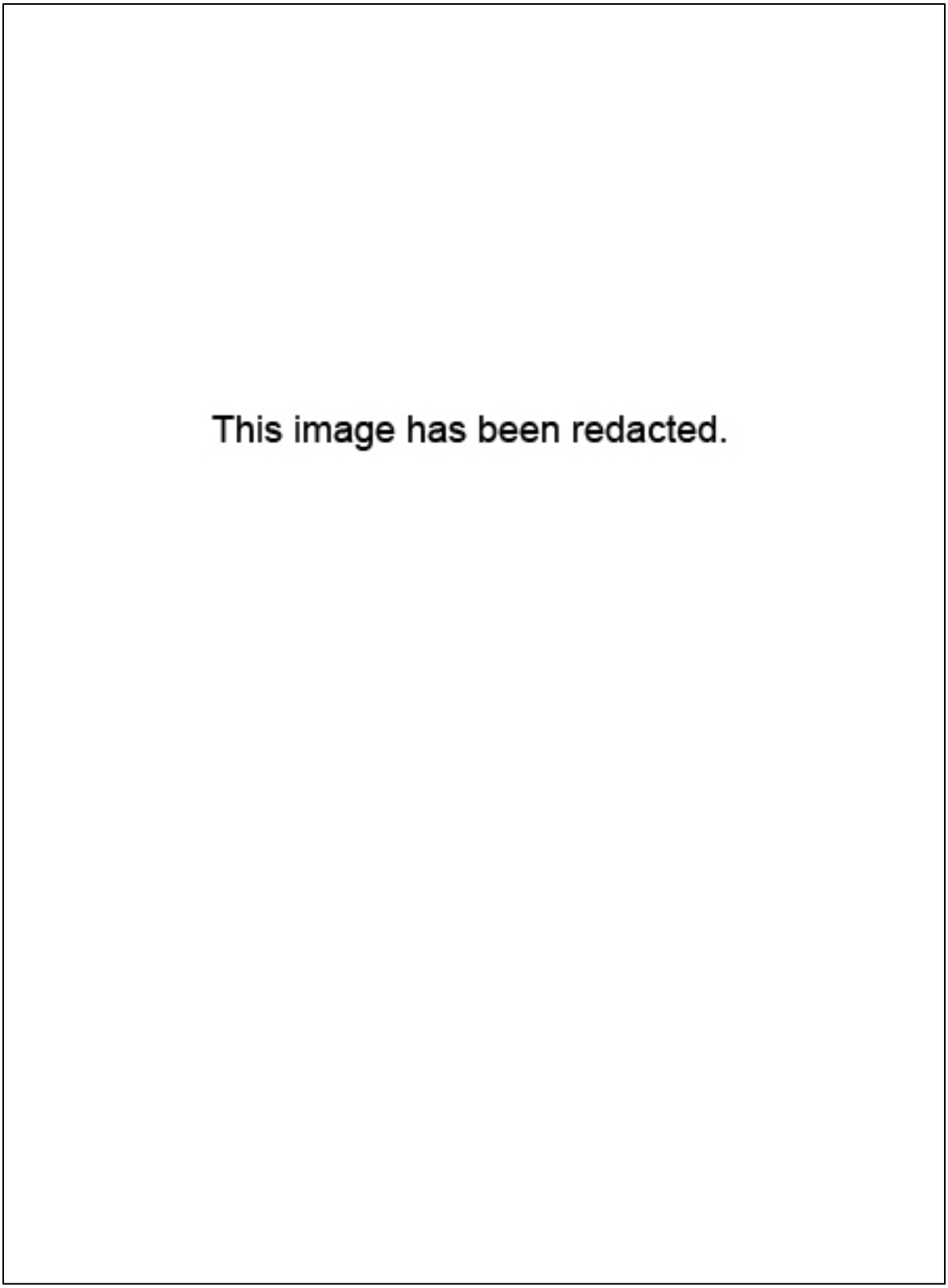

Figure 6-1. Significant historical buildings and structures and potentially eligible archaeological sites within the project APE.

TABLE 6-2. EFFECTS ON HISTORIC PROPERTIES WITHIN THE APE (ID KEYS TO FIGURE 6-1).

