SR 99: ALASKAN WAY VIADUCT & SEAWALL REPLACEMENT PROGRAM

Hazardous Materials Technical Memorandum

S. Holgate Street to S. King Street Viaduct Replacement Project

Environmental Assessment

June 2008

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LIST OF EXHIBITS

ATTACHMENTS

ACRONYMS

µg/L	micrograms per liter
ACM	asbestos-containing materials
AHERA	Asbestos Hazard Emergency Response Act
BMP	Best Management Practice
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
City	City of Seattle
CSCSL	Confirmed and Suspected Contaminated Sites List
CWA	Clean Water Act
cy	cubic yard
Ecology	Washington State Department of Ecology
EDR	Environmental Data Resources, Inc.
EPA	United States Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
GEDR	Geotechnical and Environmental Data Report
H_2S	hydrogen sulfide
HSWA	Hazardous and Solid Waste Amendments
LUST	leaking underground storage tank
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MSE	mechanically stabilized earth
MTCA	Model Toxics Control Act
NEPA	National Environmental Policy Act
NFRAP	no further remedial action is planned
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls

PCS	petroleum-contaminated soil
PGIS	pollutant-generating impervious surface
ppb	parts per billion
ppm	parts per million
Project	SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project
PSCAA	Puget Sound Clean Air Agency
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RCW	Revised Code of Washington
REC	recognized environmental condition
SEPA	Washington State Environmental Policy Act
SIG	Seattle International Gateway
SR	State Route
TPH	total petroleum hydrocarbons
TS&L	type, size, and location
TSCA	Toxic Substances Control Act
TSD	treatment, storage, and disposal
UST	underground storage tank
VOCs	volatile organic compounds
WAC	Washington Administrative Code
WA-ICR	Washington Site Register of Independent Cleanup Reports
WISHA	Washington Industrial Safety and Health Act
WOSCA	Washington-Oregon Shippers Cooperative Association
WSDOT	Washington State Department of Transportation

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Chapter 1 SUMMARY

This technical memorandum presents the results of a study to identify properties that have the potential to contain hazardous materials that could affect replacement of the existing Alaskan Way Viaduct from S. Holgate Street to S. King Street. The study area includes the alignment of State Route (SR) 99 from S. Walker Street to S. King Street and the area within two city blocks (approximately 400 feet) of the alignment. This memorandum also discusses design and construction issues as they relate to hazardous materials and correlating effects and mitigation.

1.1 Affected Environment

The property identification process focused on properties where it is likely that contamination would be encountered during excavation or dewatering and on properties that would be acquired or modified as part of the SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project (the Project).

Sources of information regarding current and historical land uses and records of environmental enforcement were reviewed to identify potentially contaminated properties and properties with documented releases within the study area. These properties, identified as "validated sites" (sites) were then screened to assess their potential to adversely affect the Project and to categorize them as either potentially "substantially contaminated" or potentially requiring remediation measures that would be "reasonably predictable" as defined by Washington State Department of Transportation (WSDOT). Those sites that would be acquired or were situated adjacent to the Project also were ranked as posing low, moderate, or high risk to the Project.

The study area is characterized by industrial activity and railroad operations. Waterfront industries have included metal works, foundries and plating operations, machine shops, boat building and repair, warehouses, and fueling facilities, including several bulk fuel facilities. The most likely contaminants from such operations include metals, solvents, and petroleum products. Also, the area is underlain by fill that was placed in the early 1900s, which covered and incorporated timber and debris that previously had been used in the construction of piers, wharves, and trestles. Common contaminants in this old fill include petroleum constituents and metals. In addition, the buried piles and timbers were probably treated with creosote, which likely has leached into the adjoining soil and groundwater. Lubricating oil associated with railroad operations may also be encountered in the fill soils.

Historical land uses potentially resulted in releases of a variety of hazardous materials into the surrounding environment, causing soil and groundwater contamination that could adversely affect the Project.

Because there has been only limited redevelopment in this section of Seattle, most of the buildings were constructed prior to recent laws restricting the use of hazardous building materials. Therefore, asbestos-containing material and lead-based paint should be anticipated in many of the buildings in the area.

1.2 Operational Effects and Mitigation

Compared to existing conditions, the Project would reduce pollutant loading and improve the quality of stormwater runoff from the project area that would be discharged to surface water.

The coarse backfill surrounding subsurface utility corridors may act as preferential pathways for contaminant migration. To mitigate this effect, controlled-density fill or trench dams may be installed at intervals along utility runs where contamination is suspected to prevent migration of contaminants in shallow groundwater.

1.3 Construction Effects and Mitigation

The Project has been designed to avoid contamination where possible, and to the extent feasible minimize handling and disposal activities if contaminated material can not be avoided.

Construction effects could result if contaminated soil and/or groundwater are encountered during various construction activities (e.g., drilled shafts and piles, deep soil mixing or jet grouting, excavation for retaining walls, and relocating utilities). In addition to the sites that have been identified as potentially contaminated, the SR 99 alignment is underlain by fill that consists of soil and debris from unknown sources. Construction throughout the project footprint could encounter contaminants such as petroleum, metals, and polycyclic aromatic hydrocarbons (PAHs) in the fill soils, as well as creosote-treated timbers and wood debris. These contaminants have been identified in the Alaskan Way S. right-of-way.

To the extent that soil and groundwater removed during construction is contaminated, there would be requirements for special handling and disposal and for provisions to provide for the health and safety of workers and the public, as well as to protect the environment from releases of contaminants, spreading of contamination, or cross-contamination.

The Project would acquire portions of three parcels and temporary or permanent easements on four additional parcels. These parcels contain

32 potentially contaminated sites, a majority of which are associated with the terminals, which have long and varied historical uses. No buildings are being modified or acquired for the Project. Five parcels with three potentially contaminated sites have already been acquired by WSDOT for the Project. A Phase I Environmental Site Assessment (ESA) was conducted for each parcel that was acquired, and a Phase II ESA was conducted for two of these parcels to address recognized environmental conditions (RECs). Phase II ESAs and other environmental sampling are conducted to identify potential contaminants that could be encountered during construction. Data generated from explorations for engineering design could provide sufficient data to substitute for focused Phase II ESAs.

Construction activities on these and other sites could result in the following types of effects related to hazardous materials:

- Large volumes of spoils containing contaminated soil and debris would be removed from the subsurface for the retained cut.
- Contaminated groundwater could be extracted as a by-product of construction techniques to improve ground conditions.
- Slurries formed to aid in construction techniques could become contaminated by contact with contaminated soil or groundwater.
- Air quality could be affected by release of contaminants and dust during construction and handling of contaminated media.
- Groundwater pathways could be modified by subsurface construction or dewatering, resulting in the mobilization and spread of existing contaminants.

Construction methods that would involve direct soil removal include excavation for retaining walls, changes in grade, and utility installation. Similarly, the use of drilled shafts for construction of piles and diaphragm walls would generate large volumes of spoils that would have to be handled and properly disposed. Ground improvement techniques that would be employed would also generate large volumes of spoils and dewatering groundwater. Jet grouting operations, which inject cement grout to strengthen the subsurface soils, typically produce spoil volumes equal to about 30 to 50 percent of the volume of soil treated. An estimated 20 percent of these spoils would be solids. This spoil material would consist of a blend of eroded soil and cement grout that is flushed to the ground surface during grouting. Deep soil mixing, which involves in situ mechanical mixing of soil and cement, is estimated to produce spoil volumes equal to about 25 to 30 percent of the volume of soil treated. An estimated 20 percent of these spoils would be solids. The spoils from this method would consist of blended

soil and cement with the consistency of a thick mud that would have to be allowed to settle before it could be handled or disposed of.

The Project would generate an estimated 222,000 cubic yards (cy) of spoils, and approximately 90 percent of that (204,000 cy) could be contaminated or require special handling. Soil would be removed in an area of fill and wood debris (including creosote-treated pilings that had supported former elevated railroads and a wood-plank road). Spoils from ground improvement (deep soil mixing and jet grouting) would require special handling because they would consist of commingled soil and cement.

Dewatering activities would also be required for the retained cut. The water could require treatment prior to discharge. In addition, the drawdown could affect groundwater gradients in the area and mobilize contaminants at some distance from the excavation.

The volume of problem waste, particularly from deep soil mixing and jet grouting, could be reduced in some areas by use of alternate technologies that would generate less spoils. The use of vibro-technology (stone columns), to the extent it is appropriate, should be considered to reduce the quantity of spoils where ground improvement is required. However, a potential effect from stone columns would be excessive vibrations that could damage adjacent buildings and induce overall ground settlement. For drilled shafts, casing of the shafts should be considered in areas where caving and sloughing is likely. This would reduce both the volume of soil generated and the potential for contamination of the slurry that is used to complete the shafts.

To the extent feasible, the dewatering systems required for construction will be designed to minimize drawdown of the water table. This would reduce the volume requiring treatment and disposal of groundwater. It would also reduce the potential for mobilization and spreading of groundwater contaminants toward the cone of depression.

The potential for effects to air quality from contaminants, dust, and nuisance odors could be mitigated, where required, by Best Management Practices (BMPs) or engineering controls. Depending upon the size of the excavation, work areas could be covered to reduce the effect of the odors, or the amount of active work surface that is open could be reduced. Engineering controls such as wetting of surfaces with water or polyacrylamide blends that bind soil to prevent the soil from becoming airborne, ventilation with fans, and air filtration methods could also be implemented. The Project will be planned to control fugitive dust during construction according to an existing agreement between WSDOT and Puget Sound Clean Air Agency (PSCAA).

Chapter 2 METHODOLOGY

The objective of this Hazardous Materials Technical Memorandum is to identify current and historical land uses near the Project that have the potential to result in environmental contamination and to assess the possible environmental effects of such hazardous material on the Project. The Seattle waterfront and downtown area has a long history of commercial and industrial use, with a large number of known and suspected contaminated sites near the alignment. In order to evaluate the potential for contamination from such sites to affect the alignment, the study area was defined to include the area underlying the SR 99 alignment from S. Walker to S. King Streets and within two city blocks (approximately 400 feet) of the alignment. The distance of 400 feet was selected because it was judged to encompass most, if not all, of the areas from which contamination could be expected to migrate to the project footprint.

The study consisted of the following elements:

- A review of historical data within the study area.
- A regulatory database search of known and suspected contaminated sites within 1 mile of the project footprint. The search was updated in February 2008.
- A review of the Washington State Department of Ecology (Ecology) files for all known and suspected contaminated sites within the study area. Files were also reviewed in March 2008.
- A review of Tax Assessor records for properties located adjacent to the project footprint.
- A windshield survey of the study area to identify current land uses that could result in environmental contamination. The survey was conducted from a vehicle in April 2008, and observations were limited to those that could be made from public areas. Only prominent features can be observed or verified.
- A summary of area geology as it applies to contaminant distribution and migration based on the Geology and Soils Technical Memorandum.

All known and potentially contaminated sites identified by this study were screened to assess their potential risk to the Project, as described in Section 3.8. The site screening resulted in the identification of a list of sites that pose some risk to the Project. These sites are included either because current or historical property practices are commonly associated with hazardous material use or storage, or the properties in question have a history of contamination that could affect the Project.

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Chapter 3 STUDIES AND COORDINATION

This section presents a summary of the studies that were undertaken to identify potentially hazardous materials that may be present within the study area. Environmental studies were coordinated with geotechnical studies that were conducted to evaluate the preliminary design.

3.1 Historical Records Reviewed

The following information sources were reviewed to identify historical uses of properties that are commonly associated with generation, storage, or transportation of hazardous materials. Historical review was limited to the study area (proposed alternative and adjacent areas within approximately 400 feet, or two city blocks).

3.1.1 Sanborn Maps

Historical fire insurance maps (Sanborn maps) are available for a majority of the study area for intermittent periods between 1888 and 1969. The most useful maps for this study were those dated 1905, 1917, 1949–50, and 1969. Some maps were illegible because of scale or reproduction quality. Information contained in the Sanborn maps was used to identify historical businesses by name, exact location, and unique concerns for insurance underwriters, such as large fuel tanks and chemical hazards.

3.1.2 Polk Directories

Polk Directories identify businesses by name, type of business, and address for the years 1938 to 1990. The directories, which can be searched using the address, are an excellent source of information regarding area development and use of properties over time. Directories for the years 1938, 1940, 1943–44, 1951, 1956, 1960, 1965, 1970, 1975, 1980, 1985, and 1989–90 for the city of Seattle were reviewed at the Seattle Public Library.

3.1.3 Aerial Photographs

Black and white aerial photographs for the entire study area dated 1936, 1946, 1951, 1956, 1961, 1966, 1970, 1974, 1979, 1985, and 1992 and color photographs taken in 2000 were obtained from the WSDOT Photography Series Division and from Walker & Associates. Photographs were examined to provide general information regarding the historical and current development within the study area.

3.1.4 Washington State Archive Records

The King County Assessor archives were used to obtain information regarding building construction dates, heat sources, presence of underground tanks, property use, and ownership for the study area from approximately 1936 to 1972. These records are stored at the regional branch of the Washington State Archives. Records after 1972 were stored electronically and were updated periodically by the County Assessor's office.

3.1.5 King County Assessor Records

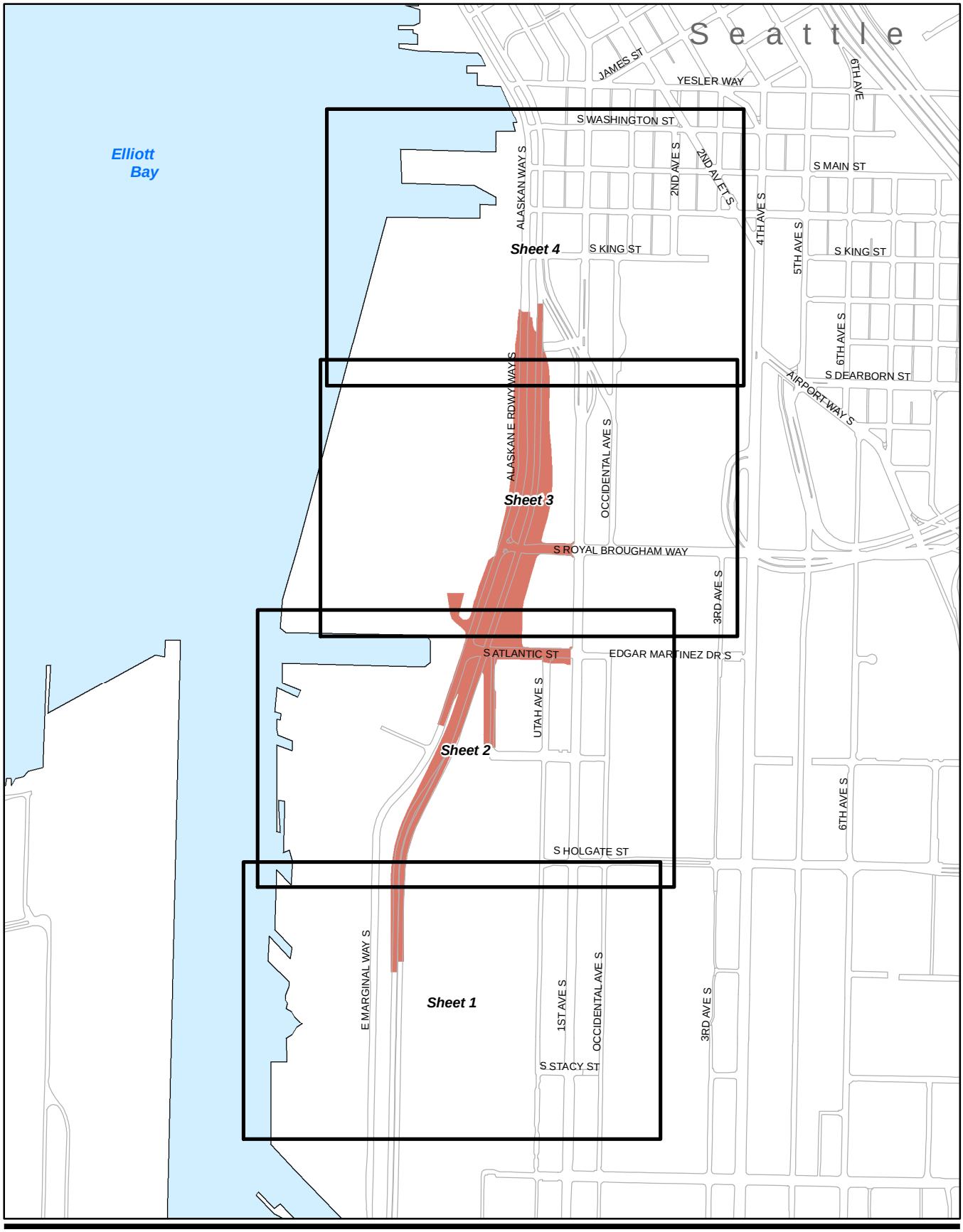
Current Assessor records obtained from the King County website were reviewed for the blocks underlying or immediately adjacent to the SR 99 alignment within the study area. The current records confirm the age of the buildings, current use and ownership, and current heat source.

3.1.6 Previous Studies

Geotechnical data from previous explorations in the study area were reviewed as part of the *Geotechnical and Environmental Data Report* (Shannon & Wilson, Inc. 2002a). These geotechnical data were used to supplement the field explorations and provide a database of subsurface geologic, hydrogeologic, and environmental information for use in evaluation of individual sites. Project files and archives from several sources were reviewed. In addition to obtaining information from WSDOT files, other data, primarily consisting of boring logs, were collected from the following sources:

- Shannon & Wilson, Inc. project files
- University of Washington Seattle-Area Geologic Mapping Project
- Seattle Department of Planning and Development (DPD)
- Washington State Ferries
- Port of Seattle
- Washington State Department of Ecology (Ecology)
- Seattle Public Utilities (SPU)
- Seattle Department of Transportation (SDOT)
- Seattle Parks and Recreation

Data from Shannon & Wilson, Inc. files and publicly available reports for previous geotechnical studies performed within the study area were compiled into a database. All boring logs were reviewed for field observations that were indicative of potential for contamination, most notably odor or visual identifiers. Approximate locations of the previous explorations with evidence of potential contamination and the description are shown in Exhibit 3-1. A more complete description of the database and source of information is included in the *Geotechnical and Environmental Data Report* (Shannon & Wilson, Inc. 2002a).



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0 500 1,000 2,000 Feet

Exhibit 3-1
Index for Explorations

Sheet A

LEGEND

- **Shannon & Wilson Borings**
- **Shannon & Wilson Borings with Groundwater Monitoring Device (Wells or Vibrating Wire Piezometer)**
- w **Monitoring Well Installed**
- **Historic Boring**

Outfalls

- Combined Sewer Outfall
- Sewer Drain Outfall

- **Build Alternative**
- **Fill**
- **Historic Railroad Use**
- **Parcel**
- 60.2 **Block w/Designation**
- **Study Area**

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Exhibit 3-1
Legend For Explorations

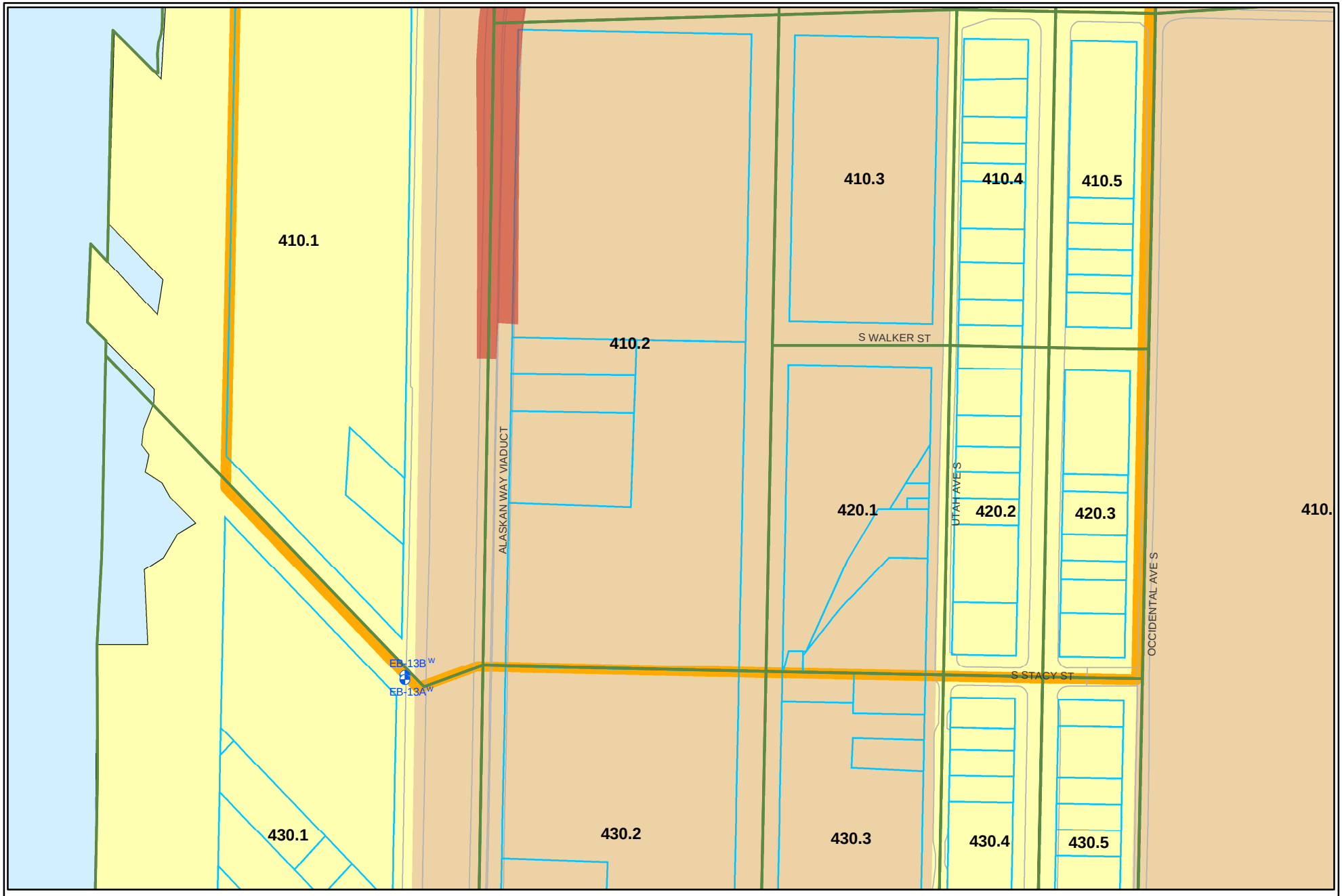

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Exhibit 3-1
Explorations

Sheet 1 of 4

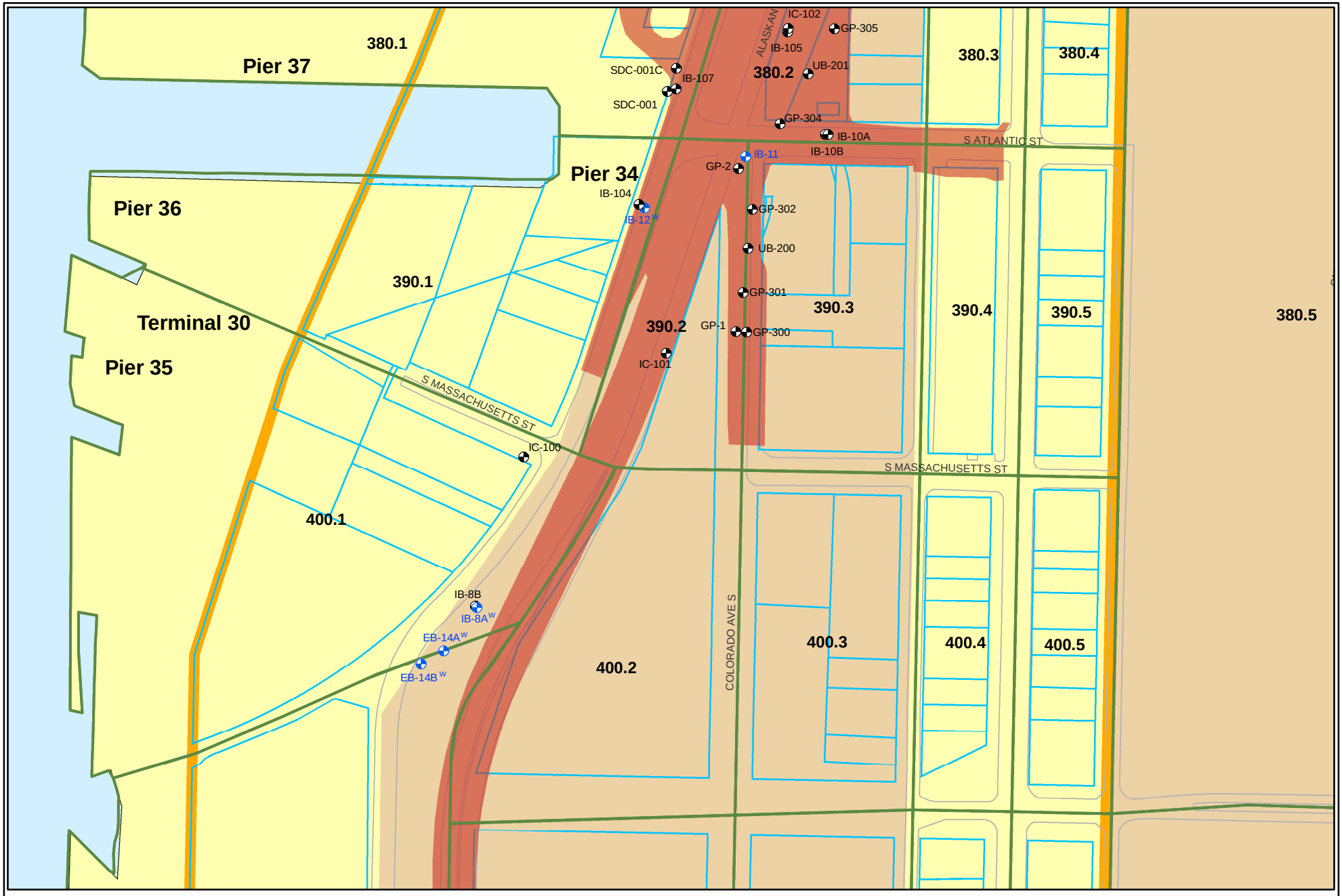

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Exhibit 3-1
Explorations

Sheet 2 of 4

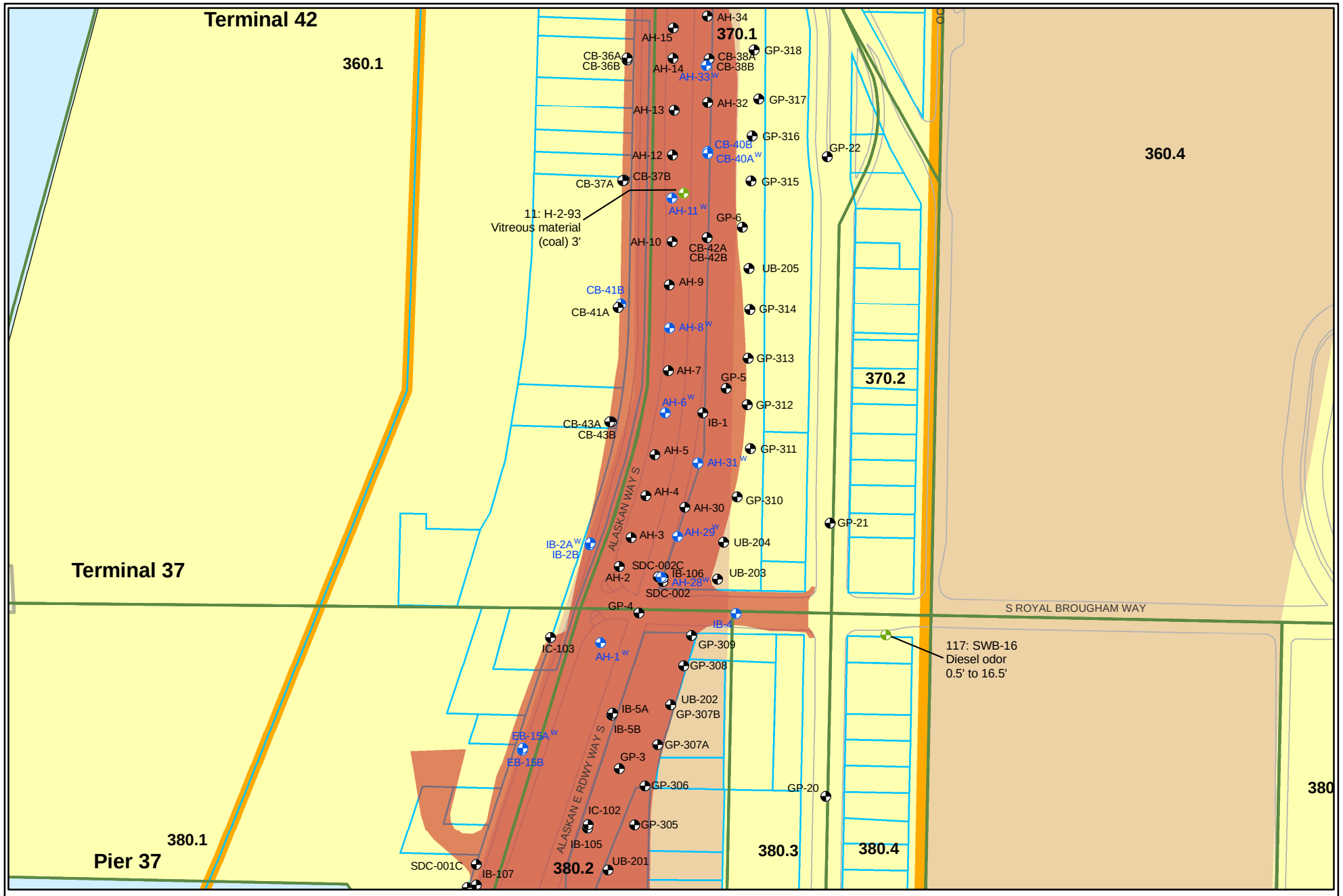

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Exhibit 3-1
Explorations

Sheet 3 of 4

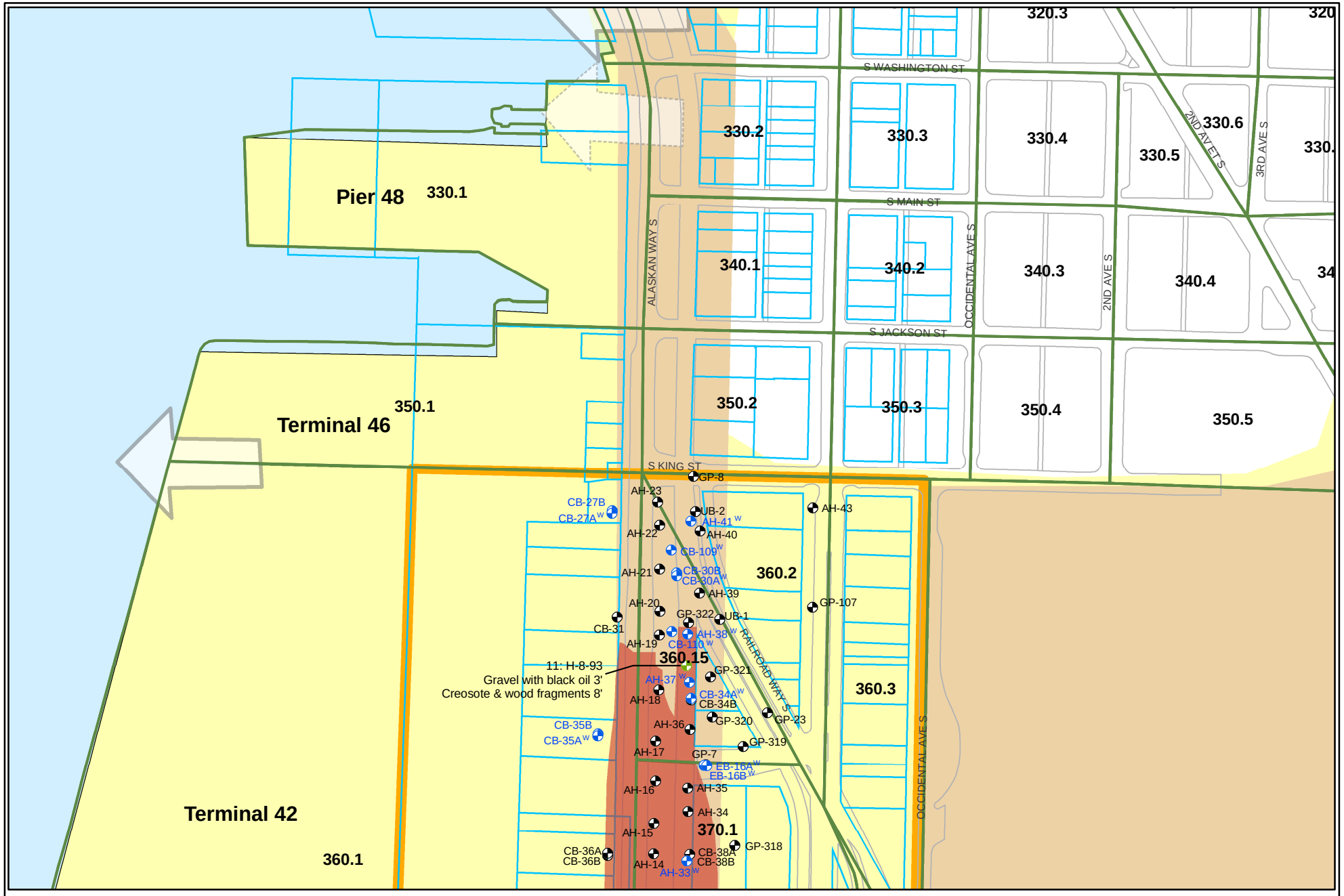

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Exhibit 3-1
Explorations

Sheet 4 of 4

3.2 Regulatory Records Review

Federal and state databases were reviewed to identify former and current land uses that could result in the contamination of soil or groundwater within the study area. The objective of this review was to identify and document reported releases of hazardous or toxic materials to the environment as well as to pinpoint businesses and industries that use, generate, store, transport, or dispose of regulated hazardous materials in the normal course of business.

Environmental Data Resources, Inc. (EDR) was subcontracted to conduct a search (as recommended by the American Society for Testing and Materials [ASTM]) of available agency databases, including those of the United States Environmental Protection Agency (EPA) and Ecology, for known and suspected contaminated sites within 1 mile of the project footprint.

The project team evaluated all federal National Priority List (NPL) and Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites within 1 mile of the project footprint and all state Confirmed and Suspected Contaminated Sites List (CSCSL), Washington Site Register of Independent Cleanup Reports (WA-ICR), and leaking underground storage tank (LUST) sites within 400 feet of the project footprint (approximately two city blocks). The project team also evaluated orphan sites identified by EDR. Orphan sites are those sites that are identified, but lack distinct addresses, and therefore cannot be plotted by EDR. The NPL and CERCLIS sites were considered to have a low potential to adversely affect the Project based on the extent and type of contamination and the relative distance of the sites from the project footprint.

Sites identified on the state lists that are located greater than two blocks from the project footprint were not evaluated because they do not have as likely a potential to affect the Project relative to the large number of similar sites identified in the study area.

A total of 36 sites within the study area have the potential to affect the Project. These sites are summarized in this technical memorandum. The EDR Area Study Report is presented in Attachment A (appendix to the memorandum). Sites identified in the EDR search are presented in Exhibits 3-2 and 3-3 and Attachment B. As described in Section 3.8, Site Screening Criteria, some of the sites listed on the EDR Report were excluded from further evaluation because they are unlikely to affect the Project. These sites are presented in Attachment B.

Each site was assigned a number based on the city block where it was located. The block numbering system developed for the Alaskan Way Viaduct and Seawall Replacement Program allowed flexibility to add or eliminate city

blocks as the study area changed. City blocks within the study area of the Alaskan Way Viaduct and Seawall Replacement Program were numbered from north to south by increments of 10 south of Ward Street. Blocks west to east were then assigned decimal numbers. Additional blocks have been added and numbered similarly to accommodate changes in the corridor configuration. The site number consists of one or more parcels depending upon the business. In some instances, individual parcels have been sold and may have subsequently been used for a different type of business. Site numbers would then overlap. For example, Union Pacific Railroad at 801 First Avenue S. has a site number of 370.1-2, where 370.1 is the block number and -2 is the site number (within the block).

3.2.1 Federal Databases

The following four EPA databases were searched:

Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS): This database contains data on potentially hazardous material sites that have been reported to EPA by states, municipalities, private companies, and private persons. Sites listed in CERCLIS are either proposed NPL sites or included on the NPL. Sites currently in the screening or assessment phase of the investigation for possible inclusion on the NPL may also be included in CERCLIS. This list also includes sites for which no further remedial action is planned (NFRAP). One CERCLIS-NFRAP site was identified within the study area, as provided in Exhibit 3-2 and described below.

National Priority List (NPL): This database is a subset of CERCLIS that identifies more than 1,200 sites (nationwide) for priority cleanup under the Superfund program. No NPL sites were identified within the study area.

Resource Conservation and Recovery Information System (RCRIS): This database contains selective information on sites that generate hazardous material or transport, store, treat, and/or dispose of hazardous material as defined by the Resource Conservation and Recovery Act (RCRA). RCRIS also identifies treatment, storage, and disposal (TSD) facilities with RCRA corrective action activity (CORRACTS). There are no TSD facilities listed within the study area. There is one large quantity generator (LQG) and three small quantity generator (SQG) sites listed within the study area that are not identified as sites with known or suspected contamination. A list of these generators is provided in Exhibit B-1, Attachment B.

Exhibit 3-2. Sites Within the Study Area with Documented or Suspected Contaminant Releases
(Legend at end of exhibit)

Block	Site No. (Exhibit 3-1, Exhibit C-1)	Address	Site/ Business Name	Ecology File Summary	Known or Suspected Contaminants	EDR Map No.	List
360.1	360.1-2	401 Alaskan Way S.	Terminal 46	Most recent Ecology documentation: January 2003 UST closure report: a 2-compartment UST (gasoline and diesel fuel), and an oil/water separator were removed; PCS with diesel was removed from below the separator; confirmation sample results from the UST excavation and the separator were less than MTCA Method A criteria. Hydrocarbon contamination assessment report dated July 1992: 2 USTs removed in September 1991; groundwater monitoring wells installed; soil and water samples did not have contaminant concentrations greater than MTCA Method A cleanup levels. Reportedly, 1991 assessment showed PCS remained at site because excavation was limited by adjacent structures (maintenance bldg.) EDR summary 2008 CSCSL: phenolic compounds and primary pollutant metals suspected in sediments; awaiting site hazard assessment.	Petroleum, metals, solvents	28	CSCSL, LUST, ICR
360.1	360.1-13	Alaskan Way S.	SR 519 Street Improvement Project	Most recent Ecology documentation: 8/25/2003 report of subsurface investigation at 9 locations in the Alaskan Way S. right-of-way; contaminant concentrations in soil included TPH-G at 730 mg/kg, TPH-O at 2,200 mg/kg, cPAHs at 8 of 9 locations at > 0.1 mg/kg (highest concentration 9.75 mg/kg), lead up to 1,800 mg/kg, arsenic at 73 mg/kg, cadmium at 4.2 mg/kg. The highest concentrations in soil are above respective MTCA Method A cleanup levels. Maximum groundwater concentrations in µg/L: arsenic 92, cadmium 11, chromium 740, copper 480, lead 6,300, mercury 4.0, nickel 690, and zinc 1,200. For those hazardous substances for which a cleanup level has been established, the concentration exceeded the respective MTCA Method A cleanup level for groundwater.	Gasoline, petroleum, metals and PAHs	Orphan, page 5-270	CSCSL
360.15	360.15-1	90 S. Dearborn Street	WA DOT S. Dearborn (former Trager Building)	750-gal heating oil tank removed April 2007; 32 cy PCS excavated above groundwater (8.5-9 ft below ground surface). Excavation limited to the NE and the SE, in vicinity of highway off-ramp columns. Concluded that petroleum contamination has migrated off site in the south and east directions, into City right-of-way. Maximum diesel concentration in soil sample 7 feet below ground surface was 30,400 mg/kg, above the MTCA Method A cleanup level of 2,000 mg/kg. Most recent documentation is the report describing the tank removal and PCS excavation.	Petroleum	40	LUST

Exhibit 3-2. Sites Within the Project Corridor With Documented or Suspected Contaminant Releases (continued)

Block	Site No. (Exhibit 3-1, Exhibit C-1)	Address	Site/ Business Name	Ecology File Summary	Known or Suspected Contaminants	EDR Map No.	List
370.1	370.1-2	801 First Avenue S.	Union Pacific Railroad	March 1998 Limited Phase II Environmental Assessment report: Isolated areas of TPH contamination in soil resulting from removed or abandoned USTs (Bunker C oil range TPH 16,000 mg/kg in a sample collected near a closed-in-place UST [above the MTCA Method A cleanup level of 2,000 mg/kg]). Groundwater has not been affected based on limited sampling. It does not appear that contaminants pose a potential to migrate off the site. Ecology has no reports documenting if any site remediation has been conducted (2008). See Section 3.6 for Environmental Site Assessments Conducted for the Project which summarizes a new Phase II ESA conducted by WSDOT (2007).	petroleum	49	ICR, LUST
370.2	370.2-6	826 First Avenue S.	Squire Shop Warehouse (former)	EDR summary: Squire Shop Warehouse: petroleum release from heating fuel tank in 1993. Interim cleanup report received (no date provided). No Ecology file (March 2008).	metals, petroleum	49	ICR
370.2	370.2-19	1046 First Avenue S.	Kingdome Station	Most recent Ecology documentation: "Cleanup Action Status Report" 4/10/2007: site remediation for new hotel included excavation and groundwater monitoring; Phases included: 1) excavated upper 3 ft of soil, 2) installed soil-cement piles around site perimeter, 3) excavated soil to final underground garage elevation and 4) excavated for utility vault and trench for full length of south boundary (vault 14 ft deep and trench 5 ft deep). 9,798 tons PCS and 30,050 gallons of water removed for off-site disposal. Report is in VCP review at Ecology. On-site soils meet MTCA Method A criteria. Off-site benzene concentrations (south) 0.41 mg/kg and 0.52 mg/kg, above the MTCA Method A cleanup level of 0.03 mg/kg, TPH-G soil samples at MW-7 were collected from 5 to 13 ft below ground surface. TPH-G concentrations were 1,700 to 880 mg/kg, above the MTCA Method A cleanup level of 30 mg/kg (in sidewalk on east side of 1st Avenue S.) Benzene and TPH-G concentrations fluctuate in MW-7 (other 2 wells in compliance); 1/5/07 groundwater sample from MW-7 had benzene at 42 µg/L, TPH-G was 2,100 µg/L, above the respective MTCA Method A cleanup levels of 5 µg/L and 800 µg/L. EDR summary (2008): Kingdome Station – 12 USTs removed: Five unleaded gasoline, one diesel, five leaded gasoline, and one waste oil UST. CSCSL: petroleum products in soil and groundwater; Ecology received final independent remedial action report.	gasoline	51	CSCSL, LUST, VCP

Exhibit 3-2. Sites Within the Project Corridor With Documented or Suspected Contaminant Releases (continued)

Block	Site No. (Exhibit 3-1, Exhibit C-1)	Address	Site/ Business Name	Ecology File Summary	Known or Suspected Contaminants	EDR Map No.	List
380.1	380.1-1	1201 Alaskan Way S.	Port of Seattle Terminal 37	Terminal 37: Most recent Ecology file documentation: Ecology letter 3/27/2003 requesting update. Ecology notified in 1995 of petroleum release when four tanks were removed. Gasoline contamination was encountered. Waste oil remains beneath the office trailer. Benzene is present in groundwater (59 µg/L) above MTCA criterion of 5 µg/L. Groundwater flows to the northwest. (Ecology did not have file available for review in March 2008.)	Gasoline, petroleum, metals, solvents	59	LUST, ICR
390.1	390.1-1	1305-1343, 1555 Alaskan Way S.	Federal Warehouse	Federal Warehouse/U.S. Coast Guard: Extent of petroleum contamination in soil and groundwater beneath the building has not been addressed. TPH remain at 25,900 mg/kg in soil adjacent to the loading dock, above the MTCA Method A cleanup level of 2,000 mg/kg; TPH-D 2,200 µg/L in groundwater at MW-3 near Alaskan Way South right-of-way (February 1997), above the MTCA Method A cleanup level of 500 µg/L. Soil contamination exceeds MTCA residential cleanup levels in the area north of the former gasoline UST excavation near the fiber optics line. The Coast Guard does not want to enter into restrictive covenant. Voluntary Cleanup Program suspended. Most recent Ecology file documentation: 4/30/2001 Ecology letter indicating further action is required to address petroleum contamination.	solvents, metals, gasoline	67	LUST, CSCSL, ICR
390.1	390.1-5	1519, 1545 Alaskan Way S.	U.S. Coast Guard Support Center Seattle	United States Coast Guard Support Center Seattle: Lead encountered above MTCA Method A cleanup level of 250 mg/kg for unrestricted land use. The Coast Guard is proceeding with an independent interim action to remove contaminated soil during a 1995 project. EDR summary: Ecology received a final cleanup report 6/4/1996 regarding remediation of metals in soil. (Report was not available for review March 2008.)	metals	69	CERCLIS-NFRAP, LUST, ICR
390.3	390.3-1	1527, 1531 Utah Avenue S.	Rental Machinery Co.	Rental Machinery Co./Coast Crane: Three USTs removed in 1989; TPH as oil, diesel, and gas with BTEX, and PAHs present in soil and groundwater. PCS was land-farmed. Groundwater monitoring from 1999 shows all constituents (TPH-G/BTEX, TPH-Dx, and cPAHs) below MTCA criteria (TPH-G in two wells at 140 and 54 µg/L, below the MTCA Method A cleanup level of 800 µg/L, other constituents not detected). The site is also a hazardous waste generator of mineral spirits (for degreasing); recycled off-site. The 10/15/1999 groundwater monitoring report is the most recent documentation in Ecology's file.	petroleum, gasoline, PAHs	62	LUST, ICR

Exhibit 3-2. Sites Within the Project Corridor With Documented or Suspected Contaminant Releases (continued)

Block	Site No. (Exhibit 3-1, Exhibit C-1)	Address	Site/ Business Name	Ecology File Summary	Known or Suspected Contaminants	EDR Map No.	List
390.3	390.3-3	1541 Utah Avenue S., 1555 Utah Ave. S.	City Light	EDR summary: Seattle City Light: PCBs spilled in soil; Ecology received report 4/24/1991; no report available at Ecology for review (March 2008).	PCBs	62	ICR
400.1	400.1-5	9 S. Massachusetts Street	Emerald City Disposal/Sea Bay Transport	Emerald City Disposal/United States Coast Guard Pier 35: Removed three tanks in 1990. Gasoline present (840 mg/kg) at the bottom of the excavation (10 feet) and at the south wall (3,500 mg/kg), above the MTCA Method A cleanup level of 30 mg/kg. BTEX also present. United States Coast Guard is not planning to remediate. Tanks were owned by Rabanco/Emerald City Disposal. Most recent Ecology file documentation: UST removal report 11/4/2005: 2 tanks discovered during construction, one contained water and Bunker C, other auxiliary tank may have been associated with a boiler; maximum TPH-D was 462 mg/kg, TPH-O 1,440 mg/kg (below the MTCA Method A cleanup level of 2,000 mg/kg); PCS and groundwater removed off site. Sampling and Analysis report 2/10/2005: cPAH in soil 2.93 mg/kg (above the MTCA Method A cleanup level of 0.1 mg/kg for unrestricted land use); arsenic from 0.007 to 0.180 mg/L in five groundwater samples, above the MTCA Method A cleanup level of 0.005 mg/L. Ecology Further Action Required letter 2/28/2005.	Gasoline, metals, PAHs	70	LUST, CSCSL, ICR
400.1	400.1-5	Pier 35	Marine Disposal Corp.	EDR Summary: CSCSL NFA received 9/13/1995. Ecology has no file for this site (March 2008).	unknown	71	CSCSL-NFA
400.1	400.1-6	1727 Alaskan Way S.	California Ink Co. (Flint Ink Co.)	Flint Ink Co./Terminal 34: Chlorinated solvents and petroleum detected in groundwater (Port of Seattle, 1993). Groundwater monitoring and sampling conducted as part of monitoring at Terminal 34. Most recent Ecology file documentation: March 2000 UST decommissioning report: one UST inside building removed February 2000; non-detect for all in-situ samples, stockpiled soil had 71 ppm TPH-D, below the MTCA Method A cleanup level of 2,000 mg/kg.	solvents, petroleum	75	LUST, ICR

Exhibit 3-2. Sites Within the Project Corridor With Documented or Suspected Contaminant Releases (continued)

Block	Site No. (Exhibit 3-1, Exhibit C-1)	Address	Site/ Business Name	Ecology File Summary	Known or Suspected Contaminants	EDR Map No.	List
400.1	400.1-7	1733 Alaskan Way S.	GATX/ Pier 34	GATX/Pier 34: Bulk fuel tanks removed. PCS excavated. Air-sparge system operated from 1996 to 1998 to remediate soil and groundwater. Groundwater monitoring continued semiannually through 2003. Constituent concentrations (metals, gasoline, diesel, PAHs, and BTEX) below trigger levels that are protective of aquatic life (MTCA Method C) as of 2004. Most of the contamination is located in the center of the property and closer to the waterfront. The site is paved.	Gasoline, petroleum, PAHS, metals, BTEX	75	ICR , CSCSL
400.5	400.5-8	1700 First Avenue S.	Snyder Property	2001 report: 3 USTs were reportedly removed in 1949; during a 1995 Phase 1 ESA with sampling, TPH-D was found at maximum of 11,400 mg/kg in soil 6 to 8 feet below ground surface, above the MTCA Method A cleanup level 2,000 mg/kg. Groundwater depth is approximately 7 to 10 feet below ground surface. VCP report 10/8/2002: 25 drive points with oxygen release compounds (ORC) installed July 2001 at two areas, southwestern site area and northwest corner; groundwater was monitored. Most recent Ecology file documentation: Ecology NFA letter issued June 10, 2003. (The upgradient [south] well had diesel detection that analytical laboratory said looked like fresh product: may indicate an off-site source; also, MW-3 at northwest site corner had TPH-D at 2,000 µg/L, above the MTCA Method A cleanup level of 500 µg/L.)	Petroleum	77	CSCSL-NFA, VCP
410.1	410.1-1	1901, 2431 E. Marginal Way S. (includes Site 410.1-2)	Terminal 30/ Drew, E.F., and Co.	Port of Seattle Terminal 30: Petroleum contamination predominantly in middle to western portions of the property. Product recovery shut down in 1992. Entire site was paved in 1986 and has a groundwater-monitoring program. Diesel- and kerosene-range petroleum hydrocarbons detected in Alaskan Way S. right-of-way (290 mg/kg TPH soil, below the MTCA Method A cleanup level of 2,000 mg/kg, 5 mg/L gas and diesel in groundwater, which are above the respective MTCA Method A cleanup levels of 1.0 mg/L and 0.5 mg/L). The site is under an Agreed Order with Ecology (1991). No new information was found during the March 2008 file review, and Ecology staff couldn't locate the 1998 RI/FS except for multiple appendices.	solvents, petroleum	100	LUST, ICR

Exhibit 3-2. Sites Within the Project Corridor With Documented or Suspected Contaminant Releases (continued)

Block	Site No. (Exhibit 3-1, Exhibit C-1)	Address	Site/ Business Name	Ecology File Summary	Known or Suspected Contaminants	EDR Map No.	List
420.2	420.2-5	2233 First Avenue S.	Thrifty Office Furniture	Surface spill of fuel for boiler. Soil and groundwater contaminated with TPH (diesel and oil). Approximately 23 tons PCS excavated. Some affected soil remains beneath building. 2,100 gallons groundwater removed from excavation by vacuum truck. The potential for contaminants to migrate off the site is unknown. This information was documented in the most recent Ecology file report: June 1995 PCS cleanup report.	solvents, metals, petroleum	92	ICR

Notes:

BTEX = benzene, toluene, ethylbenzene, xylenes
CERCLIS-NFRAP = Comprehensive Environmental Response, Compensation, and Liability Information System-No Further Remedial Action Planned
CSCSL = Ecology's Confirmed and Suspected Contaminated Sites List
cy = cubic yard
EDR = Environmental Data Resources Inc.
ICR = Washington Site Register of Independent Cleanup Reports
LUST = Leaking Underground Storage Tank
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
MTCA = Model Toxics Control Act
MTCA-A = MTCA Method A cleanup levels
PAHs = polycyclic aromatic hydrocarbons
cPAHs = carcinogenic PAHs
PCBs = polychlorinated biphenyls
PCS = petroleum-contaminated soil
ppb = parts per billion
ppm = parts per million
TPH = total petroleum hydrocarbons
TPH-D = diesel range TPH
TPH-G = gasoline range TPH
TPH-O = heavy oil range TPH
UST = underground storage tank
VCP = Ecology's voluntary cleanup program

Notations regarding the most recent Ecology file documentation refer to review conducted March 13, 2008 at Ecology's Northwest Regional Office in Bellevue, Washington.

Emergency Response Notification System (ERNS): This database records and stores information on reported releases of oil and hazardous substances. Twelve sites within the study area have reported spills. A complete listing of ERNS sites is provided in Exhibit B-2, Attachment B.

3.2.2 Washington State Regulatory Databases

The following four Ecology databases were searched:

Confirmed and Suspected Contaminated Sites List (CSCSL): This database contains state hazardous material site records—Washington's equivalent to CERCLIS. Seven sites within the study area are included on the CSCSL, as shown in Exhibit 3-2.

Washington Site Register of Independent Cleanup Reports (WA-ICR): This database contains remedial action reports that Ecology has received from either the owner or operator of the sites. These actions have been conducted without Ecology oversight or approval and are not under an order or decree. Thirteen sites within the study area are included on the WA-ICR list. These sites are shown in Exhibit 3-2.

Leaking Underground Storage Tank (LUST) Database: This database is an inventory of reported LUST incidents along with cleanup status and the affected medium (soil, groundwater). Ten LUST sites are within the study area. These sites are shown in Exhibit 3-2.

Underground Storage Tank (UST) List: This database identifies all properties that have registered USTs with Ecology. Information includes operational status, removal status, and tank contents. Three UST sites are located adjacent to SR 99 in the study area and were installed prior to 1980, as shown in Exhibit 3-3. These sites are not listed in WA-ICR, CSCSL, LUST, or CERCLIS databases.

Exhibit 3-3. UST Sites

Block	Site No. (Exhibit 3-1, Exhibit C-1)	EDR Site No.	Site Name	Site Address	UST Info
360.2	360.2-1	34	83 King Street Building	83 S. King Street	Two USTs, install date not reported, unleaded gasoline, one removed, and one closure in process (3/2008).
380.2	380.2-4	62	Fortune	84 S. Atlantic Street	One UST, installed 1964, removed, substance not reported.
410.4	410.4-11	88	Seattle Chocolate Factory	1962 First Avenue S.	One UST, install date not reported, diesel, removed.