ID	Address	Current Name (Historic Name)	Historic Designation	Effect Alternative A	Effect Alternative B	Effect Alternative C (Preferred Alternative)
H1	Alaskan Way	Elliott Bay Seawall	Eligible NRHP	Partially demolished; Adverse effect	Partially demolished; Adverse effect	Partially demolished; Adverse effect
H2	Alaskan Way/Battery Street	Alaskan Way Viaduct and Battery Street Tunnel	Eligible NRHP	No adverse effect	No adverse effect	No adverse effect
H3	S. Main Street to Bell Street	Burlington Northern Railroad Tunnel (Great Northern Railway Tunnel)	Eligible NRHP	No adverse effect	No adverse effect	No adverse effect
H4	Foot of S. Washington Street	Washington Street Boat Landing Pergola	NRHP, PSPD	Removed during construction; Adverse effect	Removed during construction; Adverse effect	Removed during construction; Adverse effect
H5	1 Yesler Way	One Yesler Building (Bedford Hotel)	PSHD, PSPD	No adverse effect	No adverse effect	No adverse effect
H6	619 Western Avenue	Western Building	PSHD, PSPD	No adverse effect	No adverse effect	No adverse effect
H7	61 Columbia Street	Polson Building	PSHD, PSPD	No adverse effect	No adverse effect	No adverse effect
H11	925 Alaskan Way	Fire Station No. 5	Eligible NRHP and SL	No adverse effect	No adverse effect	No adverse effect
H12	911 Western Avenue	Maritime Building	Eligible NRHP	No adverse effect	No adverse effect	No adverse effect
H13	1001 Alaskan Way	Pier 54 (Northern Pacific Railroad 3/ Galbraith Dock)	SL; eligible NRHP	No adverse effect	No adverse effect	No adverse effect
H14	1101 Alaskan Way	Pier 55 (Northern Pacific Railroad 4/ Arlington Dock)	SL; eligible NRHP	No adverse effect	No adverse effect	No adverse effect
H15	1201 Alaskan Way	Pier 56 (Frank	SL; eligible	No adverse	No adverse	No adverse

ID	Address	Current Name (Historic Name)	Historic Designation	Effect Alternative A	Effect Alternative B	Effect Alternative C (Preferred Alternative)
		Waterhouse House)	NRHP	effect	effect	effect
H16	1203-1207 Western Avenue	(Olympic Warehouse)	NRHP; SL	No adverse effect	No adverse effect	No adverse effect
H17	51 University Street	(Pacific Net and Twine Building)	SL; eligible NRHP	No adverse effect	No adverse effect	No adverse effect
H18	1301 Alaskan Way	Pier 57 (John P. Agen's/ Milwaukee Dock)	SL; eligible NRHP	No adverse effect	No adverse effect	No adverse effect
H23	1483 Alaskan Way	Pier 59/Seattle Aquarium (Ainsworth & Dunn Pike St. Wharf)	SL	No adverse effect	No adverse effect	No adverse effect
H26	1507 Western Avenue	Fix Building	Eligible NRHP and SL	No adverse effect	No adverse effect	No adverse effect
H27	Pike Place	Main Arcade Pike Place Market	PPMHD	No adverse effect	No adverse effect	No adverse effect
H34	2800 Elliott Avenue	Old Spaghetti Factory (Ainsworth & Dunn)	Eligible NRHP and SL	No adverse effect	No adverse effect	No adverse effect

Notes: NRHP = National Register of Historic Places; PPMHD = Pike Place Market Historic District; PSHD = Pioneer Square Historic District; PSPD = Pioneer Square Preservation District (local); SL = Seattle landmark

6.1 ARCHAEOLOGICAL RESOURCES EFFECTS

Pre-contact, ethnohistoric and historical archaeological resources could be directly affected by construction, including removal, reconstruction, or construction of the seawall, utility relocations, as well as construction related to habitat restoration and access improvements. Any near-surface ground disturbance affecting Holocene-aged sediments and historical fill deposits has the potential to damage archaeological resources.

To determine the effects on archaeological resources, the construction locations and methods were evaluated in context with known or potential archaeological resources. Existing information from historical shoreline mapping and prior subsurface explorations, as well as new data from the two underwater archaeological surveys and sonicores/geoprobes were used to evaluate whether project elements have the potential to affect archaeological resources. This included an assessment of proposed

soil improvements, seawall removal, new seawall construction, and related shoreline improvements and habitat restoration activities.