3.3 Ecology Files Review

Ecology files were reviewed to further evaluate the potential for the listed/ reported sites to affect the study area and the Project. The sites were selected based on their location and their potential to affect the Project. Files for CERCLIS, CSCSL, WA-ICR, and LUST sites were requested from Ecology. A summary of the Ecology files reviewed is presented in Exhibit 3-2.

3.4 Windshield Survey of the Study Area

A windshield survey was conducted to evaluate current site uses in the study area that are likely to involve the use, treatment, storage, or disposal of hazardous materials and to verify the location of listed and orphan sites associated with the regulatory review, where possible. All observations were from public areas. Detailed site investigations were beyond the scope of this evaluation. Properties that are adjacent to the SR 99 alignment within the study area were viewed to compare the current Assessor description of the site/buildings with site conditions. Findings from the windshield survey conducted in April 2008 are included in Chapter 4 and Attachment D.

3.5 Asbestos

There is a potential to encounter asbestos-containing materials (ACM) where the Project would require demolition or modification of buildings or other structures. No buildings would be demolished or modified for the Project. The potential for ACM to release asbestos fibers into the environment is dependent on their content, condition, and the friability of the material.[1] Asbestos was used widely in building materials until 1977, when laws regulating its use and disposal were established. The likelihood of encountering asbestos in buildings constructed after 1980 is low, as stockpiles of ACM were mostly exhausted. Asbestos can be found in a variety of older building materials, including exterior siding, roofing shingles, flooring, sprayed-on fireproofing, insulation, soundproofing, and ceiling tiles and texturing. Asbestos was also commonly used as a major component of heating systems, gaskets, pipe wrapping, wire duct lining, and brake linings in trucks and cars.

Buildings constructed prior to 1977 are assumed to have a high potential to have ACM, whereas younger buildings are substantially less likely to pose a significant hazard from asbestos.

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[1] A friable material can be crushed with hand pressure so that the fibers are readily released into the environment.

3.6 Environmental Site Assessments Conducted for the Project

WSDOT has conducted Phase I Environmental Site Assessments (ESAs) as part of due diligence requirements on three properties for this Project. These properties have been acquired by WSDOT. A Phase II ESA to address recognized environmental conditions (RECs) was conducted on two of these properties. Because these properties still pose a potential risk to the Project, they are identified as potentially contaminated properties in this evaluation.

A Phase I ESA was completed in September 2006 for the U-Park located at 550 Alaskan Way S., Project Parcel Number S212 (CDM 2006a). RECs include potential metals contamination of soil and groundwater from former metal works that operated in the 1910s to 1920s and potential contaminants associated with the former use by the railroad. A gas station operated northeast of the property, and it poses a moderate potential to affect the property.

Phase I and Phase II ESAs were completed for the former Washington-Oregon Shippers Cooperative Association (WOSCA) and Gerry Sportswear properties located at 801 and 1051 First Avenue S., respectively (CDM 2006b). The Phase II ESA was completed in January 2007 (CDM 2007). As part of the Phase II ESA investigation, a geophysical survey was conducted to identify potential USTs, and 13 soil probes were completed to collect soil and groundwater samples for chemical analysis.

Based on sample results, only soil appears to be contaminated with petroleum hydrocarbons. Diesel contamination was verified in soils in the central parking area of the WOSCA property, between a parking pay booth and the Gerry Sportswear building. Diesel range hydrocarbons were identified at 10,000 milligrams per kilogram (mg/kg) in a soil sample collected at a depth of 4 feet below the ground surface, above the MTCA Method A cleanup level of 2,000 mg/kg. There is no known source for the contamination, and it may have been a surface spill, which is not inconsistent with activities associated with a railroad freight terminal, the historical site use.

3.7 Subsurface Explorations Conducted for the Project

A field exploration program was performed along the project footprint to supplement the existing subsurface information and to obtain more specific geotechnical data in the locations of the proposed structures. In general, the explorations were located in areas where structures are proposed or where geologic conditions were not well documented. Groundwater monitoring wells (piezometers) were installed at many of the boring locations. Environmental laboratory tests (chemical analyses) were performed on samples collected during the geotechnical field explorations to assess

potentially contaminated soil and groundwater. Specifically, selected soil and groundwater samples were analyzed to identify contaminants that may affect disposal or treatment of the respective media. The results of these explorations are discussed in Chapter 4 and in the following reports:

- Geotechnical and Environmental Data Report (GEDR), by Shannon & Wilson, Inc., August 2002, 5 Volumes
- GEDR, by Shannon & Wilson, Inc., August 2005, 7 Volumes
- GEDR – Electrical Utility Explorations, by Shannon & Wilson, Inc., April 2007
- Utility Geoprobe Report, by Shannon & Wilson, Inc., April 2006
- Geotechnical and Environmental Report for Type, Size and Location (TS&L) Studies – South Section, by Shannon & Wilson, Inc., May 2007, 2 Volumes
- GEDR – Phase 1 Archeological Explorations, by Shannon & Wilson, Inc., October 2007

3.7.1 Soil Sampling and Analysis

Soil samples were analyzed for petroleum hydrocarbons either by hydrocarbon identification (HCID) methodology or by northwest total petroleum hydrocarbon–gasoline (NWTPH-G) and/or northwest total petroleum hydrocarbon–diesel-extended (NWTPH-Dx) methodology. Most samples were also analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Selected samples where creosote was suspected were also analyzed for semivolatile organic compounds (SVOCs) or PAHs. Samples from borings located near historical or current businesses that may have used solvents were analyzed for volatile organic compounds (VOCs). Samples that contained oil were frequently analyzed for polychlorinated biphenyls (PCBs). CCI Analytical Laboratories, Inc., of Everett, Washington, and OnSite Environmental Inc. of Redmond, Washington, performed chemical analyses under subcontract to Shannon & Wilson, Inc.

3.7.2 Groundwater Sampling and Analysis

Groundwater from each monitoring well was analyzed for a variety of potential contaminants, depending on the type of contaminant that might be expected, based on soil results and historical land use. Chemical analyses included VOCs; gasoline; diesel; PAHs; methane; total sulfides; total and dissolved metals, including arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc; and general water quality parameters. Analytes were selected for testing based on the results of soil testing, adjacent land use, and general location.

CCI Analytical Laboratories, Inc., of Everett, Washington, and OnSite Laboratories of Redmond, Washington, generally performed chemical analyses of the groundwater samples under subcontract to Shannon & Wilson, Inc. OGW Research Labs, Inc., of Tukwila, Washington, performed the methane analyses.

3.8 Site Screening Criteria and Evaluation Criteria

3.8.1 Listed Sites with Documented, Suspected, or Potential Releases

Regulatory databases were searched for sites within a distance of 1 mile from the project footprint (EDR 2008). Documented release sites are defined as those that appear in the regulatory database search as having reported a release of contaminants into the soil, sediment, or groundwater of a property. Other sites included in the regulatory database search (EDR 2008) include generators of hazardous wastes (not necessarily indicating a release) and registered USTs.

Sites within 1 mile of the project footprint were identified by the environmental database search. Many of the sites appear on more than one list. All federal NPL and CERCLIS sites within 1 mile of the project footprint and all state CSCSL, WA-ICR, and LUST sites within 400 feet of the project footprint (approximately two city blocks) were evaluated. The NPL and CERCLIS sites identified were considered to have a low potential to adversely affect the Project based on the extent and type of contamination as described in the EDR summary (Attachment A) and the relative distance of the sites from the study area.

Sites identified on the state lists that are located greater than two blocks from the project footprint were not evaluated because they do not have as likely a potential to affect the Project as do the large number of similar types of sites identified in the study area.

Thirty-six sites are located within the study area. Of these sites, 16 were eliminated in the evaluation as being unlikely to affect the Project based on the following screening criteria:

- Sites listed solely on the RCRIS database (Exhibit B-1, Attachment B) were eliminated. Inclusion on the RCRIS list indicates that a site uses or generates regulated materials as part of their business practice, but gives no indication of releases to soil or groundwater (4 sites).
- Sites listed solely on the ERNS database (Exhibit B-2, Attachment B) were eliminated. Inclusion on this list indicates that a spill has occurred on site. None of the sites found here are included on other lists that would indicate soil or groundwater contamination (12 sites).

3.8.2 Potential Releases Based on Historical Uses

A list of the historical businesses and industries within the study area that are likely to have been associated with generation, storage, or transportation of hazardous materials was developed based on a review of historical records discussed in Section 3.1. Exhibit 3-4 includes a list of the identified industries and associated contaminants that were considered as having the potential for historical releases. Although many contaminants may have been used at some sites, only the most likely contaminants that would be encountered at each business type have been identified.

In reviewing archive files, properties with heating oil tanks were also identified. These tanks are not required to be registered and do not appear in the state UST databases.

Properties where the only potential source of contamination is a known or suspected heating oil UST were eliminated from further evaluation because of their typically smaller volume and the low mobility of heating oil. These "oil heat only" properties totaled 36; they are listed in Exhibit 3-5.

Exhibit 3-4. Types of Businesses and Likely Contaminants

Business	Likely Contaminants
Asphalt paving	***Petroleum***, others
Auto service	***Petroleum***, solvents
Auto washing	***Petroleum***
Auto wrecking/junk yard	***Petroleum***, metals
Batteries	***Metals***, other
Blacksmiths	***Metals***
City Light (Power) substation	***PCBs***
Cleaners/laundry	***Solvents***
Coal storage/bunkers	***Petroleum***, others
Dyers	***Solvents***, metals
Foundry	***Metals,*** solvents
Gas station	***Petroleum***
Gas station with auto service	***Petroleum***, solvents
Hat cleaners	***Solvents***
Laundry/laundromat only	***Solvents***
Lithographers	***Solvents***, metals
Machinists	***Metals,*** solvents, petroleum
Manufacturing chemists	***Solvents,*** petroleum
Metal plating	***Metals,*** solvents
Oil burner repair/sales	***Petroleum***
Painters	***Solvents***, metals
Photo finishers	***Solvents***, metals
Plastic fabricators	***Solvents***
Printers	***Solvents***, metals
Railroads	***Petroleum,*** solvents, paint, fungicides, insecticides
Saw mill	***Petroleum***
Sheet metal works	***Metals,*** solvents
Stockyards	***Insecticides,*** fungicides
Trunk manufacturers	***Solvents***, metals
Upholstery cleaners	***Solvents***
Welding	***Metals,*** solvents

Bold/Italic text = Predominant contaminant, most likely to pose a problem.
PCBs = polychlorinated biphenyls

Exhibit 3-5. Oil Heat Only Properties

Block	Address (Archive)	Property Type/ Business Name (Archive)	Property Use	Comments/Description (Archive)	Current Tax Assessor Notes
360.1	525 Alaska Way, building A.	--	Pier, warehouse, and maintenance buildings	One-story gate house, built 1965, oil heat	Terminal 46 (marine/commercial/fish) – four buildings: (1) two-story transit warehouse/gate/guardhouse, 401 Alaskan Way S., built 1967, warmed and cooled air; (2)office building, built 1967, warmed and cooled air; (3)transit warehouse/transit shed, built 1967, space heaters; and (4) storage warehouse/maintenance, built 1967, space heaters
360.1	1049 Railroad Avenue South	The B.F. Goodrich Company	Waterfront property	Three-story warehouse, built 1922-23, oil burner	Port of Seattle: commercial, terminal (marine, commercial fish)
360.1	32 West Connecticut Street	A.M. Castle & Co.	Waterfront property and warehouse	Two-story warehouse, built 1918, oil burner	Port of Seattle: commercial, terminal (marine, commercial fish)
360.15	90 West Dearborn	Auto Freight Depot	Warehouse	Two-story warehouse, built 1921, oil burner	Vacant land. UST removed in 2007. See Section 3.6.
370.1	77 West Dearborn (also given address 801 1st Avenue South)	Union Pacific Freight Station	Railway, warehouse, and loading dock	Two-story freight depot, built 1912; 1-story freight depot and garage, built 1935, stove heat	WSDOT (former WOSCA Terminal) – three buildings: (1) one-story transit/freight warehouse, built 1912, steam and no boiler heat; (2) one-story transit warehouse/loading dock, built 1935, no heat; (3) two-story office, built 1912, forced air unit
370.1	1019 1st Avenue South	--	Railway, warehouse, and loading dock	One-story team track office, built 1941, stove heat; building moved in 1968	WSDOT (former WOSCA Terminal) – three buildings: (1) one-story transit/freight warehouse, built 1912, steam and no boiler heat; (2) one-story transit warehouse/loading dock, built 1935, no heat; and (3) two-story office, built 1912, forced air unit
370.1	1041-51 1st Avenue South	--	Clothing warehouse	Two-story warehouse, built 1939, oil burner	WSDOT (former Gerry Sportswear) (1041 1st Avenue S.): two-story warehouse, built 1939, space heaters

Exhibit 3-5. Oil Heat Only Properties (continued)

Block	Address (Archive)	Property Type/ Business Name (Archive)	Property Use	Comments/Description (Archive)	Current Tax Assessor Notes
370.2	1014-16 1st Avenue South	Backus Import Company Corporation	Warehouse	Four-story warehouse/store, built 1907, oil burner	Four-story storage warehouse built 1907, space heaters
370.2	932 1st Avenue South	Cragin & Company	Retail and warehouse	One-story office, built 1918, oil burner; six-story warehouse, built 1910	One-story sports bar building, built 1918, complete heating, ventilation, and air conditioning (HVAC) system
380.1	1241 Railroad Avenue South	Merchants Transfer & Storage	Waterfront property and warehouse	Warehouse, built 1907, oil burner, torn down 1966	Terminal 46 (marine/commercial/fish) – four buildings: (1) two-story transit warehouse/gate/ guardhouse, 401 Alaskan Way, built 1967, warmed and cooled air; (2) office building, built 1967, warmed and cooled air; (3) transit warehouse/transit shed, built 1967, space heaters; and (4) storage warehouse/maintenance, built 1967, space heaters
380.1	1215 Railroad Avenue South	A.M. Castle & Co.	Office, maintenance, and transit shed buildings	Built 1918, stove heat, one tank (type unknown – listed under plumbing)	Four buildings: (1) two-story gate and guard houses, built 1967, warmed and cooled air; (2) two-story office building, built 1967, warmed and cooled air; (3) one-story transit shed, built 1967, space heaters; and (4) one-story maintenance building, built 1967, space heaters
380.4	1230 1st Avenue South	M. Block & Co.	Warehouse and sport facility	Warehouse, built 1910, stove heat	Safeco Field Sport Facility
380.4	1212 1st Avenue South	General Electric Supply Corporation	Warehouse and sport facility	Three-story warehouse, built 1929, oil burner in office only	Safeco Field Sport Facility
380.4	1258 1st Avenue South	Former automotive supply	Warehouse and sport facility	Warehouse, built 1926, oil burner; sign indicates automotive supply (i.e., batteries, tires)	Safeco Field Sport Facility

Exhibit 3-5. Oil Heat Only Properties (continued)

Block	Address (Archive)	Property Type/ Business Name (Archive)	Property Use	Comments/Description (Archive)	Current Tax Assessor Notes
390.1	West of 170 West Massachusetts Street	--	Waterfront property and warehouse	Two-story warehouse, built 1925, stove heat	Terminal 46 (marine/commercial/fish) – four buildings: (1) two-story transit warehouse/gate/guardhouse, 401 Alaskan Way S., built 1967, warmed and cooled air; (2) office building, built 1967, warmed and cooled air; (3)transit warehouse/transit shed, built 1967, space heaters; and (4) storage warehouse/maintenance, built 1967, space heaters
390.3	85 Atlantic Street	--	Warehouse	Two oil burners	Two-story storage warehouse, built 1937, hot water heat/vacant lot
390.3	1541 Utah Avenue	State Transfer, Inc.	Waterfront property and warehouse	One-story freight shed, built 1918, stove heat	Terminal 46 (marine/commercial/fish) – four buildings: (1) two-story transit warehouse/gate/guardhouse, 401 Alaskan Way S., built 1967, warmed and cooled air; (2) office building, built 1967, warmed and cooled air; (3) transit warehouse/transit shed, built 1967, space heaters; and (4) storage warehouse/ maintenance, built 1967, space heaters
390.3	65 Atlantic Street	Bemis Brothers Bag Co.	Warehouse and bag company factory	Office/factory, built 1904, oil burner	Bemis Building (65 S. Atlantic St.): four-story storage warehouse/residential studios, built 1904, space heaters/vacant lot
390.5	1500 -16 1st Avenue South	--	Office, commercial	Office/clinic/warehouse, oil burner	Baseball Club of Seattle, Outback Steakhouse, tents and other temporary improvements

Exhibit 3-5. Oil Heat Only Properties (continued)

Block	Address (Archive)	Property Type/ Business Name (Archive)	Property Use	Comments/Description (Archive)	Current Tax Assessor Notes
400.1	111 West Massachusetts	--	Office building, oil / boiler house	Oil/boiler house, built 1951, oil burner	U.S. Coast Guard (17 South Massachusetts) – three buildings: (1) built in 1991, one-story government services, warmed and cooled air; (2) one-story storage warehouse, built in 1991, unknown heating; (3) one-story office building, built in1992, warmed and cooled air/ Washington State Department of Natural Resources, U.S. Coast Guard – two buildings: (1) one-story multi-purpose, built in 1991, heat pump; (2) one-story storage warehouse, built 1991, no heat.
400.1	121 West Massachusetts	--	Office building and warehouse	Warehouse, built 1909, stove heat	U.S. Coast Guard (17 South Massachusetts) - three buildings: (1) built in 1991, one-story government services, warmed and cooled air; (2) one-story storage warehouse, built in 1991, unknown heating; (3) one-story office building, built in1992, warmed and cooled air/ Washington State Department of Natural Resources, U.S. Coast Guard - two buildings: (1) one-story multi-purpose, built in 1991, heat pump; and (2) one-story storage warehouse, built 1991, no heat.
400.1	1201 Railroad Avenue South	Washington Glass Company	Glass company	Built 1909, stove heat	One-story industrial, vacant, built 1950, no heat
400.2	Massachusetts Street & Colorado Avenue	--	Railway	Office, stove heat	Railroad operating property: one-story shed, built 2000, no heat
400.3	Colorado Avenue South, West Holgate Street and Utah Avenue South	Puget Sound Butter and Egg	Railway and food products	One-story warehouse/office/retail, built 1916, oil burner	BNSF Railway Company (BNSF) operating property

Exhibit 3-5. Oil Heat Only Properties (continued)

Block	Address (Archive)	Property Type/ Business Name (Archive)	Property Use	Comments/Description (Archive)	Current Tax Assessor Notes
400.3	Portion of Lots 16-19	A.H. Cox & Co. (Leaser)	Warehouse	One-story warehouse, stove heat	BNSF operating property
400.4	1701 1st Avenue South	Kellogg	Warehouse	Warehouse, built 1910, stove heat	Not reviewed, not adjacent
410.1	Stacy Street and East Waterway	San Juan Fishing & Packing Co.	Food products	Two-story cold storage, built 1910, oil burner and stove heat; two-story storage shed; one-story storage shed	Port of Seattle, tideland
410.1	76 West Stacy Street	San Juan Fishing	Food products	Factory and cannery, stove heat	Port Terminal 30 (marine/commercial/ fish)/ Port of Seattle, tideland
410.1	2257 East Marginal Way South	Seattle Hardware Co.	Hardware retail	One-story retail, built 1910, stove heat	Port Terminal 30 (marine/commercial/fish)
410.1	2257 East Marginal Way South	Seattle Hardware Co.	Hardware warehouse	One-story warehouse, built 1907, stove heat	Port of Seattle, tideland
410.2	2220 East Marginal Way South	Northern Pacific Railroad	Railway	One-story office/shop/lunchroom, built 1957, stove heat	Railroad operating property - commercial rail terminal
410.4	1963 1st Avenue South	Independent Paper Stock Co.	Paper company	Two-story warehouse/office, built 1909, stove heat	Not reviewed, not adjacent
420.1	Stacy Street & Utah Street	Mike Duffy Beverages	Food products	One-story café, built 1938, stove heat	BNSF operating property/SODO Center Parking Garage (2245 Utah Avenue S.) two buildings: (1) seven-story parking garage, built 1976, space heaters; and (2) seven-story "Starbucks" parking garage, built 2002, unknown heat source

Exhibit 3-5. Oil Heat Only Properties (continued)

Block	Address (Archive)	Property Type/ Business Name (Archive)	Property Use	Comments/Description (Archive)	Current Tax Assessor Notes
420.1	Utah Avenue South & South Walker Street	Chicago Milwaukee and St. Paul Railyard Co.	Railway and garage	One-story office/locker, built 1943, stove heat	BNSF operating property/SODO Center Parking Garage (2245 Utah Avenue S.) two buildings: (1) seven-story parking garage, built 1976, space heaters; and (2) seven-story "Starbucks" parking garage, built 2002, unknown heat source
420.2	2237 1st Avenue South	--	Warehouse and drilling co.	Two-story shed, built 1913, stove heat, well drilling company	Vulcan Northwest, Inc. (2245 1st Avenue S.): three-story storage warehouse, built 1930, space heaters
420.2	2255 1st Avenue South	National Bank of Commerce	Bank	Two-story bank, built 1953, oil burner	Evergreen Money Source, U.S. Bank Corporate Property (2265 1st Avenue S.): two-story office, built 1953, forced air unit

-- indicates no site / business name

BNSF =BNSF Railway Company

3.9 Validated Sites

The site screening resulted in a list of sites that pose some risk to the Project. These sites include listed sites that have a known release (that were not eliminated as described above) and sites identified through review of historical information. The two lists were reconciled to avoid listing a site for both a known release (listed site) and potential release based on historical business activities. The final list of sites was classified as "validated."

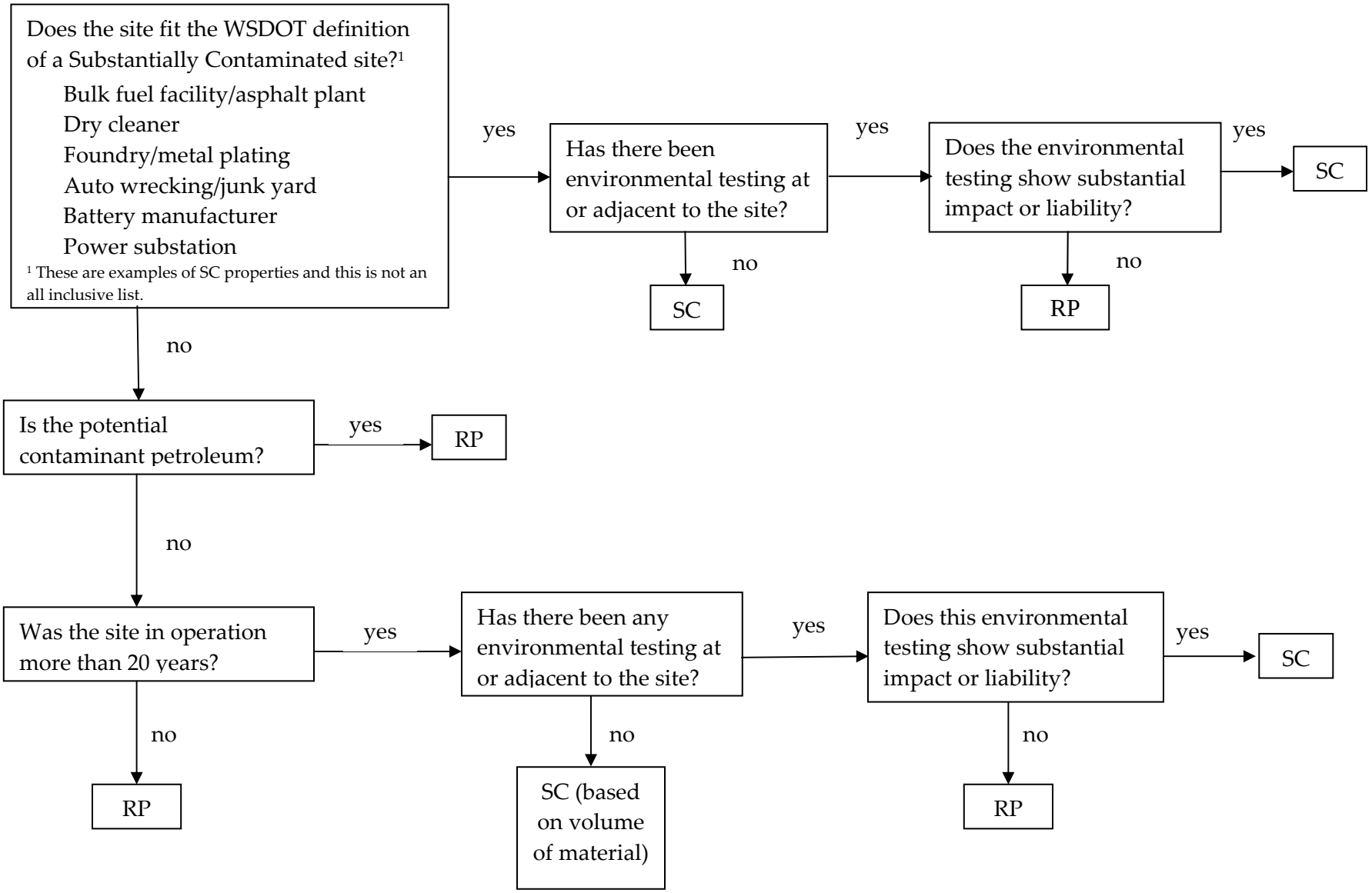
A determination was then made as to whether remediation measures for each validated site would be "reasonably predictable" or whether the site is considered to be potentially "substantially contaminated," as defined by WSDOT (WSDOT 2007a). The flow chart in Exhibit 3-6 was used to classify the validated sites as reasonably predictable or substantially contaminated, as defined below. Of a total of 146 sites, 29 are considered to potentially be substantially contaminated and 117 are considered reasonably predictable (Exhibit C-1, Attachment C). The validated sites that are adjacent to the SR 99 alignment in the study area are discussed and presented in Chapter 4, Affected Environment.

"Reasonably predictable" sites are those where the nature of potential contamination is known based on existing data, or where it can be reasonably predicted based on observations of the site, experience at similar sites, and/or best engineering judgment. Reasonably predictable sites are typically small to medium in size, contain potential contaminants that are not extremely toxic or difficult to treat, and dictate straightforward approaches to remediation. Examples of sites that are classified as reasonably predictable are gas stations, auto repair shops, most USTs, LUSTS, aboveground storage tanks, small manufacturing operations, and buildings with asbestos or materials containing lead paint.

"Substantially contaminated" sites may pose a potential for major liability for WSDOT either in construction liability or by virtue of acquiring all or a part of the site. If the site has undergone a detailed investigation and a feasibility study, the effects and remediation costs may have been predicted. Nonetheless, the site is identified as substantially contaminated because of its potential effect to the Project. Other sites are considered substantially contaminated because their effects are not reasonably predictable. In general, substantially contaminated sites possess a potential for substantial soil or water contamination, and/or the information necessary to predict remedial costs is lacking, and/or the contaminants are persistent and/or expensive to manage. The site may be contaminated over a large area with a single contaminant or over a smaller area with multiple contaminants. Substantially contaminated sites are typically large and/or have large volumes of

contaminated material, and/or have a long history of industrial or commercial use. Examples of sites that would be classified as substantially contaminated include wood treating operations, metal plating facilities, large bulk petroleum facilities, refineries, hazardous material treatment facilities, or other sites that use or have used large amounts of contaminating materials (WSDOT 2007a).

Exhibit 3-6. Substantially Contaminated (SC) and Reasonably Predictable (RP) Flow Chart



Chapter 4 AFFECTED ENVIRONMENT

The study area extends from about S. Walker Street, north along the existing viaduct alignment, to approximately S. King Street. The study area passes through highly developed commercial and industrial areas of Seattle. These areas of the city were first developed in the 1870s through the early 1900s and have a long and varied land use history. As a result of the commercial and industrial use of this area, hazardous materials may have been released into the surrounding environment from a wide range of potential sources. Also, the placement of fill and road and pier construction may have adversely affected the environmental conditions in the study area.

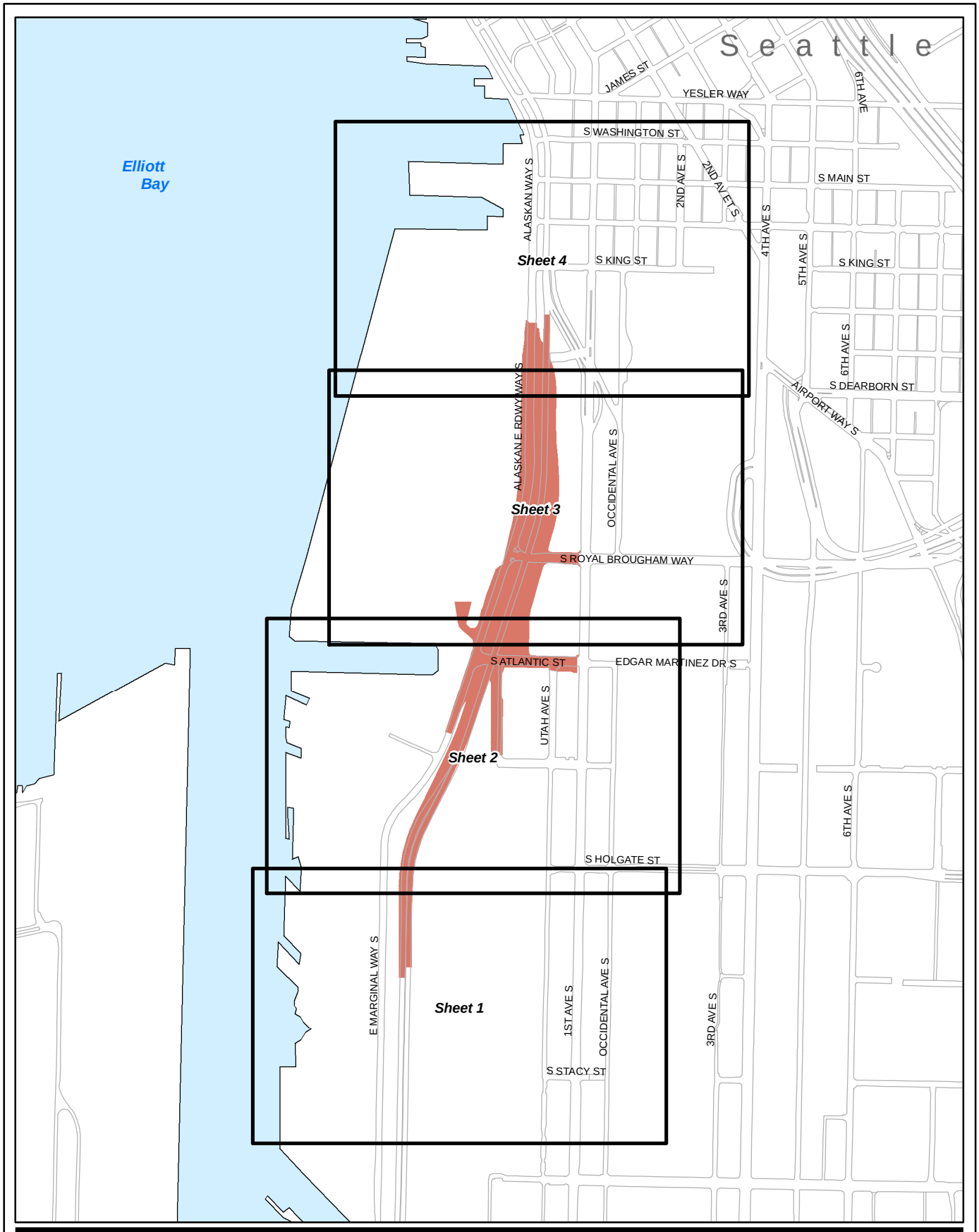
The physical environment in the study area is another major factor that must be considered in evaluating the extent of potential contaminant releases. The most important characteristics of the physical environment are the soil and groundwater conditions in and near the project footprint. These physical characteristics affect the potential for vertical and lateral migration of contaminants and, therefore, the potential for contamination from nearby releases to migrate to soils within the project footprint or to be present in groundwater encountered during construction. The presence of hazardous materials in the soils or groundwater could have broad implications for the construction approach and costs for this Project.

The following discussion of the affected environment summarizes physical environment, historical land use, and the potential and known distribution of contaminants in the study area. The study area is discussed, as shown in Exhibit 4-1, from south to north. Site-specific information shown in Exhibit 4-1 is also presented in Attachment C, Exhibit C-1.

4.1 Physical Environment

This section presents a description of the physical environment and how it relates to the movement of contaminants.

During the last century, fill material was placed to depths of 5 to 50 feet along E. Marginal Way S. and the Port of Seattle facilities to the south. Much of the shallow soil along the study area was soil that was dredged from the Duwamish Waterway and hydraulically placed (placed by using water). A variety of pile supported structures, dock facilities, and railroad tracks were formerly located along the proposed alignment. Concrete, wood, manmade debris, ship ballast, sawmill by-products, trees, and other waste and debris is likely present in the naturally occurring deposits and fill. Piles from former



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N

0 500 1,000 2,000 Feet

Exhibit 4-1
Index for Sites with Documented and Potential Contaminant Releases
Sheet A

LEGEND

(See Exhibit C-1 for a summary of each site)

Documented Releases

Gasoline

- Reasonably Predictable
- Substantially Contaminated

PAHs

- Reasonably Predictable
- Substantially Contaminated

Solvents

- Reasonably Predictable
- Substantially Contaminated

Petroleum (diesel and/or oil)

- Reasonably Predictable
- Substantially Contaminated

Metals

- Reasonably Predictable
- Substantially Contaminated

PCBs

- Reasonably Predictable
- Substantially Contaminated

Build Alternative

Fill

Historic Railroad Use

Parcel w/Site Designation

-1

Block w/Designation

60.2

Study Area

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Exhibit 4-1
Legend for Sites with Documented and Potential Contaminant Releases
Sheet B

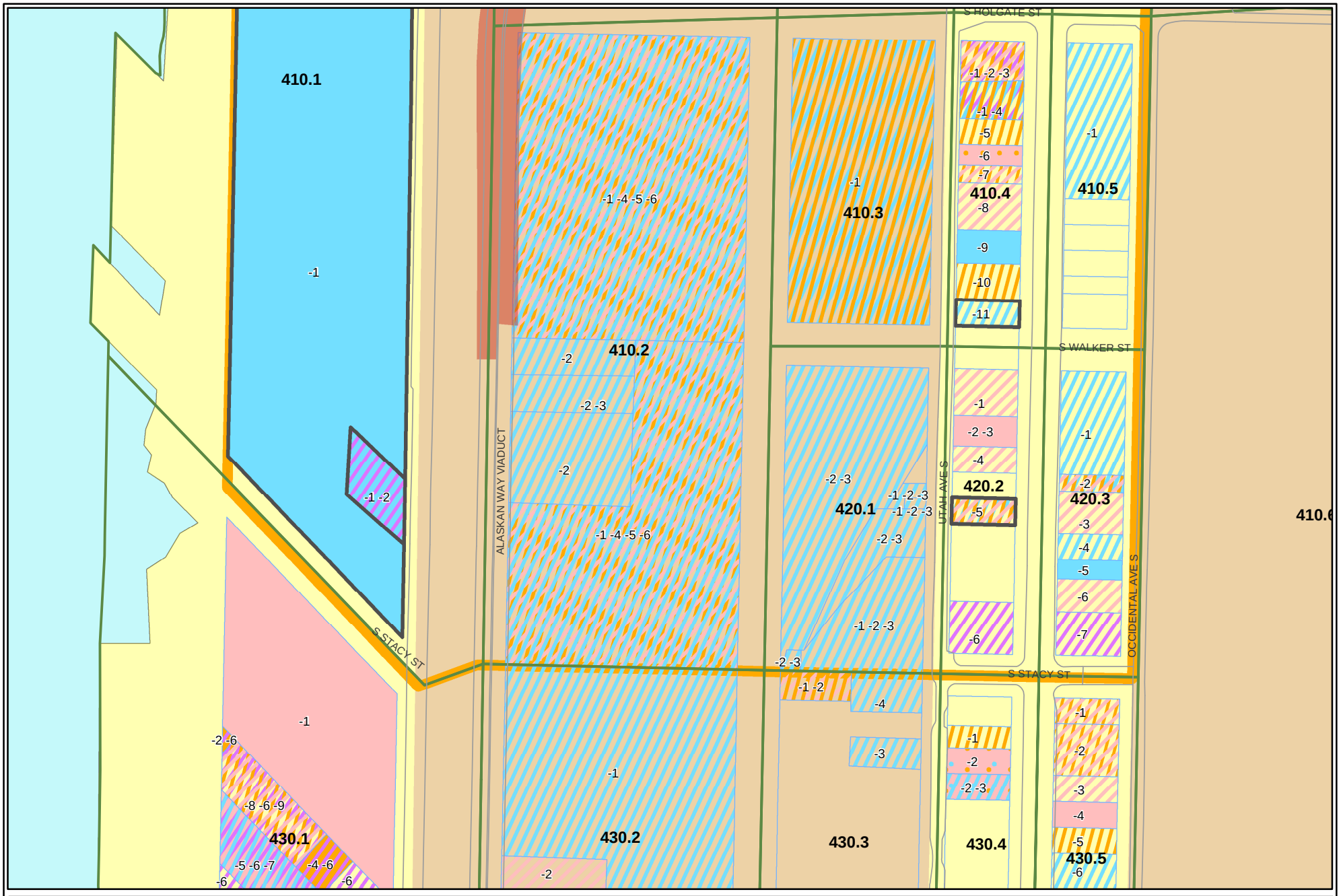

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Exhibit 4-1
Plan of Sites with Documented and Potential Contaminant Releases
Sheet 1 of 4

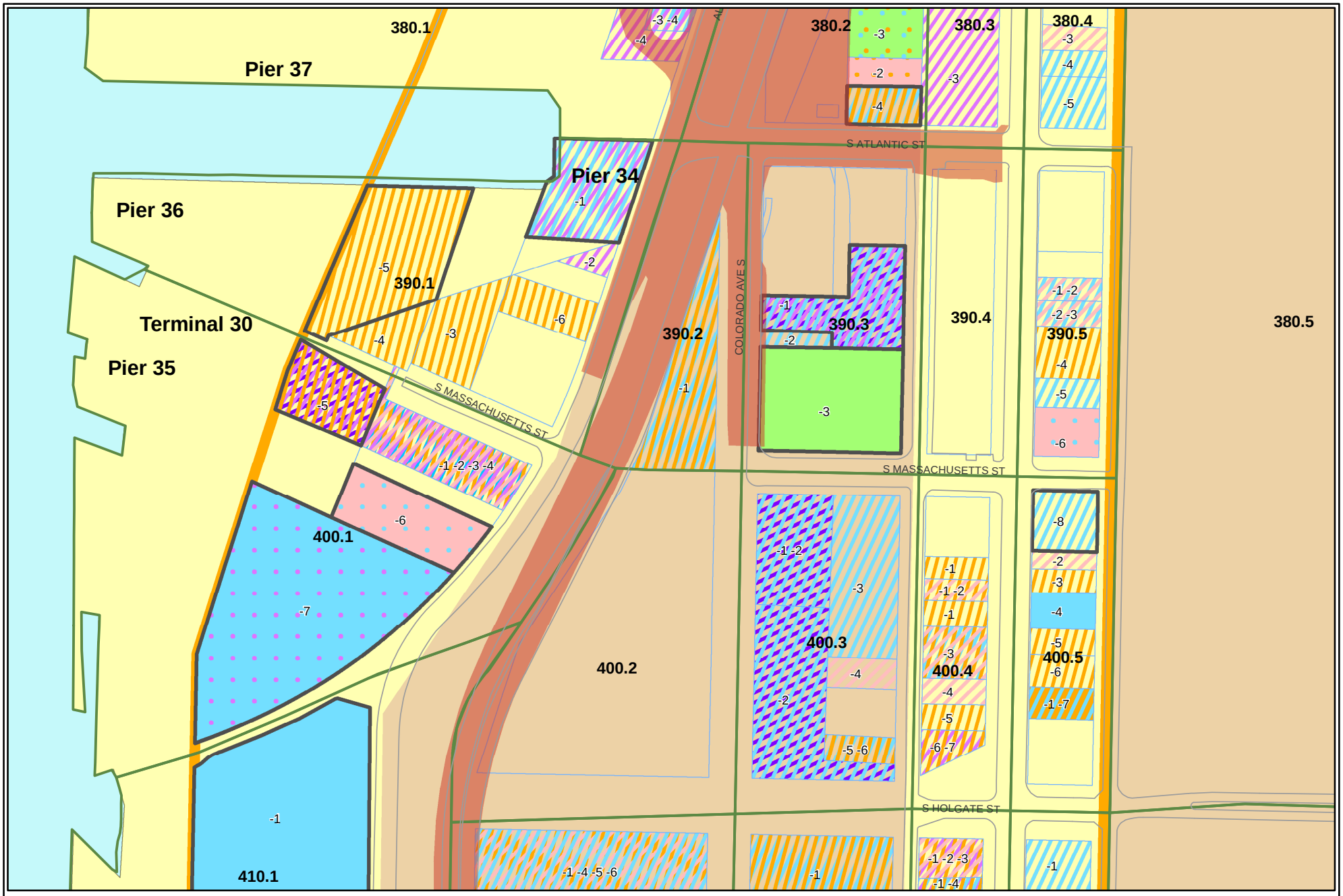

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Exhibit 4-1
Plan of Sites with Documented and Potential Contaminant Releases
Sheet 2 of 4

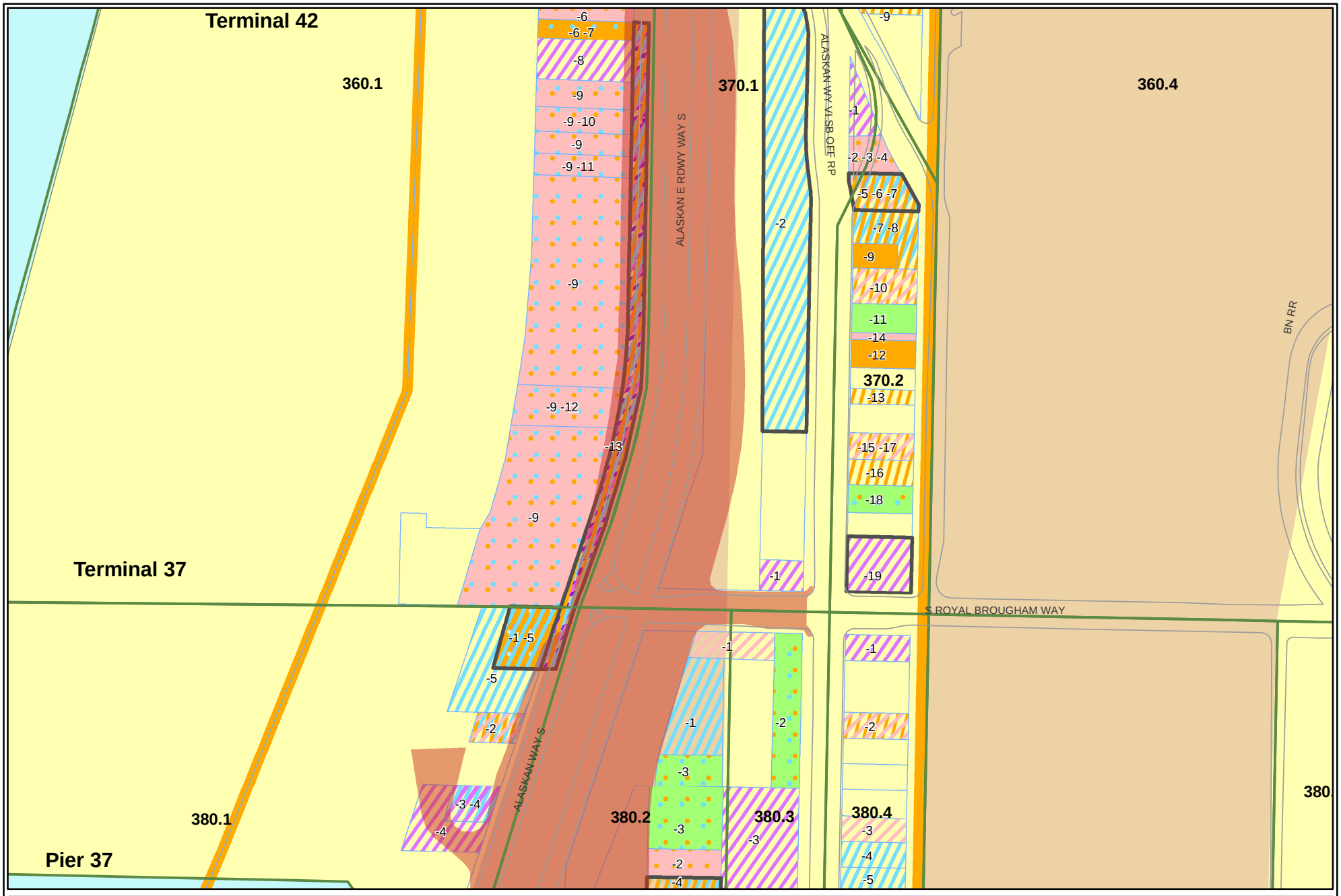

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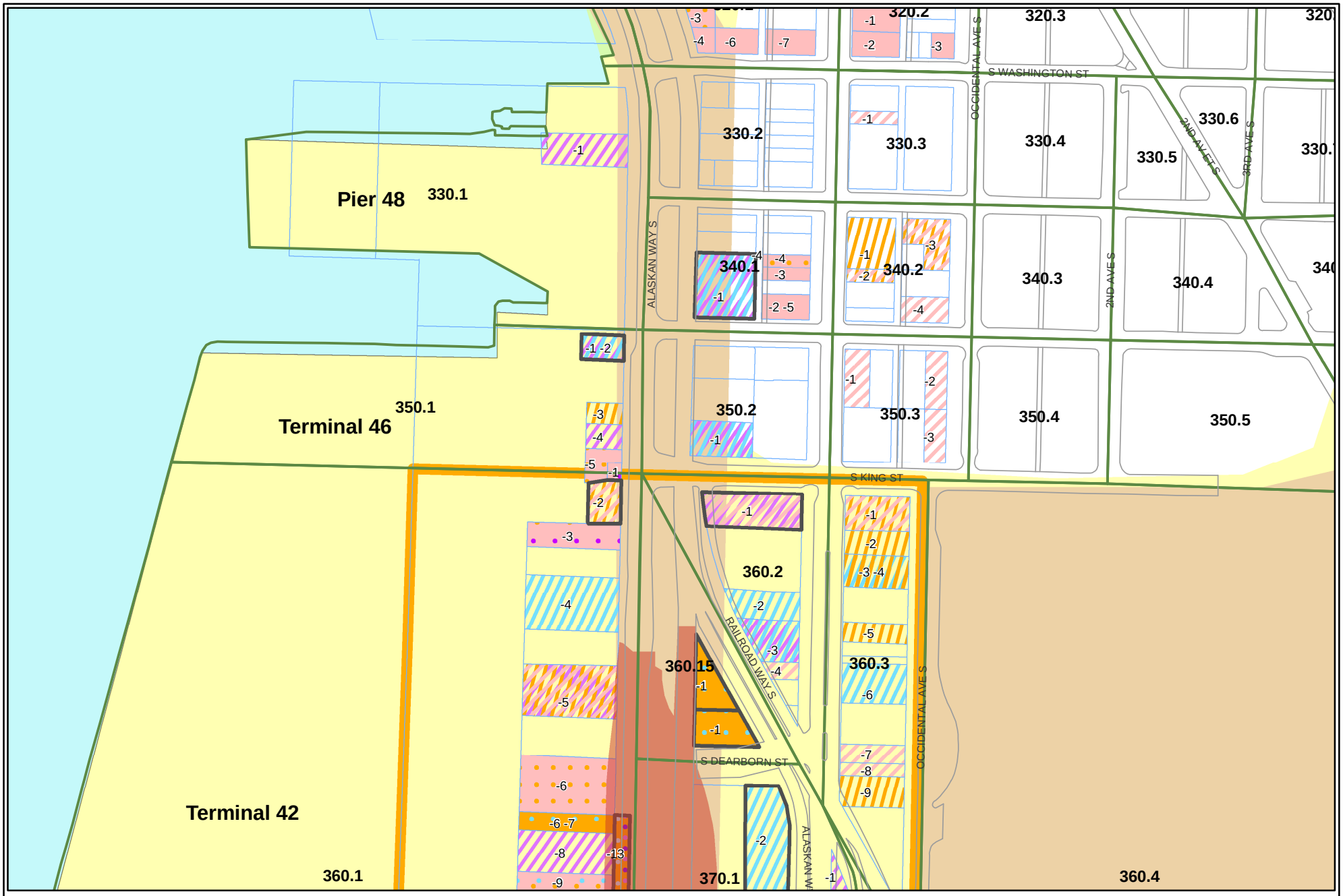
Exhibit 4-1
Plan of Sites with Documented and Potential Contaminant Releases
Sheet 3 of 4



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0 150 300 600 Feet

N

Exhibit 4-1
Plan of Sites with Documented and Potential Contaminant Releases
Sheet 4 of 4

structures and railroad alignments were likely left in place and are now buried. Multiple structures and multiple reconstructions and realignment of railroad tracks likely occurred. A large number of piles, some closely spaced, may be present. Abandoned piles, trees, and other wood that has been continuously saturated and buried may be in relatively sound condition.

The movement of a contaminated material is influenced by the subsurface conditions and the physical properties of the contaminant, including its density relative to water and how soluble the contaminant is in water. Contaminants may migrate as a pure liquid or as a dissolved constituent within groundwater. Consequently, understanding groundwater movement is the primary means of assessing potential contaminant migration pathways.

Groundwater flows most readily through coarse-grained soils such as sand and gravel. Groundwater does not flow readily through fine-grained soils such as silt and clay, or through till, which is a mixture of silt, clay, sand, and gravel deposited and consolidated by glaciers.

Liquid contaminants on or near the ground surface may move downward through coarse-grained soils. This movement is typically enhanced by infiltration of precipitation or other surface water, which can either physically transport the contaminant or carry it downward in solution. Similarly, a solid contaminant can be mobilized downward into the soil column when it is dissolved in water. A contaminant that moves downward to the shallow groundwater will then behave differently, depending on its solubility in water and whether it is lighter or heavier than water density:

- Contaminants that are soluble in groundwater (such as some solvents) will tend to dissolve and move in the direction of groundwater flow within pervious soils.
- If the contaminant does not readily dissolve in water and is lighter than water (such as oil and gasoline), the contaminant could float on the surface of the groundwater.
- If the contaminant does not readily dissolve in water and is heavier than water (such as creosote and some degreasing solvents), the contaminant could sink through the water column, moving downward until it reaches the fine-grained soil that separates shallow groundwater and deep groundwater.

Soils in this area are predominantly fine-grained, with thin layers of coarse-grained soils scattered throughout the area. Shallow groundwater is first encountered approximately 6 to 8 feet below ground surface. Deep groundwater is encountered in a thin layer of coarse-grained soil that is

approximately 200 feet below ground. The direction of groundwater flow is predominantly toward Elliott Bay.

4.2 Historical Land Use

Historical land use activities in the study area were reviewed to identify properties that have a high potential for hazardous material contamination. The historical land use information was obtained through a review of data from public agencies and library resources.

Based on historical activities, six general types of contaminants of concern have been identified in the study area; these contaminant types have varying toxicity and mobility that will determine how significant their presence may be to the Project. They include:

- Mid- to heavy-range petroleum hydrocarbons (referred to in the text as oil) – These contaminants include diesel, bunker fuel, and lube oils. Historical uses were widespread and associated with a variety of land uses. Lube oils were used extensively by the railroads. Diesel was used to heat businesses and homes. For the most part, these contaminants are relatively low in toxicity, are not particularly mobile, and tend to float on the water table rather than dissolve or disperse throughout the water column. As a result, any given leak or release of diesel or oil is not likely to have resulted in widespread contamination.
- Gasoline – Gasoline contamination generally results from leaks and spills associated with former gasoline stations and vehicle maintenance facilities. Gasoline is relatively mobile in the environment and is more toxic at lower concentrations than heavier grades of hydrocarbons. Gasoline also tends to float on the water table; however, more soluble components such as benzene, toluene, ethylbenzene, and xylenes (BTEX) may be present, depending upon the age of the release. These volatiles can pose a substantial risk to humans and the environment and are highly soluble and mobile in groundwater.
- PAHs – PAHs, some of which are carcinogenic, are present in heavy-range petroleum hydrocarbons and are also created during the burning process as a result of incomplete combustion. PAHs are also present in creosote. PAHs may be associated with petroleum releases such as leaking heating oil USTs, lubricating oils from the former railroad use, burned timbers, and creosote-treated timbers or pilings used to support railroad trestles or the former elevated roadway (Alaskan Way S.).

- Metals – Heavy metals, including arsenic, cadmium, chromium, lead, zinc, and copper, are associated with metal works, foundries, and plating operations. Metal-contaminated sites have the greatest effect on the soils and groundwater directly underlying the site; however, metals may also move off-site with groundwater. Because of the limited mobility of metals, downgradient soils are not likely to be highly contaminated as a result of groundwater migration.
- Solvents – Trichloroethylene (TCE) and tetrachloroethylene (PCE) were used historically as solvents in dry cleaning and for degreasing at a variety of businesses. These compounds result in breakdown products such as dichloroethylene (DCE) and vinyl chloride. A variety of businesses such as machine shops and metal works tended to use small volumes of solvents. Solvents are highly toxic at low concentrations and are highly mobile in soil and groundwater. Most solvents are denser than water and therefore tend to move downward through the subsurface and water column. Unlike most contaminants, solvents can migrate relatively readily through fine-grained soils.
- PCBs – The most likely sources of PCBs are spills or leaks of dielectric fluids from PCB-containing equipment such as transformers or switches, which are often found at power stations. PCBs are associated with junkyards because of the historic mismanagement of used electrical equipment. PCBs tend to adhere to organic matter in soil and do not readily migrate from soil to groundwater.
- Elevated pH – naturally occurring levels of pH that are potentially toxic to aquatic organisms have been identified.

In addition, large quantities of fill and wood have been encountered, and the presence of these materials may affect disposal options. Fill materials were placed in the tidelands in the 1910s to 1920s around pile-supported railroad lines and around a parallel, wood-planked timber trestle roadway that extended through the study area. Reportedly, many of the piles were treated with creosote (composed of PAHs and petroleum compounds). Because of the toxic constituents of creosote, these treated timbers pose a hazard to human health and the environment, both from the timbers themselves and from contamination that has leached from the wood to the adjoining soil and groundwater. The timbers appear to be closely spaced and will complicate the excavation, handling, and disposal of the fill materials. In addition to the creosote and timbers, the fill materials likely contain a variety of other contaminants scattered throughout the study area. Petroleum hydrocarbons are relatively common contaminants in the fill materials. Metals, construction debris, and other constituents are also likely present in the fill.