6.1.1 No Action Alternative

Under Section 106, the no action alternative is not an understaking, however, it is considered under NEPA and SEPA. There are three scernarios considered for the EBSP no action alternative:

Scenario 1: Minimal Damage: Under this scenario, site 45KI1011 would not be affected by continued maintenance repair of the seawall. Sites 45KI1012 and 45KI1013 would not be affected if repair and maintenaice activites avoid these areas. Landward repairs of the seawall, primarily collapse of sidewalks, should not affect archaeological resources since this usually occurs above the 1930s seawall relieving platform.

Scenario 2: Loss of Functionality: This scenario would involve greater damage to the seawall and, potentially, to the waterfront piers. Repairs to piers would impact underwater archaeological sites 45KI1011, 45KI1012, and 45KI1013 if they take place near these resources. Collapse of the piers would adversely effect these sites. Repair or replacement of part or all of the seawall, under this scenario, would adversely affect 45KI1012 and 45KI1013 and possibly 45KI1011, if activities occur these sites.

Scenario 3: Collapse of the Seawall: The impacts to archaeological resources from the collapse of the seawall are similar to those described in Scenario 2, only more profound. Loss of the seawall and damage or collapse of the piers would adversely affect underwater archaeological sites 45KI1011, 45KI1012, and 45KI1013. The collapse of the seawall would also adversely affect any archaeological sites that are preserved in historic fill behind the seawall, in particular sites associated with Yesler's Wharf and Ballast Island in Zone 1. Construction of a new seawall would adversely affect the underwater archaeolgicla sites if actiivties occur near these resources and could adversely affect landward of the seawall if significant resources are identified.

6.1.2 Alternative A

Construction of Alternative A involves ground disturbance up to 60 fbs and moving the face of the seawall up to 15 feet landward (Zone 2) and 3 feet waterward (Zone 3) of the existing wall face. Other project activities extend up 60 feet landward and as much as 350 feet waterward of the existing seawall.

Construction of Alternative A should not adversely affect site 45KI1011. However, this alternative would have an adverse affect on archaeological sites 45KI1012 and 45KI1013 (Figure 6-1, Table 6-1), primarily from construction activities that extend into the water, including habitat restoration. These activities also include installation of a containment wall and pilings to support the new cantilevered sidewalk, removal of rip-rap along the base of the existing seawall face, removal of the existing seawall, and construction of the new seawall. Habitat improvements that would affect sites 45KI1012 and 45KIKI1013 include addition of material (gravel, shell hash, and habitat benches) to the sea floor.

Soil stabilization landward of the new seawall would adversely affect archaeological resources within and beneath the historic fill if these resources are present, intact, and eligible for the NRHP. In particular, the fill in the vicinity of the historic Yesler's Wharf contained evidence of wharf activity

between 10 and 48 fbs, and Ballast Island sediments were identified between 10 and 18 fbs at the foot of S. Washington and S. Main Streets. Similarly, cinder and charcoal deposits in Zone 3 possibly associated with the White Star Dock or Seattle Coal and Iron were encountered between 10 and 48 fbs. Native beach deposits in Zones 1, 2, 3, and 4, where potentially significant archaeological sites may be present, would be intersected by soil improvements that extend to 58 fbs.

Other landward activities that may adversely affect archaeological resources in Zones 1 and 2, where the gravity seawall is located, include utility relocation and other infrastructure improvements.

6.1.3 Alternative B

Construction of Alternative B includes ground disturbance up to 60 fbs and moving the face of the seawall up to 75 feet landward (Zone 3) of the existing face. Other project activities extend up to 130 feet landward and 300 feet waterward fo the existing seawall. In-water activities would include construction of confined substrate and habitat benches, and subtidal substrate enhancements.

As with Alternative A, construction of Alternative B should not adversely affect site 45KI1011, but would have an adverse effect on 45KI1012 and 45KI1013, primarily from activities that extend waterward of the existing seawall face. These activities include installation of a containment wall and pilings to support the new cantilevered sidewalk, removal of rip-rap along the base of the existing seawall face, removal of the existing seawall, and construction of the new seawall. Habitat improvements that would affect sites 45KI1012 and 45KIKI1013 include addition of material (gravel, shell hash, and habitat benches) to the sea floor.

Soil stabilization landward of the new seawall would adversely affect archaeological resources within and beneath the historic fill if these resources are present, intact, and eligible for the NRHP. Archaeological deposits associated with Yesler's Wharf and with Ballast Island in Zone 1 would be encountered, as would the cinder and charcoal deposits in Zone 3 and the native beach deposits in Zones 1, 2, 3 and 4. Other landward activities that may adversely affect archaeological resources in Zones 1 and 2, where the gravity seawall is located, include utility relocation and other infrastructure improvements.