The decay of wood and sawdust, which was used as fill at the north end of the study area, can result in the production of hydrogen sulfide (H_2S). H_2S poses problems for workers, as it is heavier than air and "sinks" in trenches, displacing air. In addition, H_2S can dissolve in water. Metro has established discharge criteria for discharge of H_2S in the municipal sewer system.

Each validated site described below is located adjacent to the proposed project footprint or is a site that would potentially be acquired or modified for the Project. Because of their proximity to the alignment, these sites have a higher potential to affect the Project than sites located farther away. The potential risk to the Project from each of these sites is characterized as low, moderate, or high depending on whether contamination is known to be present, if remediation of suspected contaminants is reasonably predictable, and whether earthwork is anticipated in the site vicinity or the site would be acquired for the Project. In general, the criteria in Exhibit 4-2 were used to characterize the risk of the validated sites:

Exhibit 4-2. Criteria for Characterizing Level of Risk

Risk	Category of Potential Contamination/Remediation	Proximity/Future Ownership
Low	Reasonably predictable	Property is located adjacent to the project footprint.
Moderate	Reasonably predictable	WSDOT is anticipated to acquire the site and/or have a temporary or permanent easement.
Moderate	Substantially contaminated	Property is located adjacent to the project footprint, but WSDOT is not acquiring the property.
High	Substantially contaminated	WSDOT is anticipated to acquire the site and/or have a temporary or permanent easement.

The area between S. Walker and S. King Streets was tideland when the region was first settled in the early 1850s. Beginning in 1895 and continuing through the early 1900s, extensive dredging and filling in the southern portions of Elliott Bay radically altered the shoreline. Upon the completion of the East Waterway in 1905, piers and wharves were constructed to facilitate cargo transfer and to provide marine-related services. Although this area has been substantially redeveloped, the supports for the piers and wharves may not have been removed for structures located directly west of the proposed alignment along E. Marginal Way S. (formerly known as Whatcom Avenue) and Alaskan Way S. (formerly known as Railroad Avenue). In the early 1900s, Whatcom Avenue was a pile-supported, wood-planked road. Typical industrial activities along the waterfront during that period included storage warehouses and transit sheds, boat building yards, dry docks, and iron and machine works. Standard Oil Company of California operated a large tank

farm from the early 1900s until the 1980s. The Port of Seattle acquired this site in the 1980s for freight transfer (Terminal 30). Another large tank farm (GATX), located north of S. Holgate Street, operated from 1928 until 1993.

The waterfront has a long history of use by railroads, with tracks located directly east of E. Marginal Way S. and parallel to the Project. The Seattle-Walla Walla Railroad was constructed on pilings over the tideland of Elliott Bay between 1874 and 1878. Other railroad lines and associated buildings were also constructed on piling or planks over the tidelands. In the early 1900s, a roundhouse and a turntable were located in the railyard between S. Stacy and S. Holgate Streets. The roundhouse and turntable were removed by 1966. Stockyards were located directly east of the railyard and north of S. Holgate Street in the 1900s. Petroleum is the most common contaminant associated with railyards, and use of fungicides and insecticides is common in stockyards and railyards. Prior to 1950, warehouses and repair shops to support Port activities displaced some of the rail lines along the east side of E. Marginal Way S.

By the late 1800s, S. King Street terminated at a coal wharf, which also housed machine shops and a roundhouse for railroad cars. Metal works, metal plating, machine shops, and foundries were located on wharves both north and south of the S. King Street Wharf through the early 1900s.

Foundries and iron works were also located east of Colorado Avenue S. and the rail lines. Many of the metal/iron works industries east of the rail lines are still in operation. Solvents and metals are common contaminants associated with these industries.

A dry dock and a shipbuilding yard were also located on the piers. During the 1930s, the former Skinner & Eddy Shipyard (Pier 42) was a collection of shanties for the homeless. In the 1940s, Pier 42 was used as a rail/marine cargo loading facility. By 1960, the Port of Seattle had constructed Terminal 46 for use as a container facility. During phased construction between 1978 and 1980, Piers 37, 39, 42, 43, and the old Terminal 46 were removed. Fill was placed behind an embankment and a new Terminal 46, which also is a container facility, was constructed.

Aerial photographs were reviewed to augment other historical information. At the scale that was available, only general use and large features were discernable. At the southern end of the study area by Terminal 30 (Block 410.1), the 1936 aerial photos confirm the presence of two tank farms to the west of E. Marginal Way S. One was just northwest of S. Holgate Street (11 tanks), and the other is southwest of S. Holgate Street (3 tanks). By 1946, the southern portion of Block 360.1 consisted of piers. Two additional tank farms were added by 1956. Pier redevelopment continued to take place,

including filling the area between the Coast Guard Museum and S. Jackson Street. By 1985, the only tank farms remaining were those to the northwest of S. Holgate Street. These tank farms were also present in 1992. In the year 2000, no tank farms remained in this area.

The area has undergone little redevelopment, other than the Port acquisitions, since the 1950s. Although many businesses may no longer be in operation, the buildings that housed them remain and have been converted to other uses.

There is a high likelihood that many of the piles and timbers that were used to support the railroad trestles, buildings, and wharves were treated with creosote. Creosote contaminants have likely leached from the wood into the surrounding soil. Low levels of lubricating oil associated with railroad operation may also be encountered in soils directly under the former rail lines.

Because of the industrial nature of this area and the lack of redevelopment immediately east of E. Marginal Way S., contaminated soils and groundwater are likely present east of E. Marginal Way S. Historically, approximately 21 gas stations/repair shops operated in the study area; gas stations and repair shops are likely sources of petroleum contaminants and solvents. In addition, 26 former and current metalwork operations have been identified in the area. Metal and solvent contaminants are commonly associated with properties that were used for metalwork operations. If contaminant levels are high, the soluble metals may have migrated with the groundwater, but would not generally result in widespread soil contamination off the site.

As described below, petroleum contamination has been encountered at Terminal 30 and at Pier 34, which are located west of E. Marginal Way S. and south and north of S. Holgate Street, respectively. The Terminal 30 property was the site of the former Standard Oil of California tank farm, and Pier 34 was the site of the GATX tank farm. Most of the tanks and operations were located on the Duwamish River East Waterway side of the properties and were removed as part of redevelopment by the Port of Seattle. However, based on sampling in the 1980s and 1990s, low levels of petroleum may have migrated into E. Marginal Way S. Sampling in the 1990s identified petroleum contamination in shallow groundwater and soil at the eastern margin of the property.

King County combined sewer outfalls are located at S. Royal Brougham Way and S. King Street. Elevated concentrations of highly mobile contaminants, particularly gasoline and solvents, may be present in the permeable backfill of these sewers.

4.2.1 Validated Sites

Each block within the corridor was assigned a number, from north to south. Block boundaries were established based on the original city plat maps; consequently, block boundaries presented in Exhibit 3-1 may differ slightly from current block boundaries. The area south of S. Royal Brougham Way has had the greatest changes in block configurations. The site number consists of one or more parcels depending upon the business. In some instances, individual parcels have been sold and may have subsequently been used for a different type of business. Site numbers would then overlap.

Blocks 410.2, 410.1, 400.4, 400.3, 400.2, 390.2. Active and historical railroad operations and facilities are located on both sides of Alaskan Way S. within the study area. The areas beneath and around many of the tracks are not paved, and the potential exists for spills, drips, and various railroad operations to have affected the property. Specific information regarding individual properties, if known, is summarized below.

Block 410.2. At least three fuel tanks, a blacksmith shop, a machine shop, a power house, an oil shed, and multiple garages were located on this block (**Sites 410.2-1**, **410.2-2**, **410.2-3**, **410.2-4**, **410.2-5**, and **410.2-6**). These sites are considered reasonably predictable and a low risk to the Project.

Site 410.1-1. This site is part of Terminal 30 (formerly known as Pier 32). A bulk oil facility operated on this 11-acre site from 1913, or earlier, until 1984. A plume of free product was discovered in the early 1980s. A product recovery system was installed and operated until 1992. Most of the petroleum contamination occurred in the middle to western portions of the property; contaminants also included metals and cyanide. The consultant's report suggests that metals and cyanide may be from an off-site source (GeoEngineers and ERDA Environmental Services 1997). The entire site is paved, as of 2008. Diesel and kerosene-range petroleum hydrocarbons were detected in the right-of-way of E. Marginal Way S. (290 mg/kg total petroleum hydrocarbons [TPH] in the soil, 5 milligrams per liter [mg/L] gasoline and diesel in groundwater, below the respective MTCA Method A cleanup levels). The site is under an Agreed Order with Ecology (1991). The most recent report in Ecology's file is a Remedial Investigation/Feasibility Study1998. This site is considered to be a moderate risk to the Project.

A retail service station (**Site 410.1-2**) was also located at the bulk oil facility site. Records indicate that it was built in 1950 and had three USTs. The service station is considered to be reasonably predictable and a low risk to the Project.

Site 400.3-1. A coal yard operated at this site from at least 1946 to 1956. The site is considered to be reasonably predictable and a low risk to the Project.

Site 400.3-2. Railroad operations at this site date back until at least 1916 and include oil tanks. The potential petroleum products and/or PAH contamination at the site is considered to be reasonably predictable, and the risk to the Project is considered to be low. Other sites on **Block 400.3** are not adjacent to the alignment and are considered reasonably predictable, based on site use of less than 20 years or use of only petroleum.

Sites 400.1-1, -2, -3, -4, and -5. These sites were occupied by a waste transfer station in the 1970s. Earlier businesses at the location included a furniture factory, an aluminum business, a foundry supply business, and machine shops. Three USTs were removed from the site in 1990. Gasoline was detected in the soil at a concentration of 840 mg/kg at 10 feet (bottom of excavation) and 3,500 mg/kg at the south wall, above the MTCA Method A cleanup level of 30 mg/kg for gasoline that contains benzene. BTEX was also detected. No remediation is planned for this site.

Two USTs were removed in 2005. One tank contained water and Bunker C; the other tank may have been associated with the boiler. The maximum concentrations of contaminants in soil were 462 mg/kg diesel and 1,440 mg/kg oil, below the MTCA Method A cleanup level of 2,000 mg/kg. A Sampling and Analysis Plan report prepared in 2005 indicated that carcinogenic PAHs were detected in soil at 2.93 mg/kg, above the MTCA Method A cleanup level of 0.1 mg/kg; arsenic was detected in five groundwater samples at 0.007 to 0.180 mg/L, above the MTCA Method A cleanup level of 0.005 mg/L. These sites are considered a moderate risk to the Project because potential metals, solvents, gasoline, and petroleum contamination associated with them is considered reasonably predictable.

Site 400.1-6. Archive records indicate that the facility was constructed in 1950 and operated through 1993. Operations included blending of ink products, and the facility had three large tanks. The building is still present. Soil contaminants detected at the site include PAHs, metals, and petroleum hydrocarbons. Chlorinated solvents and petroleum were detected in site groundwater during unrelated groundwater monitoring for Pier 34 (see Site 400.1-7). Because of potential solvent contamination, this site is considered substantially contaminated and poses a high risk to the Project.

Site 400.1-7. A large tank farm and petroleum refinery was formerly located at Pier 34. The bulk fuel tanks have been removed, and petroleum-contaminated soil was excavated. An air-sparging system was operated from 1996 to 1998 to remediate soil and groundwater. Groundwater monitoring was to continue semiannually through at least 2003. Concentrations of

contaminants, including metals, gasoline, diesel, PAHs, and BTEX are below trigger levels that are protective of aquatic life (Model Toxics Control Act [MTCA] Method C). As of March 2004, the groundwater compliance monitoring report concluded that no further monitoring should be conducted. Most of the contamination is located in the center of the property and closer to the waterfront. The site is paved, as of 2008. The site is considered substantially contaminated based on known gasoline and petroleum contamination and is considered a high risk to the Project.

Site 390.3-1. A shop, constructed in 1926, operated on this site until at least 1975. Assessor information indicates that the current property owner has three buildings. Ecology's records indicate that three USTs were removed. TPH as oil, diesel, and gas with BTEX, and PAHs were present in soil and groundwater. Soil was land farmed. Groundwater monitoring from 1999 indicated that all constituents were below MTCA cleanup levels. The most recent documentation in Ecology's file, as of March 2008, was the 1999 groundwater monitoring report. Two drums containing soil from a recent site investigation were observed during the windshield survey conducted in April 2008. The investigation appeared to be ongoing because the boring spray painted identification labels were still visible on the pavement. The portion of the property that was being investigated fronted on First Avenue S. and did not appear to extend west of approximately mid-block. Good housekeeping practices were observed. The potential petroleum contamination is considered to be reasonably predictable, and the risk to the Project is considered to be low.

Site 390.3-2. A garage was constructed in 1937. Current Assessor information indicates that the property is now part of **Site 390.3-1**. Garbage (paper, plastic bottles) was observed between the substation (Site 390.3-3) and the building located on Site 390.-3-2. Petroleum contamination, if encountered, is considered to be reasonably predictable, and risk to the Project is considered to be low.

Site 390.3-3. A power plant and substation were at the site, dating back until at least 1916. Currently, the property contains two warehouse/utility buildings that were constructed in 1969 and 1990. The EDR (2008) report indicates that PCBs were spilled onto the soil in 1991. No information regarding cleanup or site status is available at Ecology, as of March 2008. The site is considered substantially contaminated (PCBs) and a moderate risk to the Project because excavation at the property is not anticipated.

Site 390.2-1. A railroad repair shop was built on this property in 1927. Potential contaminants include petroleum and metals. This site is considered reasonably predictable and a low risk to the Project.

Site 390.1-1. Historical records indicate that a steel and equipment company operated machine and blacksmith shops at the site (1916). Recent records indicate that three USTs were removed from the site in 1997. Some petroleum-contaminated soil was removed, but contaminated soils remain beneath the building, utility lines, and the paved parking lot. The extent of petroleum contamination in soil and groundwater beneath the building has not been addressed. TPH in the soil was detected at a concentration of 25,900 mg/kg adjacent to the loading dock. Soil contamination exceeds MTCA cleanup levels in the area north of a former gasoline UST located near a fiber optics line located near Alaskan Way S. The site is included on the state's CSCSL, LUST, and ICR databases. The most recent documentation in Ecology's file was a letter indicating further action is required to address petroleum contamination. Petroleum-contaminated soil, as well as solvent and metals contamination, may be encountered within excavations near this site. The types and quantities of contamination are considered to be reasonably predictable, so the site is considered moderate risk for the Project.

The following is a summary of available information for the remainder of **Block 390.1**:

Site 390.1-2. A filling station was constructed in 1924. It had four USTs, each with 550-gallon capacity. It is not known if the USTs have been removed.

Site 390.1-3. A repair shop occupied this property in 1950.

Site 390.1-4. Based on archive records, a metal manufacturer was located on this property in 1937.

Site 390.1-5. Archive records indicate that several machine shops and a blacksmith shop were located at or near this property in the early 1900s. In 1995, soils contaminated with lead were discovered at the site, with the highest concentrations located near the waterfront. Information from Ecology's files indicated that the owner planned to conduct an independent interim action to remove contaminated soil during a project to construct a new shipping and receiving facility. According to the EDR summary (February 2008) Ecology received a final cleanup report in 1996; however, this report was not available for review in March 2008.

Site 390.1-6. This property was occupied by a blacksmith shop in 1916.

The potential gasoline contamination at **Site 390.1-2** and potential metals contamination at **Sites 390.1-3**, **390.1-4**, **390.1-5**, and **390.1-6** are considered to be reasonably predictable based on a usage history of less than 20 years. Remediation of known contamination at **Site 390.1-5** may have been

conducted. Sites 390.1-1, -2, and -6 pose a moderate risk to the Project; sites 390.1-3, -4, and -5 pose a low risk to the Project.

Block 380.4. The following is a summary of available information regarding past uses of the properties on this block:

Site 380.4-1 was occupied by an auto repair shop and gas station from 1939 to 1969.

Site 380.4-2 was occupied by a machine shop in 1916. A drug company also occupied the site.

Site 380.4-3 was occupied by a paint warehouse in 1969.

Site 380.4-4 was occupied by an oil and gas company in 1938 and 1940.

Site 380.4-5 was occupied by an auto supply store in approximately 1937.

There is potential contamination by gasoline (**Site 380.4-1**), solvents and metals (**Site 380.4-2**), solvents (**Site 380.4-3**), and petroleum (**Sites 380.4-4** and **380.4-5**) from past site uses. These sites are considered reasonably predictable and a low risk to the Project based on a usage history of less than 20 years. The sites were redeveloped as Safeco Field, a baseball stadium.

Site 380.3-3. A truck sales and service company operated in the 1950s and 1960s and had gas tanks. There is no known contamination at the site. The potential for gasoline contamination is considered to be reasonably predictable, and the risk to the Project is considered to be low.

Site 380.3-2. Archive records indicate that the junk company on **Site 380.2-3** (see discussion under **Site 380.2-3** below) also had a facility on **Site 380.3-2** that was constructed in 1954. Many types of contaminants may be present in the subsurface from past operations, including petroleum products, metals, and PCBs. This site is considered substantially contaminated and is considered to be high risk for the Project.

Site 380.3-1. A company on this site was indicated in Polk Directories from 1938 to 1944 as handling cleaning products. No other information was readily available. The property is located east and south of the project footprint. Depending on the types of materials the former company handled, there is some potential for solvents to be present in the subsurface. The site is considered reasonably predictable but is ranked as presenting a moderate risk to the Project.

Block 380.2. The property along the west side of the block is occupied by multiple railroad tracks. The railroad operations, along with expected fill materials and timber pilings, may have resulted in subsurface contamination

from petroleum products and PAHs. Other information regarding the validated sites on this block is summarized below.

Site 380.2-1. The Assessor's records indicate that the property contains a cargo terminal and a vacant lot. Archive records indicate that the building at the site was an office constructed in the early 1900s and that operations continued until at least the 1940s. The property has some potential for subsurface contamination from petroleum products (reasonably predictable). This property is considered a moderate risk to the Project.

Site 380.2-2. The archive record indicates that an iron works/foundry was constructed in 1902 and was demolished in 1949. There is potential for substantial metals and/or solvent contamination to be present at the site from past operations. The site is considered a high risk to the Project.

Site 380.2-3. The Assessor's records indicate that the property is currently vacant. Most of the property is paved and used for event parking. Archive information indicates that a junk company was constructed in 1903 and was torn down in 1951. Many types of contaminants may be present in the subsurface from past operations, including petroleum products, metals, and PCBs. The property is considered to be substantially contaminated and a high risk to the Project.

Site 380.2-4. Archive information indicates that the Seattle Can Company had a warehouse at the property, constructed in 1902. There is a potential for metals to be present in the subsurface environment from the past use, as well as petroleum product contamination from a former UST. Potential contamination is considered to be reasonably predictable, but the property is considered a moderate risk to the Project.

Terminal 46

The Terminal 46 property encompasses Blocks 350.1, 360.1, and 380.1 and extends from S. Jackson Street to S. Atlantic Street. Block 350.1 and Sites 360.1-1 through 360.1-4, although located within Terminal 46, are north of the construction area and are not included in this discussion. In January 2003, a UST and oil-water separator at Terminal 46 were removed. Confirmation sampling results were below MTCA Method A cleanup criteria. Past land uses and potential contaminants for the portion of Terminal 46 within the study area are presented by block and site.

Site 380.1-1. Historical records indicate that a gasoline/service station was present from 1922 to 1944. A description of more recent activities includes machine and maintenance shops, paint shop, and boat repair (1950 to 1969). In 1995, Ecology was notified by the Port of Seattle that a petroleum release had occurred when four tanks were removed. Gasoline contamination was

encountered. Waste oil remains beneath the office trailer. Benzene is present (59 parts per billion [ppb]) in groundwater above the MTCA criterion of 5 ppb. In 2003, Ecology requested an update. The file was not available for review in March 2008. Based on the potential for substantial solvent contamination associated with the paint shop and boat repair shop, this site is considered substantially contaminated and a high risk to the Project.

Site 380.1-2. The 1916 Sanborn map indicates a junk (rag picking) facility, plus warehouses and several machine shops in this block. The most likely forms of contamination from the past uses include petroleum products, solvents, and metals. The site is considered to be reasonably predictable, and the risk to the Project is moderate.

Sites 380.1-4 and 380.1-3. Historical records indicate that a garage/service station was located on **Site 380.1-4**, constructed in 1914. A portion of the property was also a coal briquette plant in 1916 (**Site 380.1-3**). More recently, the site has had warehouses, offices, and maintenance facilities. Ecology's records indicate that two USTs (gasoline and diesel) were removed in 1993, and a waste oil UST was closed in place in 1994. Gasoline contamination was encountered, and waste oil contamination remains beneath the office trailer. Benzene in groundwater was detected at a concentration greater than the MTCA cleanup level. Groundwater flow is toward the northwest (see discussion for Site 380.1-1) The sites are considered to be reasonably predictable and a moderate risk to the Project.

Site 380.1-5. Former tenants in two buildings at the pier included an oil company. The buildings were constructed in the 1920s and were torn down in 1943 and 1961. There is some potential for petroleum contamination to be present from past site uses. The site is considered reasonably predictable and a moderate risk to the Project.

Block 370.2 is located adjacent to a property of concern and is not adjacent to the construction area. The following is a summary of available information regarding past uses of the properties on this block:

> **Site 370.2-1** was occupied by a gas station from 1938 to 1950. The potential gasoline contamination is considered reasonably predictable, and the site is considered a low risk to the Project.
>
> **Site 370.2-2** was occupied by a pattern works (most likely a metal pattern works) from 1916 to 1950. Based on the potential for substantial metals contamination, the site is considered substantially contaminated and a moderate risk to the Project.

Site 370.2-3 was occupied by a machinist from 1938 to 1943. The potential metals or solvent contamination is considered reasonably predictable based on a usage history of less than 20 years (low risk to the Project).

Site 370.2-4 was occupied by a machine works and pattern shop from 1890 to 1943. There is potential for substantial metals or solvent contamination. This site is considered substantially contaminated and a moderate risk to the Project.

Site 370.2-5 was occupied by a chemical manufacturer in 1960. The potential solvent contamination is considered reasonably predictable based on a usage history of less than 20 years. This property is considered a low risk to the Project.

Site 370.2-6. Archive records indicate that a machine shop was located in the warehouse constructed in 1920. The EDR (2008) report indicates that there was a petroleum release from a heating fuel tank in 1993. An interim cleanup report was received, but no additional information was available at Ecology in March 2008. The potential metals contamination (based on a usage history of less than 20 years) and/or petroleum contamination is considered reasonably predictable. The site is considered a low risk to the Project.

Site 370.2-7. An iron wire rope manufacturer and fuel company was situated on this site in 1965. The potential metals contamination (based on a usage history of less than 20 years) and/or petroleum contamination is reasonably predictable. The site is considered a low risk to the Project.

Site 370.2-8. An aluminum company occupied this site from 1965 to 1970. The potential metals contamination (based on a usage history of less than 20 years) and/or petroleum contamination is considered reasonably predictable. The site is considered a low risk to the Project.

Site 370.2-9. A copper and brass works occupied the building on this site, constructed in 1927. There is a potential for substantial metals contamination associated with this property use. This site is considered substantially contaminated and a moderate risk to the Project.

Site 370.2-10. A machine shop was located on this site in 1916. The potential metals and/or solvent contamination is reasonably predictable, and the site is considered to be a low risk to the Project.

Site 370.2-11. An electric company was situated in a warehouse on this site, which was constructed in 1903. There is a potential for substantial PCB contamination associated with this property use. This site is considered substantially contaminated and a moderate risk to the Project.

Site 370.2-12. An electric motors and chains company occupied the existing site warehouse building constructed in 1910. There is a potential for substantial metals contamination associated with this property use. This site is considered substantially contaminated and a moderate risk to the Project.

Site 370.2-13. A machinery manufacturer occupied the existing site building in 1910. The potential metals contamination is considered reasonably predictable based on a usage history of less than 20 years. The site is considered a low risk to the Project.

Site 370.2-14. Former site uses include paint manufacturers (1940 to 1943), a metallurgist (1940 to 1943), an oil company (1951), battery and chemical company (1960), and a printer (1985). The potential solvents, metals, and/or petroleum contamination is considered reasonably predictable based on a site usage history of less than 20 years for individual operations. The property is considered a low risk to the Project.

Sites 370.2-15 and **370.2-17.** A paint company occupied the existing building on **Site 370.2-15** in 1909, and a machine shop was located on this site and **Site 370.2-17** in 1950. The potential solvents and/or metals contamination is considered reasonably predictable based on a usage history of less than 20 years. These sites are considered a low risk to the Project.

Site 370.2-16. A machinery company was located in the existing building in 1900. The remediation of potential metals contamination is considered reasonably predictable based on a usage history of less than 20 years. The site is considered a low risk to the Project.

Site 370.2-18. A junkyard was situated on this site in 1916. There is the potential for substantial metals, petroleum, and/or PCBs contamination due to this property use. The site is considered substantially contaminated and a moderate risk to the Project.

Site 370.2-19. A gas station occupied this site from 1942 to 1989. USTs were removed from the site and the site has been redeveloped as a hotel. The site is in Voluntary Cleanup Program review at Ecology as of March 2008. On-site soils meet MTCA Method A criteria. Soil samples were collected in the sidewalk on First Avenue S. at 5 to 13 feet below the ground surface. Off-site benzene concentrations were detected at 0.41 mg/kg and 0.52 mg/kg, above the MTCA Method A cleanup level of 0.03 mg/kg and TPH-G was detected at 1,700 to 880 mg/kg above the MTCA Method A cleanup level of 30 mg/kg. Benzene and TPH-G concentrations fluctuate in groundwater samples. In a groundwater

sample collected from a monitoring well located in the First Avenue S. sidewalk, benzene was detected at 42 micrograms per liter (µg/l) and gasoline was detected at 2,100 µg/l in January 2007, above the respective MTCA Method A cleanup levels. Gasoline contamination is considered reasonably predictable. The site is considered a low risk to the Project.

Block 370.1. There are three buildings on the terminal property: a one-story transit/freight warehouse (1912), a one-story transit warehouse/loading dock (1935), and a two-story office building (1912). Past land uses and tenants have included a gasoline station (**Site 370.1-1**), a lighting company (**Site 370.1-2**), and a freight company (**Site 370.1-2**). Isolated areas of petroleum contamination have been encountered in the eastern portion of the block, presumably resulting from removed or abandoned USTs. Records reviewed at Ecology indicate that one gasoline UST was removed and two other USTs were closed in place in the 1990s. Approximately 300 tons of petroleum-contaminated soil was removed from the site. Groundwater has not been affected based on limited sampling. A Phase II ESA conducted by WSDOT in 2007 also identified localized petroleum contamination. Based on the Phase II groundwater sampling results, groundwater did not appear to be contaminated. Good housekeeping procedures were observed outside the building during the windshield survey. Old rail lines that trend north-south were observed on the west, central, and east portions of the block. The potential gasoline and other petroleum contamination is considered to be reasonably predictable. **Sites 370.1-1 and 370.1-2** are considered a moderate risk to the Project.

Block 360.2. Currently, a seven-story office building, an athletic club, and several retail stores occupy this block. Historical records indicate that occupants included a paint manufacturer (**Site 360.2-1**); a fuel company (**Site 360.2-2**); a tires, gas, and oil company (**Site 360.2-3**); and sign painters (**Site 360.2-4**). The properties are not listed as having known contamination, but past land uses suggest a potential for contamination from petroleum products (gasoline and oil) and solvents. Potential contamination at these sites is considered to be reasonably predictable based on a usage history of less than 20 years by the individual businesses. The sites are considered a low risk to the Project.

Site 360.15-1. Historical records indicate that a sheet metal works business was at this site in 1916 and was replaced by a freight depot in 1931. A parking lot and laydown area currently occupy the property. The potential for metals contamination in the subsurface exists for this property. The building was demolished, and in April 2007 a heating oil tank and 32 cy of petroleum contaminated soil were removed. The consultant concluded that petroleum

contamination has migrated off-site in the south and east directions into City right-of-way. The maximum diesel concentration in a soil sample collected 7 feet below the ground surface was 30,400 mg/kg, above the MTCA Method A cleanup level of 2,000 mg/kg. A boring in the right-of-way adjacent to the site and to the project footprint encountered black oil at a depth of 3 feet and creosote and wood at 8 feet. WSDOT conducted a Phase I ESA in 2006, and the property has been acquired for the Project (see Section 3.6). The property is considered substantially contaminated and a high risk to the Project based on potential metals contamination.

Site 360.1-1. Operations included plating works, boiler works, brass foundries, a tin shop, a blacksmith, machine shops, sheet metal works, gas and oil storage, and foundries. A retail gasoline station apparently was also located at **Site 360.1-1** (noted on 1950 Sanborn map). The site is now a King County Sewer Station. It is considered potentially substantially contaminated because of the historic activities, and it poses a high risk to the Project based on potential metals contamination.

Site 360.1-5 was occupied by a machine shop (1916), gas and oil station (1950), and repair shop (1969). Petroleum and/or gasoline contamination, if encountered, is considered reasonably predictable. The potential solvents and/or metals contamination associated with **Site 360.1-5** is considered reasonably predictable because it appears that the machine shop was located on the property for less than 20 years. The site is considered a moderate risk to the Project.

Sites 360.1-6 and 360.1-7. The railroad had a roundhouse, machine shops, and blacksmith shops on these sites as indicated on 1916 and 1950 Sanborn maps. Later (1969 Sanborn map), the Port of Seattle also operated a repair shop in this location. There is a potential for substantial metals contamination associated with these property uses. The sites are considered to be substantially contaminated and a high risk to the Project.

Site 360.1-8. Historical records indicate that the gasoline and service station was present from at least 1938 to 1960. The site is considered reasonably predictable and a moderate risk to the Project.

Site 360.1-9. Historical records indicate that beginning in the early 1900s, Seattle Construction & Dry Dock Company was located on this property and included machine shops, a blacksmith, an auto repair shop, forge shops, a copper shop, and foundry. This site may have substantial solvents, metals, and/or petroleum contamination, and is therefore considered substantially contaminated and a high risk to the Project.

Site 360.1-10. An oil house and a machine and steel shop were located on this site from 1950 to 1969. Potential contaminants include solvents, metals, and petroleum. This site is considered reasonably predictable and a moderate risk to the Project.

Sites 360.1-11 and **360.1-12.** A boat shop was located on **Site 360.1-11**, although the date of operation is unknown. A locomotive/engine repair shop occupied **Site 360.1-12** from 1950 to 1969. Potential petroleum and metals contamination on these sites is considered reasonably predictable, and the sites are considered a moderate risk to the Project.

Sites 360.1-13. Petroleum, metals, carcinogenic PAHs, and methylene chloride were encountered during subsurface investigations for the SR 519 Improvement Project conducted in 2003. Contamination was encountered in geotechnical borings located in the Alaskan Way S. right-of-way, adjacent to block 360.1: TPH-G at 730 mg/kg, TPH-O at 2,200 mg/kg, carcinogenic PAHs at 8 of the 9 locations at > 0.1 mg/kg, and cadmium at 4.2 mg/kg. The highest concentrations in soil are above the MTCA Method A cleanup levels. Metals concentrations in groundwater were detected above MTCA Method A criteria.

4.3 Field Data

In addition to land use and the physical environment, limited environmental testing data is available from several field exploration programs that have been performed along the project footprint between 2002 and 2007.

The analytical results indicated that petroleum (diesel and lube oil) contamination is present in soil between S. King Street and S. Royal Brougham Way along the project footprint. Petroleum contamination also occurs sporadically south of S. Royal Brougham Way along Alaskan Way S. Low levels of VOCs were encountered, typically below MTCA cleanup levels. Carcinogenic PAHs in excess of applicable MTCA cleanup levels were encountered in the vicinity of S. King Street and Alaskan Way S.

One or more of the metals arsenic, cadmium, chromium, lead, and mercury were detected in each of the soil samples. None of the detections exceeded the appropriate MTCA criteria except for cadmium in one sample and lead in four samples. Cadmium was detected at 2.2 mg/kg, exceeding the MTCA Method A cleanup level of 2 mg/kg. Lead was detected at concentrations above the MTCA Method A cleanup level of 250 mg/kg. None of these samples were found to exceed the dangerous waste criteria for lead of 5 mg/L.

Groundwater samples were collected from monitoring wells and geoprobes installed in the area. Low concentrations of p-isopropyltoluene, a compound found in gasoline, were detected in shallow groundwater samples collected at

the north end of Terminal 30. Diesel contamination was detected at 400 µg/L in the shallow groundwater monitoring well installed east of Terminal 46.

Lubricating oil-range petroleum hydrocarbons were encountered in a geoprobe water sample collected approximately 200 feet north of S. Atlantic Street. The concentration was less than the MTCA Method A cleanup level for diesel and/or oil of 500 µg/L.

No VOCs were detected in any of the groundwater samples collected for the Phase I utility explorations.

Arsenic, chromium, copper, lead, nickel, selenium, and zinc were detected in each of the total metal samples collected for the Phase I utility explorations. One or more of arsenic, chromium, and lead were detected at concentrations exceeding their MTCA Method A cleanup levels. Arsenic, copper, nickel, and zinc were also found to exceed their respective MTCA Marine Surface Water criterion. None of the detected total metals concentrations exceeded the established King County combined sewer discharge criteria. The dissolved metals analysis found no metals above the detection limits in the samples analyzed.

Chapter 5 OPERATIONAL EFFECTS, MITIGATION, AND BENEFITS

5.1 Project Description

The project footprint extends from 800 feet south of S. Holgate Street to about 400 feet south of S. King Street. The Project consists of replacing the existing viaduct with new elevated structures, ramps, and fill embankments south of S. King Street. The new SR 99 would connect to the existing viaduct where the Railroad Way S. on-ramp meets the mainline SR 99. The new SR 99 in the project footprint would generally be a side-by-side structure with three travel lanes in each direction, except at the north end where the roadway would transition to a stacked structure to match the existing viaduct. A northbound off-ramp to Alaskan Way S. and a southbound on-ramp from Alaskan Way S. would be provided north of S. Royal Brougham Way and south of S. King Street. The Project also includes modifications to the Whatcom Railyard tracks and improvements to surface streets.

From the south end of the project footprint to about S. Holgate Street, the roadway alignment would be at-grade. Proceeding toward the north, the roadway would rise up to an elevated structure over a retained fill embankment. The fill embankment would have near vertical sides retained by mechanically stabilized earth (MSE) walls. MSE walls are constructed by using reinforcing geotextile or other soil reinforcement to retain the soil mass of the fill embankment. The reinforced soil mass is typically protected by a hardened surface (e.g., concrete blocks) along the soil face. The retained fill would extend northward for about 1,300 feet and have a maximum height of about 35 feet at its north end.

At its north end, the retained fill would connect to an elevated structure supported by deep foundations. The elevated structure would span over S. Atlantic Street and railroad crossings to provide a grade separation. Deep foundation types for the elevated structure include cast-in-place concrete piles where dense glacially overridden soils are deeper than 120 feet and drilled shafts where these soils are shallower than 120 feet. Cast-in-place concrete piles are closed-end steel pipe piles (casings) driven into the ground and filled with reinforced concrete.

The elevated structure would connect to another fill embankment retained by MSE walls just south of S. Royal Brougham Way. This northern retained fill would be about 180 feet long and have a maximum height of about 12 feet. North of the retained fill, the northbound lanes of SR 99 would be near or at-

grade for about 400 feet until they connect to another retained fill. The southbound lanes would extend at-grade for about 660 feet before connecting to a fill embankment. These fill embankments would be retained with MSE walls and would extend up to an elevated structure to reconnect to the existing viaduct near its intersection with the Railroad Way S. on-ramp. The maximum heights of these retained fills would be about 20 and 14 feet for the northbound and southbound lanes, respectively. The elevated structures that would connect the north end of the retained fills to the existing viaduct would be supported by drilled shaft foundations.

The Project also includes the construction of an undercrossing near S. Atlantic Street to provide grade-separated travel for trucks accessing the adjacent Port facilities at Terminal 46. The undercrossing would extend from S. Atlantic Street north along the west side of the viaduct for about 400 feet, and then turn east, crossing under the viaduct, and then turn south back to S. Atlantic Street. This U-shaped undercrossing would start at-grade at S. Atlantic Street (on the west side of the viaduct), then descend into a retained cut with its maximum depth about 25 feet beneath the viaduct, and then return to grade at S. Atlantic Street (on the east side of the viaduct).

5.2 Operational Effects

Compared to existing conditions, the Project would reduce pollutant loading and improve the quality of stormwater runoff from the project area that would be discharged to surface water.

5.3 Operational Mitigation

The coarse backfill surrounding subsurface utility corridors may act as preferential pathways for contaminant migration. Contaminants can move easily and can travel long distances along utility corridors as dissolved compounds in shallow groundwater or as free product. As a result, contaminants can affect properties at some distance from the original source of contamination. To mitigate this effect, controlled-density fill or trench dams may be installed at intervals along utility runs where contamination is suspected to prevent migration of contaminants in shallow groundwater.

Stormwater that comes in contact with the pollutant-generating impervious surface (PGIS) would require treatment prior to discharge. Please see the Water Resources Technical Memorandum for a discussion of stormwater treatment.

5.4 Benefits

A potential benefit of the Project is the improved handling of stormwater. The Project would retrofit PGIS, which would reduce pollutants found in stormwater.

Another potential benefit of the Project is the removal of contaminated soil that may be present along the corridor. Although many of the contaminants identified in the area (creosote, lubricating oil, heavy oil, and metals) are not highly soluble, removal of contaminated soil would reduce future groundwater contamination in the area, if present, and could reduce potential exposure to workers that participate in future excavation projects in the area. Ground improvement that is required for the elevated structures is expected to reduce the mobility of contaminants in soil and their potential to migrate with groundwater.

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Chapter 6 CONSTRUCTION EFFECTS AND MITIGATION

Construction effects could arise if contaminated soil or groundwater is encountered during construction activities, such as installing drilled shafts and piles, deep soil mixing or jet grouting, excavating retained cuts, building retaining walls, installing stormwater detention vaults, and relocating utilities. Construction effects are likely to occur where these activities are required on sites that have been identified as potentially contaminated, based on the evaluation presented in the discussion of the affected environment in Chapter 4. In addition to these sites, the alignment is underlain by fill that consists of soil and debris from unknown sources. Construction throughout this area could encounter contaminants such as petroleum, metals, and PAHs in the fill soils, as well as creosote-treated timbers and wood debris.

6.1 Construction Effects

Construction activities would result in several types of effects related to hazardous materials:

- Spoils containing contaminated soil and debris would be removed from the subsurface.
- Groundwater would become contaminated as a by-product of construction techniques to improve ground conditions. This groundwater would be extracted during the construction process.
- Contaminated groundwater would be extracted during dewatering that would occur in the vicinity of the retained cut.
- Slurries formed to aid in construction techniques could become contaminated (i.e., with petroleum, metals, and/or solvents) by contact with contaminated soil or groundwater, limiting the potential reuse of the slurry.
- Air quality could be affected by release of contaminants and dust during construction and handling of contaminated media.
- Groundwater pathways could be modified due to subsurface construction, resulting in the spread of existing contaminants.

Construction methods that would involve direct soil removal include excavation for retained cuts, retaining walls, changes in grade, and utilities. Similarly, the use of drilled shafts for construction of piles and diaphragm walls would result in large volumes of spoils that would have to be handled and properly disposed. Ground improvement techniques that would be

employed in construction would also generate large volumes of spoils and groundwater. Jet grouting operations, which inject cement grout to strengthen the subsurface soils, typically produce spoil volumes equal to about 30 to 50 percent of the volume of soil treated. This spoil material would consist of a blend of eroded soil and cement grout that is flushed to the ground surface during grouting. Deep soil mixing, which involves in situ mechanical mixing of soil and cement, would produce spoil volumes equal to about 25 to 30 percent of the volume of soil treated. The spoils from this method would consist of blended soil and cement with the consistency of thick mud.

For the Project, the estimated volume of material that would be excavated or generated as spoils is 222,000 cy. About 90 percent of the material (204,000 cy) could be considered potentially contaminated or require special handling. A summary of the volume of soil that would be removed during construction, by construction activity, is presented in Exhibit 6-1. These volumes were estimated based on design parameters and are estimated to be within 30 percent of actual volumes.

The quantities are estimates based on the depth of fill, all of which is assumed to be contaminated. In addition, soft soils underlying the fill are assumed to be locally contaminated by creosote-treated piles. All of the existing rail ballast, ties, and obstructions that would be removed are also assumed to be contaminated. Included in these estimates are all of the pavement, surface structures, and obstructions, which would require special handling because of the presence of brick and asphalt, mixed with the concrete.

The elevated structures and ramps would be supported on cast-in-place concrete piles and/or drilled shafts and would have approach fill embankments supported by MSE walls. The retained cut sections would be supported by secant pile or slurry walls. Ground improvement would be performed around existing and proposed foundations and for the first 100 feet of each MSE wall fill embankment. Ground improvement would also be performed west of the roadway alignment. Ground improvement methods that may be used include jet grouting, deep soil mixing, vibro-replacement (stone columns), and earthquake drains.

Deep soil mixing and jet grouting would create a more extensive barrier to groundwater flow than currently exists, resulting in an alteration of groundwater flowpaths. This could result in cross-gradient migration of contaminated groundwater, potentially contaminating areas adjacent to the constructed, less permeable zone.

Exhibit 6-1. Estimate of Total and Potentially Contaminated Excavation Quantities (in Cubic Yards)[1]

	Railroad Excavation[2]	Roadway Excavation[3]	Retained Cut	Drilled Shafts	Deep Soil Mixing Spoil[4]	Jet Grout Spoil[5]	Site Excavation[6]	Structural Excavation[7]	Total Excavation
Total	28,000	61,000	30,000	24,000	45,000	1,000	9,000	24,000	222,000
Potentially Contaminated	28,000	61,000	30,000	6,000[8]	45,000	1,000	9,000	24,000	204,000

Notes:

1 Quantities shown are for the SR 99: S. Holgate Street to S. King Street Viaduct Replacement Project, dated March 2008.

2 Railroad Excavation: Estimated quantity to clear existing railyard ballast and ties. Assumed depth equal to 2'-6".

3 Roadway Excavation: Estimated quantity to clear existing roadway pavement and miscellaneous structures. Assumed depth equal to 2'-0".

4 Deep Soil Mixing Spoil: Estimated spoil from deep soil mixing ground improvement. Deep soil mixing spoil volume assumes ground improvement equal to 35% of the total improved soil mass and that of this volume, 30% returns to the surface as soil-cement spoils.

5 Jet Grout Spoil: Spoil volume is calculated assuming 100% coverage of improved soil mass and that of this volume, 25% returns to the surface as soil-cement spoil.

6 Site Excavation: Estimated quantity of general site excavation, not otherwise classified.

7 Structural Excavation: Estimated excavation quantity of excavation for structures, abutments, large utility vaults, etc.

8 Assume 25% of drilled shafts are contaminated to a depth of 50 feet because of creosote-treated piles or general wood debris (piles and logs).

Assumptions:

For the purposes of this estimate, quantities have been calculated for the cut items noted. Actual import and export quantities may be less than those indicated, as portions of these materials may be stored on-site and reused. Quantities do not include on-site grading and backfilling quantities for roadway finish grading, utility trenching, and backfilling, except as noted.

Ground improvements that include earthquake drains and stone columns located to the east of the deep soil mixing areas are expected to generate little to no spoils and thus were left out of the quantity calculations.

In addition, soil mixing or jet grouting would displace potentially contaminated soil to the surface. Irrespective of the potential contaminants, special handling would be required because the spoils would consist of commingled cement and soil. The spoils would need to be contained to allow the spoils to stabilize prior to being transported to a disposal area.

During installation of drilled shafts and/or cast-in-place piles, shallow groundwater and/or water used to stabilize the hole during drilling would be displaced to the ground surface. This water may have a pH of greater than 10 because of its contact with the grout. Water above a pH of 10 would need to be treated prior to discharge. At a pH of 12 the liquid would be considered a dangerous waste. Fines (cement) may also be suspended in the water. Locally, areas of groundwater may be contaminated from historical activities.

Dewatering would be required for the retained cut. Groundwater in the vicinity of the retained cut appears to be contaminated with low levels of petroleum and metals and would require treatment prior to discharge.

To the extent feasible, the dewatering systems required for construction should be designed to minimize drawdown of the water table. This would reduce the volume of groundwater requiring treatment and disposal. It would also reduce the potential for mobilization and spreading of groundwater contaminants toward the cone of depression.

Relocation of the Whatcom Railyard's lead track would require the work zone around the track alignment to be cleared. Other portions of tracks in the Whatcom Railyard would be removed and replaced. The shallow soil consists of fill from an unknown source. Because the area is an active and long-standing railyard, it is likely that petroleum-contaminated soil and ballast would be encountered.

6.2 Applicable Federal, State, and Local Regulations

Numerous federal, state, and local regulations and policies govern decisions concerning hazardous materials and hazardous waste potential and liability issues.

6.2.1 Federal Regulations

Federal law and regulations relating to hazardous materials and wastes that affect the Project include the following:

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA) define liability for hazardous waste contamination and require liable parties to take responsibility for cleanup. This relates to acquisition of previously

contaminated properties for use as part of the Project. The purpose of this technical memorandum is, in part, to address liability issues relating to identification of, and acquisitions of, previously contaminated property.

Resource Conservation and Recovery Act (RCRA) provides requirements for the handling, transportation, treatment, storage, and disposal of hazardous materials and wastes. It includes provisions for identifying and classifying hazardous materials and wastes, and through the Hazardous and Solid Waste Amendments (HSWA) creates treatment standards for specific wastes. The HSWA also establish requirements for ownership, operation, maintenance, and closure of USTs. Regulation of RCRA-regulated USTs is administered through the state under Washington Administrative Code (WAC) 173-360. Any removal, treatment, or transportation of contaminated soils as part of the Project would need to be conducted in compliance with RCRA.

Toxic Substances Control Act (TSCA) allows EPA to regulate existing chemicals when they pose an unreasonable risk to health or to the environment, and to regulate their distribution and use. Under TSCA Section 6, EPA can limit or ban manufacturing and distribution, require labeling, or place other restrictions. Chemicals regulated include asbestos, lead (such as lead-based paint), and PCBs. If these chemicals were encountered, they would have to be handled and disposed of in compliance with relevant sections of TSCA.

Occupational Safety and Health Act establishes requirements for site safety procedures, worker training, and worker safety and health standards for employees engaged in work related to hazardous materials. All work involving the handling of and potential exposure to hazardous substances by workers while conducting activities associated with the Project must be in compliance with the relevant sections of this act.

Clean Air Act (CAA) provides for comprehensive federal regulation of all sources of air pollution. Any activities associated with the Project that have the potential to introduce hazardous substances to air must be in compliance with the CAA. Discharge to air (including fugitive dust, asbestos, and hazardous chemicals) will be enforced at the state and local municipality level through Puget Sound Clean Air Agency (PSCAA).

Clean Water Act (CWA) provides for comprehensive federal regulation of all sources of water pollution. Any activities associated with the Project that have the potential to introduce hazardous substances to surface waters, including wetlands, must be in compliance with the CWA. Several permit programs have been established to address these issues. Permits and approvals required under the CWA that would require the Project to address hazardous substance issues include a National Pollutant Discharge

Elimination System (NPDES) General Stormwater Permit for Construction Activities. This permit would also require the Project to develop and implement a Stormwater Pollution Prevention Plan.

The **Asbestos Hazard Emergency Response Act (AHERA**) regulation, 40 Code of Federal Regulation (CFR) 763, is the primary governing regulation for performing asbestos surveys. AHERA defines suspect ACM and specifies the minimum number of samples to be collected and analyzed from a suspect material. AHERA was originally enacted for school buildings, but since 1994 it has been applied to public and commercial buildings by the Asbestos School Hazard Abatement Reauthorization Act (ASHARA). The Occupational Safety and Health Administration (OSHA) and WISHA worker protection regulations, specifically 29 CFR 1926.1101(k) and WAC 296-62-077, have also incorporated AHERA for demolition and renovation projects.

National Environmental Policy Act (NEPA) requires that all actions sponsored, funded, permitted, or approved by federal agencies undergo planning to ensure that environmental considerations are given due weight in project decision-making. Because the Project likely would be partially funded by the Federal Highway Administration (FHWA), NEPA compliance is required. One of the major elements addressed in a NEPA assessment is environmental health. Assessment of effects associated with hazardous materials and waste is a component of the environmental health evaluation.

6.2.2 State Regulations

Washington State implements many of the federal statutes pertaining to hazardous materials and wastes along with its own, often more stringent, laws and regulations. These requirements, listed below, take precedence over all other laws for governing business and operations within the state.

Model Toxics Control Act Cleanup Regulation (MTCA) – WAC 173-340 implements MTCA, Revised Code of Washington (RCW) 70.105D. This provides strict requirements for site discovery and reporting, site assessments, and hazardous site listing. This regulation defines standard methods used to assess whether a site is contaminated or clean. This regulation specifically relates to any hazardous materials and water investigations associated with the Project. Cleanup standards for hazardous wastes are promulgated under MTCA. Cleanup of contaminated sites is likely to be accomplished as independent actions, with technical review provided by Ecology on an as-needed basis as provided for under MTCA.

Dangerous Waste Regulations – WAC 173-303 implements RCRA and the Hazardous Waste Management Act, RCW 70-105. This provides for waste identification procedures and disposal requirements for Washington State. It

provides some unique standards for Washington State such as specific land treatment standards for high levels of cadmium under WAC 173-303-655. Detailed requirements for forms and rules related to manifesting and transporting of hazardous waste are included. As stated above, any handling, treatment, or transport of hazardous waste associated with the Project would be required to be in compliance with RCRA and also with Washington's Dangerous Waste Regulations and Hazardous Waste Management Act. Contaminated materials generated during construction, including soil, water, and debris, would need to be properly designated before disposal. In addition, wastes generated during construction also would need to be properly designated.

Solid Waste Regulations – WAC 173-304 implements the Solid Waste Management Act (RCW 70.95) and establishes the Minimum Functional Standards for Solid Waste Management. Solid waste facilities, including landfills, transfer stations, wood waste sites, and concrete recycling facilities, are permitted and monitored to ensure proper handling of wastes to prevent environmental contamination. Solid waste generated by this Project could include soil contaminated at concentrations below dangerous waste criteria, wood, and construction debris in addition to typical municipal waste. These waste types can be disposed of as solid waste at an appropriately permitted facility.

Washington State Environmental Policy Act (SEPA) –WAC 197-11 and WAC 468-12 implement SEPA, which provides a way to identify environmental effects that may result from proposed actions. Information provided during the SEPA review process helps agency decision-makers, applicants, and the public understand how a proposal would affect the environment. Assessment of effects associated with hazardous materials and waste and demonstration that the proposed action has avoided or minimized those potential effects are components of the SEPA review process.

Water Pollution Control Act – RCW 90.48 implements two administrative regulations that control pollution in state waters. Water Quality Standards for Surface Waters of the State of Washington, WAC 173-201A, establishes standards for toxic substances, conventional parameters (e.g., pH, dissolved oxygen, temperature), and aesthetic values for marine and fresh surface waters. The Water Quality Standards for Ground Water of the State of Washington contain similar regulations for groundwater, with special emphasis on radionuclides and carcinogens, due to potability issues. Any construction or operational activities associated with the Project must comply with Washington's water quality standards. Wastewater Discharges to Surface Waters, WAC 173-220, regulates discharges to surface water from

construction projects. Under this program, it is unlawful to discharge polluting matter to surface waters without an NPDES permit. A general NPDES permit for construction would be required for the Project. Wastewater Discharges to the Ground, WAC 173-216, regulates discharge of stormwater to detention basins if this water contains unacceptable concentrations of polluting matter.

Washington Industrial Safety and Health Act (WISHA) – RCW 49-17 implements the Occupational Health Standards (WAC 296-62). RCW 49-17 also implements Safety Standards for Construction Work (WAC 296-155) and the Safety Standards for Asbestos and Encapsulation (WAC 296-65). These standards include rules covering operations at known hazardous waste sites and initial investigations of sites identified by the government, which are conducted before the presence or absence of hazardous substances has been ascertained. Also included are rules on site assessment and control, training, protective equipment, and emergency response. All construction activities associated with the Project must comply with WISHA. WISHA includes specific procedures for work with lead-based paint and ACM.

The permit process involves consideration of potential contamination and could significantly affect costs and schedules. The Project would require an NPDES permit, which would require contamination issues to be addressed.

WSDOT Environmental Procedures Manual M31-11 (April 2007) establishes policies and procedures for dealing with hazardous or problem materials encountered or potentially encountered on property WSDOT owns, manages, plans to sell, or plans to purchase. This technical memorandum is intended to identify and address hazardous materials that could be encountered during construction of the Project and was prepared to support both the Environmental Assessment and the WSDOT project development process.

6.2.3 Local Regulations

The City of Seattle also has statues that pertain to hazardous materials and wastes. These requirements, listed below, take precedence over all other laws for governing business and operations within the city, where the requirements are at least as stringent as the state or federal requirements.

Seattle Municipal Code Title 15 – Street and Sidewalk Use includes provisions of the code that relate to use, maintenance, and construction of streets and sidewalks. This code addresses dust suppression requirements during construction and demolition. It also requires the timely removal of excavated soil from streets and sidewalks.

Seattle Municipal Code Title 22.800 – Stormwater, Grading and Drainage Control Code establishes the City's authority to regulate stormwater within

the city. The City has published a four-volume manual that provides guidance for site activities that could affect stormwater. The manual also outlines mitigation that could be applicable to protect stormwater quality.

Seattle Municipal Code Title 25 – Environmental Protection and Historic Preservation adopts the uniform requirements of WAC 197-11 for compliance with SEPA and to establish local procedures and policies where permitted. In particular, environmental health requires assessment for potential exposure to toxic chemicals and mitigation planning. The code also has additional requirements if the site is under an order, agreed order, or decree from Ecology.

6.3 Liabilities Associated With Property Acquisition

Properties that could be acquired and/or have temporary or permanent easements for the Project are listed in Exhibit 6-2. In addition, the Seattle International Gateway (SIG) Railyard (Block 400.2) would be modified. Railroad activities are frequently associated with petroleum, PAHs, and metals contamination.

The Project would acquire portions of three parcels and temporary or permanent easements on four additional parcels. The partial acquisitions would primarily consist of narrow strips of Pier 36 and Terminal 46 land parallel to the west side of SR 99, and portions of the Pyramid Alehouse (Blocks 380.2 and 380.3) parking lots. These parcels contain 32 potentially contaminated sites, primarily located on the large terminal parcels. No buildings are being modified or acquired for the Project. WSDOT has already acquired five parcels that contain three of these sites, including large portions of the WOSCA property (Sites 370.1-1 and 370.1-2) and the parcel directly north (Site 360.15-1) of WOSCA. A Phase I ESA was conducted for Site 360.15-1, and Phase I and II ESAs were conducted for Sites 370.1-1 and 370.1-2 (WOSCA property).