6.1.4 Alternative C

Construction of Alternative C includes ground disturbance up to 60 fbs and moving the face of the seawall up to 15 feet landward (Zones 1, 2 and 3) of the existing face. Other project activities extend 100 feet landward and 300 feet waterward of the existing seawall face. Alternative C involves features from both Alternatives A and B, as described in Chapter 1, with construction methods similar to those proposed for Alternative A. As with Alternatives A and B, construction of Alternative C should not adversely affect 45KI1011, but would have an adverse effect on sites 45KI1011 and 45KI1013 from installation of the containment wall, removal of riprap, construction of the seawall, and installation of habitat improvements. Landward construction, primarily soil stabilization, would adversely affect archaeological resources within and beneath the historic fill if these resources are present, intact, and eligible for the NRHP. As in Alternatives A and B, Zone 1 (Yesler's Wharf and Ballast Island), Zone 3 (cinder and charcoal deposits), and Zones 1, 2, 3 and 4 (native beach deposits) are areas where

potentially significant archaeologically resources may be identified and adversely affected. Other landward activities that may adversely affect archaeological resources in Zones 1 and 2, where the gravity seawall is located, include utility relocation and other infrastructure improvements.

6.2 BUILT ENVIRONMENT EFFECTS

Two types of effects on historic properties of the built environment may occur during construction: (1) direct physical effects potentially caused by vibration; and, (2) more widespread effects due to noise, dust and mud, traffic congestion, construction traffic, loss of parking and limited access to buildings. These effects would occur to some degree in all locations where demolition or construction occurs. However, effects to historic properties are adverse under Section 106 only if they are so severe that they threaten the ability of the property owner to adequately maintain the property, thereby possibly leading to loss of the property or its significant features through deterioration. Construction effects such as noise and reduced access would affect users of historic buildings, but they would not be severe enough to be considered adverse; these effects are addressed in the Social Resources and Environmental Justice, Transportation, Air Quality, and Noise and Vibration and Economics Discipline Reports (SDOT 2012b, 2012c, 2012d, 2012e, and 2012f respectively).

The central waterfront, Pike Place Market area, and Pioneer Square depend on tourist and entertainment traffic, so even the perception of reduced access could have economic effects. Experience with the Nisqually earthquake showed that a prolonged period of traffic disruption and construction could potentially result in the loss of the distinctive character and economic base of historic neighborhoods. These results could occur if construction effects are severe enough that businesses and property owners would be unable to maintain economic viability of their businesses and maintain the buildings in good condition. This could lead to a loss of character-defining features of the buildings. Therefore, the project would minimize construction impacts by halting construction during the summer months (Memorial Day weekend through Labor Day weekend). This is also addressed in the Economics Discipline Report (SDOT 2012f).

Other efforts to minimize impacts during construction would include:

- Use BMPs to control noise, air pollution, dust and mud;
- Ensure continued access to businesses and residences; and
- Minimize disruptions of utility service.

6.2.1 No Action Alternative

As stated above, under Section 106, the no action alternative is not an understaking, however, it is considered under NEPA and SEPA. There are three scernarios considered for the EBSP no action alternative:

Scenario 1: Minimal Damage: No construction is proposed under this scenario and no effects are anticipated.

Scenario 2: Loss of Functionality: This scenario could potentially involve such significant damage to the seawall that it would be altered enough that it would no longer be eligible for listing in the NRHP; this

would be an adverse effect. If the seawall failure were to occur in immediate proximity to one or more of the historic properties adjacent to the seawall, there could potentially be an adverse effect to those properties as well.

Scenario 3: Collapse of the Seawall: Under this scenario the seawall would be so severely damaged that it would no longer be eligible for listing in the NRHP; this would be an adverse effect. The potential damage would be so great that the majority of historic properties within the APE would be vulnerable to suffering an adverse effect, depending on the exact location of the failure.

6.2.2 Alternative A

Construction of Alternative A would have an adverse effect on the Washington Street Boat Landing pergola, which would be removed for the duration of construction. The project includes restoration and replacement of the pergola in an appropriate location on the water at the foot of S. Washington Street. Restoration and relocation would be done in coordination with the Department of Neighborhoods Historic Preservation Program and would have the required Certificates of Approval from the Pioneer Square Preservation Board (SMC 23.66.115).