Exhibit 6-2. Properties of Concern (Legend at the end of exhibit)

Block No.	Site No.	Type of Business/ Reference Name	Current Tax Assessor Records	Bldg No.	Property Acquisition	Permanent Utility Easement	Temporary Construction Easement	Rank	RP/SC	Potential/ Known Contaminants	Phase II ESA
360.1	360.1-1	plating works, boiler works, brass foundry, tin shop, blacksmith, machine shops, gas & oil	King County Sewer Station; 1-story utility, built 1970, no heat	Terminal 46	-	X	-	High	SC	SOLV, MET, GAS, PET	X
360.1	360.1-5	machine shop, gas & oil, repair shop	Terminals 37, 42 and 46 (marine/commercial/fish) - 7 buildings: 1) 2-story transit warehouse/gate/guardhouse, built 1967, warmed and cooled air; 2) office building, built 1967, warmed and cooled air; 3) transit warehouse/transit shed, built 1967, space heaters; 4) storage warehouse/maintenance, built 1967, space heaters; 5) office builidng built 1941, steam; 6) administrative building, built 2005, HVAC; 7) garage and service repair building built 2005, electric wall heat.	Terminal 46	X	X	X	Moderate	RP	SOLV, MET, GAS	X
360.1	360.1-6	railroad	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	High	SC	SOLV, MET	X
360.1	360.1-7	repair shop	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	High	SC	MET, PET	X
360.1	360.1-8	gasoline and service station	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	GAS	X
360.1	360.1-9	construction and dry dock company	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	High	SC	SOLV, PET, MET	X
360.1	360.1-10	machine & steel shops, oil house	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	SOLV, PET, MET	X
360.1	360.1-11	boat shop	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	PET, MET	X
360.1	360.1-12	locomotive repairing	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	PET, MET	X
360.15	360.15-1	sheet metal works	WSDOT, three-story industrial, built 1921; surface parking lot	S1	Has been acquired by WSDOT	-	-	High	SC	PET, MET	X

Exhibit 6-2. Properties of Concern (Legend at the end of exhibit)

Block No.	Site No.	Type of Business/ Reference Name	Current Tax Assessor Records	Bldg No.	Property Acquisition	Permanent Utility Easement	Temporary Construction Easement	Rank	RP/SC	Potential/ Known Contaminants	Phase II ESA
370.1	370.1-1	gas station	WSDOT, 2-story warehouse, built 1939, space heaters (WOSCA site)	S50	Has been acquired by WSDOT	-	-	Moderate	RP	GAS	XX
370.1	370.1-2	railroad	WSDOT, three buildings: 1) one-story transit/freight warehouse, built 1912; 2) one-story transit warehouse/loading dock, built 1935; 3) two-story office, built 1912 (WOSCA site)- the historic building will not be demolished	S118	Has been acquired by WSDOT	-	-	Moderate	RP	PET	XX
380.1	380.1-1	Pier 37/Gasoline Station	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	High	SC	GAS, PET, MET, SOLV	X
380.1	380.1-2	junk company	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	PET, MET, SOLV	X
380.1	380.1-3	coal briquette plant	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	PET, GAS	X
380.1	380.1-4	automotive service (Terminal 37)	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	GAS	X
380.1	380.1-5	Terminals 37, 42 ,47	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	PET	X
380.2	380.2-1	fuel company	cargo, operating terminal (auto,bus,other), built 1914, 2-story industrial, hot water heat	S51	X	X	X	Moderate	RP	PET	X
380.2	380.2-2	machine works	1-story warehouse, built 1957, space heaters	S54	-	X	X	High	SC	SOLV, MET	X
380.2	380.2-3	junk company	vacant lot /1-story warehouse, built 1957, space heaters	S54, S213	-	X	X	High	SC	MET, PET, PCBs	X
380.2	380.2-4	can company	1-story warehouse, built 1957, space heaters	S54	-	X	X	Moderate	RP	MET, PET	X
380.3	380.3-1	cleaning products	built 1914, 2-story industrial, hot water heat	S51	X	X	X	Moderate	RP	SOLV	X
380.3	380.3-2	junk company	built 1914, 2-story industrial, hot water heat (this portion only a parking lot)	S51	X	X	X	High	SC	MET, PET, PCBs	X
390.1	390.1-1	machine shops & blacksmith	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	SOLV, MET, GAS	X
390.1	390.1-2	gas station	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	GAS	X
390.1	390.1-6	blacksmith shop	Terminals 37, 42 and 46 -see above	Terminal 46	X	X	X	Moderate	RP	METALS	X
400.1	400.1-1[3]	furniture mfg., bulk petroleum storage	Government parking lot	POS, South of S. Massachusetts	-	X	X	Moderate	RP	SOLV, METALS, PET, GAS	X

Exhibit 6-2. Properties of Concern (Legend at the end of exhibit)

Block No.	Site No.	Type of Business/ Reference Name	Current Tax Assessor Records	Bldg No.	Property Acquisition	Permanent Utility Easement	Temporary Construction Easement	Rank	RP/SC	Potential/ Known Contaminants	Phase II ESA
400.1	400.1-2[3]	foundry supplies, painting	Government parking lot	POS, South of S. Massachusetts	-	X	X	Moderate	RP	SOLV, METALS, PET, GAS	X
400.1	400.1-3[3]	machine shops	Government parking lot	POS, South of S. Massachusetts	-	X	X	Moderate	RP	SOLV, METALS, PET, GAS	X
400.1	400.1-4[3]	aluminum business warehouse	Government parking lot	POS, South of S. Massachusetts	-	X	X	Moderate	RP	SOLV, METALS, PET, GAS	X
400.1	400.1-6	ink mfg.	1-story industrial building, built 1950, warmed and cooler air, teaching facility	POS, South of S. Massachusetts	-	X	X	High	SC	SOLV, PET	X
400.1	400.1-7	Pier 34 (former petroleum company	container yard, vacant / terminal (marine/commercial/fish)	POS, South of S. Massachusetts	-	X	X	High	SC	PET, GAS	X
Facilities (Parcels or Buildings) with No Specific Site (not ranked)											
380.1	NA		USCG Museum and USCG Office Bldg	T 36	X	-	X	Not Ranked		Not recommended	
380.2	NA		WSDOT, vacant	S214	Has been acquired by WSDOT	-	-	Not Ranked		Not recommended	
380.2	NA		WSDOT, cargo terminal	S215	Has been acquired by WSDOT	-	-	Not Ranked		Not recommended	
400.1	NA		parking lot	S132	-	X	X	Not Ranked		Not recommended	

Notes:

1 Site Listed in Environmental Records (databases)

2 RP = Reasonably Predictable; SC = Substantially Contaminated

3 Parcels overlap; only 1 Phase II ESA is needed to address Sites 400.1-1, 400.1-2, 400.1-3, and 400.1-4

ESA = Environmental Site Assessment
PET = petroleum
MET = metals
SOLV = solvents
GAS = gasoline
PCBs = polychlorinated biphenyls
PAHs = polycyclic aromatic hydrocarbons
POS = Port of Seattle

not ranked = site is not identified as having potential contaminants based on historic use or federal or state databases
X = will be acquired and/or have a permanent or
XX = Phase II ESA has already been conducted by WSDOT
Note: although not identified as a site, all railroad right-of-way has a potential for petroleum
- no buildings will be modified on this site based on the Request For Information 004 provided by Parsons Brinckerhoff

In obtaining a contaminated property, WSDOT could become liable for a site cleanup. RCW 70-105D.040 identifies persons liable for a facility/property as:

- The current or past facility owner/operator;
- Anyone who arranged for disposal/treatment of hazardous substances at the site;
- Anyone who transported hazardous substances for disposal/treatment at the site, unless it could legally receive the materials at the time of transport; or
- Anyone who sells a hazardous substance with written instructions for its use, if abiding by the instructions results in contamination.

In situations where there is more than one liable party, each party is jointly and severally liable for costs associated with cleanup of a site and cost to repair damages to natural resources. To avoid liability, WSDOT must perform "all appropriate inquiry" prior to obtaining any contaminated properties. If the source of contamination is on an adjacent property, the persons liable for the adjacent contamination would be responsible for cost associated with cleanup of a site and cost to repair damages to natural resources.

6.3.1 Properties of Concern

The entire study area has been filled, and railroads have operated continuously in the area. The fill was placed around timber piles, treated and untreated, that supported former railroads and the elevated road. Although no specific sites have been identified on some of the blocks, historical railroad activities that typically result in petroleum (lubricating oil and diesel), PAH, and metals contamination in near-surface soils and ballast occurred throughout the study area. Fill in the area is also frequently associated with metals and petroleum contamination. Treated piles and railroad ties would likely be encountered too.

Properties of concern discussed below include sites that pose a potential liability to the Project because of the potential presence of site contamination. These sites have been designated because, in addition to fill and the railroad, specific land uses have been identified.

A waste transfer station operated at Sites 400.1-1, -2, -3, -4, and -5 in the 1970s. Earlier businesses at the location included a furniture factory, an aluminum business, a foundry supply business, and machine shops. These sites are considered a moderate risk to the Project because potential metals, solvents, gasoline, and petroleum contamination associated with them is considered reasonably predictable.

Archive records indicate that the ink manufacturing facility was constructed in 1950 and operated through 1993 at Site 400.1-6. The building is still present. Soil contaminants detected at the site include PAHs, metals, and petroleum hydrocarbons. Chlorinated solvents and petroleum were detected in site groundwater during unrelated groundwater monitoring for Terminal 34. Because of potential solvent contamination, this site is considered substantially contaminated and poses a high risk to the Project.

A large tank farm and petroleum refinery was formerly located at Site 400.1-7. The bulk fuel tanks have been removed, and petroleum-contaminated soil was excavated. As of 2004, concentrations of contaminants, including metals, gasoline, diesel, PAHs, and BTEX, are below trigger levels that are protective of aquatic life (MTCA Method C), and the groundwater compliance monitoring report concluded that no further monitoring should be conducted. Most of the contamination is located in the center of the property and closer to the waterfront. The site is paved, as of 2008. The site is considered substantially contaminated based on known gasoline and petroleum contamination and is considered a high risk to the Project.

Historical records indicate that a steel and equipment company operated machine and blacksmith shops (1916) at Site 390.1-1. Some petroleum-contaminated soil was removed as part of a UST removal action in1997, but contaminated soils remain beneath the building, utility lines, and the paved parking lot. The extent of petroleum contamination in soil and groundwater beneath the building has not been addressed. TPH in the soil was detected at a concentration of 25,900 mg/kg adjacent to the loading dock, above the MTCA Method A cleanup level of 2,000mg/kg. Soil contamination exceeds MTCA cleanup levels in the area north of a former gasoline UST located near a fiber optics line located near Alaskan Way S. The site is included on the state's CSCSL, LUST, and ICR databases. Petroleum-contaminated soil, as well as solvent and metals contamination, may be encountered within excavations near this site.

A filling station was constructed in 1924 at Site 390.1-2. It had four USTs, each with 550-gallon capacity. It is not known if the USTs have been removed. Sites 390.1-3, -4, and -5 are located at least 300 feet west of Alaskan Way S. and are not properties of concern. Site 390.1-6 was occupied by a blacksmith shop in 1916. The types and quantities of contamination are considered to be reasonably predictable for Sites 390.1-1, -2, and -6, so the sites are considered moderate risks for the Project.

Archive records indicate that a junk company operated on Site 380.3-2, and the operation extended into the north end of Block 380.2. The property has potential for contamination from metals, petroleum, and PCBs and is

considered to be a high risk for the Project. A cleaning products company also operated on the block (Site 380.3-1), and solvents may have been used. The site is ranked as presenting a moderate risk to the Project; the site is considered to be reasonably predictable based on a usage history of less than 20 years.

Railroad operations (cargo terminal), along with expected fill materials and timber pilings, along the east side of Alaskan Way S. between S. Atlantic Street and S. Royal Brougham Way (Block 380.2) may have resulted in subsurface contamination from petroleum products and PAHs. The sites are considered to be reasonably predictable; therefore, this property is classified as a moderate risk to the Project. Other operations on the block that pose a high risk to the Project include a junk company (Site 380.2-3) and a machine works (Site 380.2-2).

Isolated areas of petroleum-contaminated soil have been encountered at the terminal on Block 370.1, and additional areas of petroleum contamination may be present. The site is considered to be reasonably predictable and a moderate risk to the Project. WSDOT conducted a Phase I and a Phase II ESA for the block. The Phase II ESA confirmed that petroleum-contaminated soil was located approximately mid-block. The contamination did not appear to be widespread.

The Terminal 46 property encompasses Blocks 350.1, 360.1, and 380.1 and extends from S. Jackson Street to S. Atlantic Street. The following summary of past land uses and potential contaminants is presented by block.

The north portion of Terminal 46, including Block 350.1, which extends along the west side of Alaskan Way S. between S. Jackson Street and S. King Street, and Sites 360.1-2 through 360.1-4 are not properties of concern. The Project would obtain a permanent utility easement for Site 360.1-1, King County Sewer Station. The site poses a high risk to the Project because of a former plating works and foundry that operated on the parcel.

Site 360.1-5 had a machine shop, gas and oil storage, and a repair shop. There is a potential for petroleum, solvents, or metals contamination at Site 360.1-5. The site is reasonably predictable and poses a moderate risk to the Project.

A railroad company and an industrial business have operated at Sites 360.1-6 and -7. The railroad had a roundhouse, machine shops, and blacksmith shops, and the industrial business operated a repair shop. There is a potential for contamination from metals at both sites and from solvents at Site 360.1-6. These sites are considered to be substantially contaminated and pose a high risk to the Project.

A gasoline station operated at Site 360.1-8. The site is considered to be reasonably predictable and poses a moderate risk to the Project.

A construction and dry dock company operated on Sites 360.1-9, -10, -11, and -12, beginning in the early 1900s. Operations included machine shops, a blacksmith shop, an auto repair shop, forge shops, a copper shop, and a foundry. Additional companies built facilities in the 1940s that had machine and repair shops and an oil house. The most likely types of contaminants from these past land uses include petroleum products, metals, and solvents. The sites are considered to be substantially contaminated and pose moderate to high risks to the Project.

Petroleum, metals, and carcinogenic PAHs were identified in geotechnical borings located in the Alaskan Way S. right-of-way adjacent to Block 360.1; identified as Site 360.1-13. The borings were drilled in 2003 as part of the SR 519 Street Improvement Project. Contaminant concentrations included TPH-G at 730 mg/kg, TPH-O at 2,200 mg/kg, carcinogenic PAHs at eight of the nine locations at greater than 0.1 mg/kg, and cadmium at 4.2 mg/kg. The highest concentrations of TPH-G, TPH-O, carcinogenic PAHs and cadmium exceed the respective MTCA Method A cleanup level. Metal concentrations were detected above MTCA Method A criteria in groundwater samples. The site poses a moderate risk to the project.

Block 380.1 extends along the west side of Alaskan Way S. between S. Royal Brougham Way and S. Atlantic Street. A gasoline station operated at Site 380.1-1. Other activities included machine and maintenance shops, paint shop, and boat repair. Gasoline, solvents, and metals contamination could be encountered, and the site is considered to be reasonably predictable based on a usage history of less than 20 years, but the site poses a high risk to the Project because of metals and solvent use.

A garage/service station, constructed in 1914, was located at Site 380.1-4. A portion of the property was also a coal briquette plant in 1916 (Site 380.1-3). More recently, the site has had warehouses, offices, and maintenance facilities. Two USTs (gasoline and diesel) were removed in 1993, and a waste oil UST was closed in place in 1994. Gasoline contamination was encountered, and waste oil contamination remains beneath the office trailer. Benzene in groundwater was detected at a concentration greater than the MTCA cleanup level. Groundwater flow was determined during the remediation work to be toward the northwest. The site is reasonably predictable, and the risk to the Project is moderate.

An oil company (Quaker State) and Gulf Pacific were former tenants in two buildings located at Site 380.1-5 (Terminals 37, 42, and 47). The buildings were constructed in the 1920s and were torn down in 1943 and 1961. There is

some potential for petroleum contamination to be present. The site is considered to be reasonably predictable and poses a moderate risk to the Project.

A manufacturing company and an associated parking lot (Block 360.15) were formerly occupied by a sheet metal works that could have resulted in metal and petroleum contamination of the surrounding environment. The building was demolished, and in April 2007 a heating oil tank and 32 cy of petroleum contaminated soil was removed. The consultant concluded that petroleum contamination has migrated off-site in the south and east directions into city right-of-way. The maximum diesel concentration in a soil sample collected 7 feet below the ground surface was 30,400 mg/kg, above the MTCA Method A cleanup level of 2,000 mg/kg. Oil and creosote were detected at 3 to 8 feet below ground surface in a boring in the Alaskan Way S. right-of-way adjacent to the site. Potential contaminants include metals, petroleum products, and PAHs. Based on site history, this site is considered to be substantially contaminated and poses a high risk for the Project. WSDOT conducted a Phase I ESA that identified the same RECs as discussed above. The property has been acquired by WSDOT for the Project.

6.3.2 Other Properties of Concern

Other properties of concern include portions of Blocks 400.1, 380.2, and 380.1. No specific hazardous materials risks were identified with these properties, other than fill and former railroad use.

6.4 Worker and Public Health and Safety Concerns

Issues related to worker public health and safety issues discussed here pertain to potential exposures to pollutants, hazardous materials, and wastes encountered or generated during construction activities. Physical hazards of construction activities are not addressed.

Workers could be at risk from hazardous materials and waste encountered or generated during construction because of the duration of their potential exposure and proximity to areas where such materials may be encountered or used. The primary means of exposure would be inhalation of dusts or vapors containing hazardous substances generated during construction activities, such as excavation in areas with contaminated soils. Also, demolition activities associated with the structures could expose workers and the surrounding public to asbestos or lead (from lead-based paint), if present.

Encountering contamination could expose workers to potentially toxic concentrations and could create other hazardous situations, such as explosive

environments. Air quality and associated heath concerns could be affected as a result of disturbing volatile substances during construction.

Minor spills of materials used in construction, such as fuels, lubricants, and hydraulic fluids, typically occur during construction operations. Exposure to such accidental releases could damage skin, eyes, lungs, and other organs. Unless a spill is a major event, it is not anticipated to present significant risk to human health. Chemicals potentially released from uncured asphalt in road surfacing also present some exposure risk. All workers have a legal right to know about potential hazardous conditions in the workplace and should be trained in hazard recognition, as well as how to respond to and report such conditions.

Public health risk could also arise as a result of accidental release or diversion of contaminants to environmentally sensitive areas, such as surface waters, groundwater, public drinking water systems, or public air spaces. Releases to such areas could provide direct or indirect pathways of contaminant exposure to the general public.

6.5 Recommendations for Further Investigations

6.5.1 Data Gaps and Unknowns

The sources of information that were used to generate the histories of properties within the study area included general information from readily available sources. There may have been uses at individual sites that could have resulted in contamination that were not revealed by the available information.

It is assumed that the risk of contamination from businesses that use, store, or dispose of hazardous materials increases with the length of time the business was in operation. The length of time particular businesses were in operation was not necessarily revealed by the available data, limiting the ability to ascertain this risk.

6.5.2 Site Reconnaissance Recommendations

A full-access site reconnaissance is recommended for all properties to be acquired or modified for the Project. These properties are identified in Exhibit 6-2. The reconnaissance should be conducted by an experienced environmental professional, and, wherever possible, include interview(s) of persons knowledgeable about present and past operations at the site.

6.5.3 Phase II ESA Recommendations

Phase II ESAs should be conducted at properties to be acquired and/or where a temporary or permanent easement would be obtained by WSDOT where

there is either a risk of contamination from past site operations, or where contamination is known to exist. Because all acquisitions and temporary or permanent easements are for only portions of a given parcel, Phase II ESAs are recommended for only those portions of the parcels that would be affected by the Project. In addition, site investigations should focus on potential contaminants associated with historical land use for that portion of the parcel. Terminals 36 and 46 had numerous historical land uses. Sites identify where each of these former land uses, and the potential contaminants associated with the land uses, existed within the larger terminals.

In addition, focused Phase II ESAs are recommended (within the WSDOT right-of-way) for properties located adjacent to the project footprint where contaminants may be encountered when performing construction activities, including excavation, ground improvement, installation of drilled shafts, and dewatering. Potentially contaminated adjacent properties that pose a high enough risk to warrant Phase II ESAs include sites where it is known or suspected that contamination extends into the right-of-way, and any sites where the most likely potential contaminants are solvents or gasoline. Such contaminants have a tendency to be highly mobile and may present a hazard to activities on other properties.

In most cases, explorations to obtain soil and groundwater samples could be conducted with direct push type equipment, such as a Geoprobe. Drilling may be necessary at a few locations, where subsurface obstacles prevent Geoprobe advancement.

Thirty-three Phase II ESAs are recommended for the Project; recommendations at specific sites are summarized in Exhibits 6-2 and 6-3. The exhibits include the location, map reference number, and primary contaminant(s). Phase II ESAs have not been recommended to characterize fill and general railroad activities; however, site characterization for properties to be acquired or modified should address these historical land uses. Phase II ESAs have already been conducted at the WOSCA property (Sites 370.1-1 and 370.1-2). Data generated from explorations for engineering design could provide sufficient data to substitute for focused Phase II ESAs in other portions of the project footprint.

6.5.4 Additional Investigations

Site characterization or more extensive investigations (Phase III ESAs) may be necessary for sites that would be acquired, particularly if the Phase II ESAs indicated that site contamination is present.

Exhibit 6-3. Additional Recommended Phase II ESAs

Block	Site No.	Type of Business/ Reference Name	Description (Archive)	Description (Polk or Sanborn)	**Polk Directory Years**	**Sanborn Map Years**	Current Tax Assessor Notes for Adjacent Properties Only	Listed Site1	Rank (adjacent properties only)	RP/SC2	Primary Contaminant(s)
370.2	370.2-19	gas station	1-story gas station, built 1942, stove heat; 6-1,000 gallon tanks; repair garage, built 1946	gas station with auto service	1943, 1951, 1956, 1960, 1965, 1970, 1975, 1980, 1985, 1989	1950, 1969	1-story retail store, built 1996, heat pump (gas)	Yes	Low	RP	gas
380.3	380.3-3	truck sales & service	1-story garage/sales, built 1938, oil burner, 2 sumps, pumps, gas tanks	truck sales & service	1956	1950, 1969	2-story warehouse, built 1938, space heaters		Low	RP	gas
380.4	380.4-1	auto repairs and gas station	service station, built 1939, stove heat; tanks: 2-2,000; 1-1,000; 1-550; and 2-300 gallon	repairs and gas station	1940, 1943, 1956, 1960	1950, 1969	Sport Facility		Low	RP	gas
390.3	390.3-1	machinery company	former shop, built 1926, stove heat	shop & storage yard	1965, 1970, 1975 / 1938, 1940, 1943-44, 1951, 1956, 1960, 1965, 1970, 1975	1969 / 1950, 1969	3 buildings: 1 & 2) 1-story industrial, built 1926, space heaters; 3) 1-story equipment shed/shop, built 1951, no heat / vacant lot	Yes	Low	RP	pet, gas, PAHs
410.1	410.1-1	Terminal 30	built 1913: 1-story garage (2), maintenance shop, warehouse (2), truck oil loading rack, train loading rack, pipe shed, and tanks (tank farm, bulk)	tank farm	1943-44, 1951, 1956, 1960, 1970, 1975	1916, 1950, 1969	Port Terminal 30	Yes	Moderate	SC	pet
410.2	410.2-5	railroad machine shop, power house, storage tank, garage	1-story locker house, machine shop, storage shed, lumber shed, power house, bar car, storage shed, 5-car garage (2), box car (2), and storage tank						Low	RP	solv, metals, pet

1 Site Listed in Environmental Records (databases)

2 RP = Reasonably Predictable; SC = Substantially Contaminated

PET = petroleum
MET = metals
SOLV = solvents
GAS = gasoline

PAHs = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyls

Blank cells in Polk Directory, Sanborn Map, Description Archive, and Listed Site columns indicate that there was no environmental problem identified.

6.5.5 Asbestos-Containing Materials and Lead-Based Paint Survey Recommendations

Surveys for ACM and lead-based paint would be required for buildings that would be acquired or modified. No buildings would be acquired or modified for the Project.

6.6 Mitigation

Mitigation and hazardous materials handling and disposal options for the construction effects of the Project are summarized below and described in greater detail in the following sections. The Project has been designed to avoid contamination where possible, and to minimize handling and disposal activities to the extent feasible where contaminated material can not be avoided.

Contaminated materials are likely to be encountered during construction. Although some contaminated areas may be avoided by not acquiring properties that have known or potential contamination, contamination may not be avoidable in areas of the SR 99 right-of-way where earthwork or building demolition are anticipated.

Contamination would likely be encountered during earthwork in the fill and in the right-of-way. Petroleum- and creosote-contaminated soil, as well as creosote-treated timber, would likely be encountered. Exhibit 6-1 summarizes the estimated volume of soil that would be removed, including the estimated volume of that material which is potentially contaminated. The quantities were estimated based on the depth of fill, all of which was assumed to be contaminated.

Contaminated soil handling options include (1) reusing soils as fill under roadways and embankments [if the soils meet both regulatory requirements and geotechnical fill specifications], or (2) transporting the soils to a thermal treatment facility, landfill, or dangerous waste landfill or incinerator, as described in Section 6.6.3.

The presence of H_2S at the north end of the study area may require special procedures, including monitoring and mechanical ventilation of excavations. For any dewatering activities that encounter H_2S dissolved in the groundwater, treatment would most likely be required prior to discharge.

Appropriate treatment options depend on the concentration of H_2S. For trace amounts of H_2S (up to a few tenths mg/L), the H_2S gas is filtered and the H_2S is adsorbed onto the carbon surface. In this method, the filter must be replaced when exhausted and cannot be recharged.

For H_2S at a concentration of less than 2 mg/L, aeration (adding air to the water) is an appropriate treatment method. In any aeration system, the water must be protected from bacterial contamination and freezing, and there are large space requirements. Another limitation of this method is that the aeration process produces a strong H_2S odor near the aerator, which may be unpleasant. Furthermore, this process, by itself, may not always reduce the H_2S sufficiently. However, the addition of a carbon filter may remove some of the remaining trace amounts of H_2S.

For H_2S at a concentration of 1 to 10 mg/L, the use of an iron-removal filter containing manganese greensand is appropriate. Manganese dioxide oxidizes H_2S, and the oxidized particles are then filtered out in the lower part of the bed. Manganese greensand filters must be recharged with a solution of potassium permanganate when the manganese greensand is depleted. Water with a pH below 6.7 may need to be treated with an acid water neutralizer before this process will be effective.

For H_2S at a concentration of greater than 6 mg/L, constant chlorination using an automatic chemical feed pump is the most common treatment method. The recommended dosage is 2 mg/L chlorine for each mg/L of H_2S. The chlorine should be added ahead of the mixing tank, and sufficient storage must be provided to maintain 20 minutes of contact time between the water and the chemical.

For structures that would be acquired or modified, it would be necessary to establish the presence of ACM and lead-based paint. This would be accomplished as a pre-demolition building survey conducted by an AHERA-certified building inspector. If ACM or lead-based paint were identified, mitigation would consist of removing these materials in compliance with WISHA and PSCAA standards prior to building demolition and disposing of them in an approved facility. No building would be demolished or modified for the Project.