This alternative would also have an adverse impact on the existing seawall. Construction in the vicinity of the central waterfront piers (Piers 54 to 59) is not anticipated to cause damage to the piers because of the minimization efforts described above. Activities near the piers that are designated landmarks (Piers 54 through 59) would be reviewed as needed by the Seattle Landmarks Preservation Board under the City of Seattle Landmarks Preservation Ordinance (SMC 25.12), and would be done only with a Certificate of Approval if one is required. These activities include alterations to the piers or piersheds, alterations that contact the piers, and alterations to pier access or views of the piers. Activities adjacent to the historic piers would be reviewed by the City Historic Preservation Officer under the City's SEPA policies (SMC 25.05.675). Activities within the Waterfront Historic Character area would be reviewed as needed by the Seattle Landmarks Preservation Board under SMC 23.60.704. Activities in the Pioneer Square Preservation District would be reviewed and receive Certificates of Approval, as needed, from the Pioneer Square Preservation Board (SMC 23.66.115).

Other historic properties in the APE are at a greater distance from the construction activities and no damage to them is anticipated (Table 6-2, Figure 6-1).

6.2.3 Alternative B

Construction of Alternative B would have an adverse effect on the Washington Street Boat Landing pergola (similar to Alternative A), which would be removed for the duration of construction. The project includes restoration and replacement of the pergola in an appropriate location on the water at the foot of S. Washington Street. Restoration and relocation would be done in coordination with the Department of Neighborhoods Historic Preservation Program and would have the required Certificates of Approval from the Pioneer Square Preservation Board (SMC 23.66.115).

This alternative would have an adverse impact on the existing seawall (similar to Alternative A). Construction in the vicinity of the central waterfront piers (Piers 54 to 59) is not anticipated to cause damage to the piers because of the minimization efforts described above. Any activities near the piers

that are designated landmarks (Piers 54–59) would be reviewed as needed by the Seattle Landmarks Preservation Board under the City of Seattle Landmarks Preservation Ordinance (SMC 25.12), and would be done only with a Certificate of Approval if one is required. These activities include alterations to the piers or piersheds, alterations that contact the piers, and alterations to pier access or views of the piers. Activities adjacent to the historic piers would be reviewed by the City Historic Preservation Officer under the City's SEPA policies (SMC 25.05.675). Activities within the Waterfront Historic Character area would be reviewed as needed by the Seattle Landmarks Preservation Board under SMC 23.60.704. Activities in the Pioneer Square Preservation District would be reviewed and receive Certificates of Approval, as needed, from the Pioneer Square Preservation Board (SMC 23.66.115).

Other historic properties in the APE are at a greater distance from the construction activities and no damage to them is anticipated (Table 6-2, Figure 6-1).

6.2.4 Alternative C

Construction of Alternative C would have an adverse effect on two historic properties: the Elliott Bay Seawall and the Washington Street Boat Landing pergola. The pergola would be removed for the duration of construction. The project includes restoration and replacement of the pergola in an appropriate location on the water at the foot of S. Washington Street. Restoration and relocation would be done in coordination with the Department of Neighborhoods Historic Preservation Program and would have the required Certificates of Approval from the Pioneer Square Preservation Board (SMC 23.66.115).

6.3 MITIGATION

Where potential unavoidable adverse effects are anticipated, mitigation measures will be identified and can be based on past projects; local, state, and federal guidance; and feedback from consulting stakeholders.

Mitigation for adverse effects to significant archaeological sites identified prior to or during construction may include scientific data recovery or other suitable measures determined in consultation with SHPO, affected Indian Tribes, and other concerned parties. Archaeological monitoring of ground disturbing activities is a typical strategy for identifying sites during the course of the project. Previous chapters in this report have outlined areas where archaeological monitoring may be appropriate. Significant sites identified prior to construction should be treated in a manner stipulated in a Memorandum of Agreement (MOA) signed by consulting parties.

Construction mitigation measures for historic properties are based on the BMPs of the type of construction activity and the extent of the adverse effect on the resource. For example, adverse effects to the seawall ould be mitigated through documentation. In addition, for construction mitigation measures, the Pioneer Square Preservation Board, the Pike Place Market Historical Commission, and the Seattle Landmarks Preservation Board will be involved in decisions about these measures, as required in their respective ordinances.

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CHAPTER 7. REFERENCES

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APPENDIX A.
INVENTORY FORMS

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APPENDIX B.
TRANSECT MAPS

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