Remediation of any petroleum contamination, ACM, or lead-based paint that is encountered is expected to be reasonably predictable. Remediation of other potential contaminants that may be encountered, such as halogenated solvents and other solvents, metals, PCBs, creosote, formaldehyde, volatile and semivolatile organic compounds, and PAHs, is not considered reasonably predictable.

6.6.1 Avoidance

Handling contaminated substances could likely be reduced by relocating to non-contaminated portions of the staging area property (WOSCA) to minimize contact with contaminated media.

In addition to avoiding acquiring the contaminated properties, there are various means of reducing potential liability, including but not limited to:

- Leasing property rather than purchasing property.
- Obtaining a surface easement rather than purchasing property.
- Creating an indemnification agreement and/or prospective purchaser agreement with the current property owner.
- Valuing property as "clean" and placing funds in escrow until cleanup is completed by the owner.

6.6.2 Minimization of Effects

Phase II ESAs should be performed in areas where excavation or drilling is expected, so that a plan for contaminant management during construction can be developed. To the extent feasible, contaminated areas identified during the Phase II explorations could be avoided. Where construction in a contaminated location cannot be avoided, construction methods could be adjusted to minimize the amount of contamination that may be encountered during project construction.

For bridge foundations, driven piles should be used, where feasible, instead of drilled shafts to reduce the potential for opening conduits for contaminant migration.

Soil removed from the drilled shafts could be contaminated. The amount of contamination removed could be reduced by alternate support structures that do not result in waste soil, such as driven piles or stone columns. Both of these methods displace soil laterally. However, they may have limited applications. Driven piles cannot be installed near buildings because vibration and installation of stone columns requires overhead clearance, which is limited along the project footprint. Large amounts of water mixed with eroded soil could be displaced to the surface during installation of stone columns if a wet method is employed.

The slurry used in diaphragm wall construction may become contaminated. To reduce the potential for slurry contamination, the contaminated portion of the hole could be cased, to a maximum practicable depth of about 50 feet. If slurry were to become contaminated, it could be reused within the contaminated zone on the property (if concentrations were below MTCA Method A criteria). The volume of contaminated slurry generated could be minimized by constant reuse through the contaminated zone. At the end of the contaminated area, the contaminated slurry should be disposed of appropriately to minimize cross-contamination along the diaphragm wall. If

the contaminated slurry is not reused, then it would be disposed of at a facility that can accept contaminated slurry (see Chapter 6.6.3).

Contaminated rail ballast may be reusable in the relocated railyard as ballast, subballast, or subbase, depending on the contaminant concentrations and geotechnical qualities of the ballast that must be removed. If the material is unsuitable because of contaminant concentrations, then the material would require disposal at a facility that can accept contaminated material (see Chapter 6.6.3).

Specific construction methods may need to be employed to prevent cross-contamination and to minimize the migration of hazardous materials or contaminated media during construction. In areas of known groundwater contamination, special drilling methods would be employed to reduce the potential for vertical migration of contaminants during drilled shaft installation. Each saturated zone would be cased to prevent the groundwater from entering the borehole and flowing down the open shaft.

The dewatering system that would be needed for construction of the retained cut should be designed to minimize drawdown and the area of influence so as to reduce the potential for mobilizing contaminants that may be present in the groundwater.

Jet grouting and deep soil mixing could be accomplished so as to allow permeable zones for groundwater to flow through the area after ground improvements are completed. Although flow paths would be altered, this approach would avoid a large-scale groundwater diversion and would reduce the potential for contamination of cross-gradient properties.

VOCs, including compounds from creosote-treated timbers and gasoline-contaminated soil, could become airborne during construction. Air monitoring can be performed, if conditions warrant, and BMPs and/or engineering controls would be employed so that VOC emissions are below all relevant criteria, including those of Washington State Labor and Industries and PSCAA. Engineering controls such as fans and blowers could be employed to dissipate volatile contaminants. More elaborate engineering controls, such as wetting of soil or filtration of air, may also be necessary.

Stormwater control and treatment would be maintained or improved, as discussed in the Water Resources Technical Memorandum.

6.6.3 Hazardous Materials Handling and Disposal Options

Mitigation measures that would be required as part of the construction planning include development of a temporary erosion and sediment control plan; spill prevention, control, and countermeasures plan; hazardous

materials management plan that addresses handling and disposal of known and unanticipated contamination; fugitive dust control plan for demolition activities; and water quality monitoring plan. Development and implementation of these plans would be required by WSDOT Standard Specifications and required regulatory permits, including the NPDES stormwater permit.

Although most contaminated sites that potentially could affect the Project have been identified, the possibility of encountering unknown contamination cannot be discounted. The WSDOT Environmental Procedures Manual (WSDOT 2007a, Section 620.08) provides guidelines for addressing discoveries of unanticipated contamination. Workers who are likely to encounter unknown contamination should be capable of identifying and rapidly responding to these situations. Workers should also be apprised of the possibility of encountering contamination. A site Health and Safety Plan would be prepared that describes monitoring requirements and the use of personal protective equipment for workers that come in contact with contaminated media.

Where encountering contaminated soil or groundwater would be unavoidable, contaminated soil or groundwater could be characterized prior to excavation to minimize space requirements for stockpiling and the need for double handling of the material.

Spoils from jet grouting and deep soil mixing would result in a waste consisting of soil and grout with the consistency of thick mud. The spoils may be contaminated if they are removed from contaminated areas. Stabilization or dewatering the mixture would be necessary prior to disposal.

Depending on the nature of the contaminant, the soil and groundwater could be stockpiled or containerized and then characterized to determine disposal options. Soil handling options include using soils that do not exceed Washington State MTCA Method A cleanup levels under roadways as fill if the soils meet state and federal regulatory requirements and geotechnical fill specifications. Soils that cannot be reused would have to be transported to a thermal treatment facility, landfill, or dangerous waste landfill or incinerator, as described below. These types of disposal sites are readily accessible by federal and state highways. Some disposal sites are accessible by rail.

Soil with low concentrations of hydrocarbons and other contaminants may be disposed at a land reclamation facility. The soil may contain construction debris other than wood.

Contaminated soil that is not a dangerous waste and contains wood (both creosote-treated and untreated) could be disposed at a RCRA Subtitle D

landfill facility. Alternatively, petroleum-contaminated soil could be remediated at a thermal treatment facility after required removal of timber and piles.

Soil contaminated at concentrations that constitute a dangerous waste would require disposal at a RCRA Subtitle C landfill, bioremediation for solvents, or incineration, depending on the type and concentration of contaminants.

Groundwater that does not exceed MTCA Method A cleanup levels could be discharged directly or indirectly to the ground surface or surface water, provided that discharge conforms to regulatory criteria. Groundwater that is above the MTCA Method A cleanup levels but below dangerous waste criteria could either be treated to meet requirements for local discharge through a publicly owned treatment works or could be transported off-site to a private treatment, storage, and disposal (TSD) facility. Groundwater that exceeds dangerous waste criteria would require either pretreatment and disposal through a publicly owned treatment works or disposal at a hazardous waste TSD facility.

Abatement of other contaminated materials, such as ACM and lead-based paint, would need to be conducted in accordance with applicable regulations.

Chapter 7 INDIRECT AND CUMULATIVE EFFECTS

Indirect effects are effects that are caused by the Project but occur later in time or farther removed in distance. Cumulative effects are those effects that, when combined with the effects of past, present, and reasonably foreseeable neighboring projects, may have an additive effect on the environment.

7.1 Indirect Effects

Indirect effects of the Project include an overall reduction of contaminants in the environment. Specifically, contamination that had not previously been identified may be discovered and cleaned up, that would otherwise remain in place with a potential to migrate. Also, removing potential hazardous materials release sources, such as USTs, would prevent future contamination from occurring. Construction activities could uncover contaminated material, resulting in more direct exposure to the public and spread of contamination if preventative measures were not implemented.

Potentially contaminated sites have been identified for possible acquisition or modification. Contaminated sites that are acquired could result in liability for cleanup beyond the construction phase. Please see Exhibit 6-2 for a list of properties of concern.

7.2 Cumulative Effects

The Project would retrofit PGIS, which would reduce pollutants found in stormwater. Any projects in the vicinity would also likely be required to retrofit PGIS, which would be a benefit for the environment. Cumulative effects of spoils handling and disposal could worsen the construction effects previously presented. For example, if construction of other large projects occurs, there may be increased difficulty handling and disposing of spoils and contaminated soil.

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ATTACHMENT A

EDR Area Study Report

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Attachment A is available electronically upon request.

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ATTACHMENT B

Sites Excluded Based on Screening Criteria

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ATTACHMENT B

SITES EXCLUDED BASED ON SCREENING CRITERIA

ATTACHMENT B

SITES EXCLUDED BASED ON SCREENING CRITERIA

LIST OF EXHIBITS

Exhibit No.

Exhibit B-1. RCRA Small- and Large-Quantity Generator Sites

EDR Site Number	Site Name	Site Address	Property Use	RCRA - LQG	RCRA - SQG
69	US Coast Guard Integrated Support Command Seattle	1519 Alaskan Way S.	military	X	
71	Guardian Security Systems Inc.	1743 First Avenue S.	commercial property		X
88	Seattle Radiator Works	1936 First Avenue S.	radiator business		X
96	First & Utah Street Associates LP	2401 Utah Avenue S.	commercial property		X

EDR = Environmental Data Resources, Inc.
RCRA = Resource Conservation and Recovery Act
SQG = small quantity generator
LQG = large quantity generator

Exhibit B-2. Emergency Response Notification System (ERNS) Sites

Site/Address	EDR Map ID[1]
562 Occidental Avenue S.	35
562 First Avenue S.	36
801 First Avenue S.	49
1200 First Avenue S.	56
84 S. Atlantic Street	62
1519 Alaskan Way S. Pier 36	69
23 S. Massachusetts Street	75
1741 First Avenue S.	78
1915 Alaskan Way S.	83
2200 First Avenue S.	92
2250 First Avenue S.	92
2400 Occidental Avenue .	94

[1] *Environmental Data Resources, Inc., 2008, The EDR South End EA AWV, King WA, prepared by Environmental Data Resources, Inc., Southport, Conn. for Shannon & Wilson, Inc., Seattle, Wash., inquiry number 02152733.1r, February.*

ATTACHMENT C

Sites with Documented and Potential Contaminant Releases

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Appendix C

Exhibit C-1. Sites With Documented and Potential Contaminant Releases

Block	Site No.	Type of Business/ Reference Name	Description (Archive)	Description (Polk or Sanborn)	Polk Directory Years	Sanborn Map Years	Current Tax Assessor Notes for Adjacent Properties Only	Listed Site[1]	Rank (adjacent properties only) - 2008	RP/SC[2]	Primary Contaminant(s)
360.1	360.1-1	plating works, boiler works, brass foundry, tin shop, blacksmith, machine shops, gas & oil		plating works, boiler works, brass foundry, tin shop, blacksmith, machine shops / gas & oil		1916 / 1950	King County Sewer Station; 1-story utility, built 1970, no heat			SC	solv, metals, gas, pet
360.1	360.1-2	copper works, machine shop		Seattle Copper works / machine shop		1916	Terminal 37, 42 and 46 (marine/commercial/fish) - 7 buildings: 1) 2-story transit warehouse/gate/guardhouse, built 1967, warmed and cooled air; 2) office building, built 1967, warmed and cooled air; 3) transit warehouse/transit shed, built 1967, space heaters; 4) storage warehouse/maintenance, built 1967, space heaters; 5) office builidng built 1941, steam; 6) administrative building, built 2005, HVAC; 7) garage and service repair building built 2005, electric wall heat.	Yes		RP	solv, met, pet
360.1	360.1-3	sheet metal works, gas station, brass foundry, boiler works, plating works, machine shop	1-story metal shop/restaurant/office building, built in 1890, stove heat	sheet metal works / gas station / brass foundry, boiler works, plating works, machine shop	1938, 1940 /1940 /	/ 1950 / 1916	See Pier 46 terminal (Site 360.1-2)			SC	solv, metals, gas
360.1	360.1-4	dock with tank	dock, built 1964-65, 2,000 gallon tank				See Pier 46 terminal (Site 360.1-2)			RP	pet
360.1	360.1-5	machine shop, gas & oil, repair shop	1-story scale house, built 1923, stove heat	machine shop / gas & oil / repair shop		1916 / 1950 / 1969	See Pier 46 terminal (Site 360.1-2)		Moderate	RP	solv, metals, gas
360.1	360.1-6	railroad	1-story office/dock building, built 1943, inventory is listed in tank section, a portion of the inventory covered by photo	Round House Machine Shop & Coal Burners: blacksmith, machine shops / machine shop & blacksmith		1916 / 1950	See Pier 46 terminal (Site 360.1-2)		High	SC	solv, metals
360.1	360.1-7	repair shop		repair shop		1969	See Pier 46 terminal (Site 360.1-2)		High	SC	metals, pet
360.1	360.1-8	gasoline and service station	1-story service station, unknown construction date, stove heat, 4x14 grease pit	gas & service station	1938, 1940, 1951, 1956, 1960	1950	See Pier 46 terminal (Site 360.1-2)		Moderate	RP	gas
360.1	360.1-9	construction and dry dock company		includes: machine shops, blacksmith, auto repairs, forge shops, copper shop, and foundry		1916	Port of Seattle Terminal - no building information		High	SC	solv, metals, pet
360.1	360.1-10	machine & steel shops, oil house	2-story machine shop/office building, built 1945, 3 oil burners	machine & steel shops, oil house		1950, 1969	See Pier 46 terminal (Site 360.1-2)		Moderate	RP	solv, metals, pet
360.1	360.1-11	boat shop	2-story boat shop, construction date unknwon, stove heat				See Pier 46 terminal (Site 360.1-2)		Moderate	RP	metals, pet
360.1	360.1-12	locomotive repairing		locomotive repairing / equipment repairing		1950 / 1969	See Pier 46 terminal (Site 360.1-2)		Moderate	RP	metals, pet
360.1	360.1-13	Road improvement					See Pier 46 terminal (Site 360.1-2)	Yes	Moderate	RP	metals, pet, gas, PAHs
360.15	360.15-1	sheet metal works	1-single story freight depot, built 1931, stove heat	sheet metal works		1916	Surface parking lot / 3-story industrial, built 1921, steam heat	Yes	High	SC	metals, pet

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Exhibit C-1. Sites With Documented and Potential Contaminant Releases

Block	Site No.	Type of Business/ Reference Name	Description (Archive)	Description (Polk or Sanborn)	Polk Directory Years	Sanborn Map Years	Current Tax Assessor Notes for Adjacent Properties Only	Listed Site[1]	Rank (adjacent properties only) - 2008	RP/SC[2]	Primary Contaminant(s)
360.2	360.2-1	paint mfrs.	No Records Available	paint mfrs.	1951		7-story office building, built 1904, warmed and cooled air heat	Yes[4]		RP	solv, gas
360.2	360.2-2	fuel company	No Records Available	fuel	1938, 1940		Retail and athletic club, masonry building built in 1923; warmed and cooled air		Low	RP	pet
360.2	360.2-3	automobile service	No Records Available	tires, gas, & oil	1938, 1940	1950			Low	RP	pet, gas
360.2	360.2-4	painters, sign co.	No Records Available	painters	1951				Low	RP	solv
360.3	360.3-1	machine works, tool mfrs.	No Records Available		1938, 1940		6-story office building, built 1910, warmed and cooled air			RP	solv, metals
360.3	360.3-2	sawmill machinery	No Records Available	sawmill machinery	1940		6-story retail/condo building, built 1909, electric heat			RP	metals
360.3	360.3-3	machinery mfrs.	No Records Available	machinery mfrs.	1938, 1940, 1951		6-story retail/condo building, built 1909, electric heat			RP	metals, pet
360.3	360.3-4	oils & lubricants	No Records Available	oils & lubricants	1938, 1940, 1951		6-story retail/condo building, built 1909, electric heat			RP	metals, pet
360.3	360.3-5	sheet metal mfrs.	No Records Available		1989		6-story retail/condo building, built 1909, electric heat			RP	metals
360.3	360.3-6	oil & gas burning equipment	No Records Available	oil & gas burning equipment	1956		4-story office building, built 1904, HVAC system			RP	pet
360.3	360.3-7	chemical co.	No Records Available		1970		5-story office/retail warehouse, built 1910, electric wall heat			RP	solv
360.3	360.3-8	printers	No Records Available		1970, 1975		5-story office/retail warehouse, built 1910, electric wall heat			RP	solv
360.3	360.3-9	tools mfrs.	No Records Available	tools mfrs.	1938		6-story office building, built 1909, package unit heat			RP	metals
370.1	370.1-1	gas station		gas station	1938, 1940, 1943		2-story warehouse, built 1939, space heaters		Moderate	RP	gas
370.1	370.1-2	railroad					Terminal - 3 buildings: 1) 1-story transit/freight warehouse, built 1912, steam & no boiler heat; 2) 1-story transit warehouse/loading dock, built 1935, no heat; 3) 2-story office, built 1912, forced air unit	Yes	Moderate	RP	pet
370.2	370.2-1	gas station	No Records Available	gas station	1938, 1940, 1943	1950	No parcel, part of roadway		Low	RP	gas
370.2	370.2-2	pattern works			1938, 1943	1916, 1950	Commercial Parking Lot		Moderate	SC	metals
370.2	370.2-3	brass works		machinists	1938, 1943				Low	RP	solv, metals
370.2	370.2-4	pattern and model works, machine works	2-story machine shop, built 1890, stove heat		1938, 1940, 1943 / 1938, 1940, 1943				Moderate	SC	solv, metals
370.2	370.2-5	chemical mfrs.			1960		2-story commercial office/warehouse building, built 1920, space heaters		Low	RP	solv
370.2	370.2-6	warehouse	2-story retail/warehouse building, built 1920, oil burner & stove					Yes	Low	RP	metals, pet

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370.2	370.2-7	fuel co. and iron wire rope mfrs.	4-story warehouse, built 1904, 2 oil burners		1965		2-story commercial office/warehouse building, built 1920, space heaters; 4-story office/warehouse, built 1904, hot water heat		Low	RP	metals, pet
370.2	370.2-8	aluminum company		plant	1965, 1970		4-story office/warehouse, built 1904, hot water heat		Low	RP	metals, pet
370.2	370.2-9	copper and brass works	1-story store, built 1927				1-story warehouse building, built 1927, space heaters		Moderate	SC	metals
370.2	370.2-10	copper and brass works, wire and cable co.	1-story store, built 1929, oil burner	machine shop		1916	1-story industrial light manufacturing warehouse, built 1929, space heaters		Low	RP	solv, metals
370.2	370.2-11	electric company	1-story store, built 1903				commercial parking lot		Moderate	SC	PCBs
370.2	370.2-12	electric motors and chains	1-story store, date built unknown, oil burner.				6-story retail, office, vacant warehouse building, built 1910, through-wall heat pump		Moderate	SC	metals
370.2	370.2-13	machinery mfrs.	1-story store/office building, built 1918, oil burner				1-story restaurant, built 1918, complete HVAC		Low	RP	metals
370.2	370.2-14	paint manufacturer/oil company/battery and chemical company		paint mfrs. & paint spraying / metallurgist / oil dealers	1940, 1943 / 1940, 1943 / 1951 / 1960 / 1960	/ 1969	6-story retail, office, vacant warehouse building, built 1910, through-wall heat pump		Moderate	RP	solv, metals, pet
370.2	370.2-15	paint co.	4-story warehouse building, built 1909, oil burner				4-story storage warehouse, built 1909, space heaters		Low	RP	solv, metals
370.2	370.2-16	machinery and equipment co.	2-story warehouse building, built 1900, stove heat				1-story warehouse and showroom store, built 1900, space heaters		Low	RP	metals
370.2	370.2-17	machine shop		machine shop		1950	4-story storage warehouse, built 1909, space heaters		Low	RP	solv, metals
370.2	370.2-18	junk company	1-story warehouse/store/office building, built 1920, oil burner	junk yard		1916	Commercial Parking Lot		Moderate	SC	pet, metals, PCBs
370.2	370.2-19	gas station	1-story gas station, built 1942, stove heat; 6-1,000 gallon tanks; repair garage, built 1946	gas station with auto service	1943, 1951, 1956, 1960, 1965, 1970, 1975, 1980, 1985, 1989	1950, 1969	1-story retail store, built 1996, heat pump (gas)	Yes	Low	RP	gas
380.1	380.1-1	Pier 37/Gasoline Station	gas station, built 1922, stove heat, torn down 1944; garage remodeled in 1939 for tire room; rear structure on property: grease shed with gas station.	machine shops & maintenance shop, paint shop / boat repair / gas station	1938, 1940 (gas station)	1950, 1969 / 1950, 1969	Metro Sewer Station; 1-story utility, built 1970, no heat	Yes	High	SC	solv, metals, pet, gas
380.1	380.1-2	junk company				1916	Terminal 37, 42 and 46 (marine/commercial/fish) - 7 buildings: 1) 2-story transit warehouse/gate/guardhouse, built 1967, warmed and cooled air; 2) office building, built 1967, warmed and cooled air; 3) transit warehouse/transit shed, built 1967, space heaters; 4) storage warehouse/maintenance, built 1967, space heaters; 5) office builidng built 1941, steam; 6) administrative building, built 2005, HVAC; 7) garage and service repair building built 2005, electric wall heat.		Moderate	RP	solv, metals, gas
380.1	380.1-3	coal briquette plant		Coal briquette plant		1916			Moderate	RP	pet, gas
380.1	380.1-4	automotive service (Terminal 37)	garage/service station, built 1914, stove heat, fuel pumps						Moderate	RP	gas
380.1	380.1-5	Terminals 37, 42 ,47	2 buildings, built 1920s, both stove heat, one torn down 1943, the other torn down 1961						Moderate	RP	pet
380.2	380.2-1	fuel company	Building listed as office		1938, 1940		cargo, operating terminal (auto,bus,other), built 1914, 2-story industrial, hot water heat		Moderate	RP	pet

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380.2	380.2-2	machine works	1-story iron works/foundry, built 1902, no heat, torn down 1949	variety foundry co.	1938, 1940, 1943-44	1916	built 1914, 2-story industrial, hot water heat		High	SC	solv, metals
380.2	380.2-3	junk company	built 1903, oil burner, torn down 1951	junk yard		1916	vacant lot / 1-story warehouse, built 1957, space heaters / vacant lot		High	SC	metals, pet, PCBs
380.2	380.2-4	can company	warehouse, built 1902, stoker heat			1916	vacant lot /1-story warehouse, built 1957, space heaters	Yes[4]	Moderate	RP	metals, pet
380.3	380.3-1	cleaning products		cleaning compounds	1938, 1940, 1943-44		built 1914, 2-story industrial, hot water heat		Moderate	RP	solv
380.3	380.3-2	junk company	built 1954, stove heat	junk yard		1916			High	SC	metals, pet, PCBs
380.3	380.3-3	truck sales & service	1-story garage/sales, built 1938, oil burner, 2 sumps, pumps, gas tanks	truck sales & service	1956	1950, 1969	2-story warehouse, built 1938, space heaters		Low	RP	gas
380.4	380.4-1	auto repairs and gas station	service station, built 1939, stove heat; tanks: 2-2,000; 1-1,000; 1-550; and 2-300 gallon	repairs and gas station	1940, 1943, 1956, 1960	1950, 1969	Sport Facility		Low	RP	gas
380.4	380.4-2	machine shop	warehouse/office/loft, built 1917, oil burner	machine shop		1916	Sport Facility		Low	RP	solv, metals
380.4	380.4-3	auto supply company/paint warehouse	warehouse, built 1904	paint warehouse		1969	Sport Facility		Low	RP	solv
380.4	380.4-4	oil & gas co.	warehouse, built 1910	oil & gas co.	1938, 1940		Sport Facility		Low	RP	pet
380.4	380.4-5	automotive supply	warehouse, built 1926, oil burner; sign indicates automotive supply (i.e.batteries, tires), photo likely taken in 1937				Sport Facility		Low	RP	pet
390.1	390.1-1	machine shops & blacksmith		machine shops & blacksmith		1916	Terminal 37, 42 and 46 (marine/commercial/fish) - 7 buildings: 1) 2-story transit warehouse/gate/guardhouse, built 1967, warmed and cooled air; 2) office building, built 1967, warmed and cooled air; 3) transit warehouse/transit shed, built 1967, space heaters; 4) storage warehouse/maintenance, built 1967, space heaters; 5) office builidng built 1941, steam; 6) administrative building, built 2005, HVAC; 7) garage and service repair building built 2005, electric wall heat.	Yes	Moderate	RP	gas
390.1	390.1-2	gas station	Built 1906, warehouse with stove, torn down 1941; gasoline station, built 1924, 4-550 gallon tanks with pipe line, grease pit						Moderate	RP	gas
390.1	390.1-3	marine repair shop		marine repair shop		1950			Low	RP	metals
390.1	390.1-4	metals company	warehouse, built 1934, oil burner						Low	RP	metals
390.1	390.1-5	U.S. Military		ship building yards		1916	USCG- 4 buildings, 1) industrial steel building, built 1991, 2) magazine building-masonry, built 1991, 3) office building, built 1992, 4) office building, built 2006.	Yes	Low	RP	metals
390.1	390.1-6	blacksmith shop		blacksmith shop		1916	See Terminals 37, 42 and 46. (see Sites 390.1-1, -2,-3,-4)		Moderate	RP	metals
390.2	390.2-1	railroad repair shop	repair shop with 3 additional shed structures, built ~1927				warehouse (shed) Railroad		Low	RP	metals, pet
390.3	390.3-1	machinery company	former shop, built 1926, stove heat	shop & storage yard	1965, 1970, 1975 / 1938, 1940, 1943-44, 1951, 1956, 1960, 1965, 1970,	1969 / 1950, 1969	3 buildings: 1 & 2) 1-story industrial, built 1926, space heaters; 3) 1-story equipment shed/shop, built 1951, no heat / vacant lot	Yes	Low	RP	pet, gas, PAHs

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390.3	390.3-2	bus garage	garage and grease rack, built 1937, 1,600 gallon gas tank, grease pit 4'x64'x4'				3 buildings: 1 & 2) 1-story industrial, built 1926, space heaters; 3) 1-story equipment shed/shop, built 1951, no heat		Low	RP	pet
390.3	390.3-3	public utility	power plant with battery room	substation	1951, 1960, 1965, 1970, 1975, 1985, 1989-90	1916, 1950, 1969	2 buildings: 1) 1-story storage warehouse/utility, built 1969, forced air unit; 2) 1-story storage warehouse/utility, built 1990, no heat	Yes	Moderate	SC	PCBs
390.5	390.5-1	warehouse and transfer company	warehouse: signs indicate chemicals, adhesives, colors, foundry & steel mill supplies, built 1926				2-story building, built 1901, space heaters			RP	solv, pet
390.5	390.5-2	electric motors/distribution company	store, built 1901, stove heat	oil and gasoline / oil treating compounds	1960	1916	2-story building, built 1901, space heaters, 1-story parking, labs and office building, built 1937, warmed and cooled air			RP	solv, pet
390.5	390.5-3	metal finishing and painting operation	built 1937, stove heat	metal finishing and painting		1916	1-story parking, labs and office building, built 1937, warmed and cooled air			RP	solv
390.5	390.5-4	radiator business	warehouse, built 1928, stoker heat				2-story storage warehouse, built 1928, forced air unit heat			RP	metals
390.5	390.5-5	auto wrecking	built 1916, stove heat		1938, 1940, 1943		1-story warehouse, built 1970, space heaters			RP	pet
390.5	390.5-6	textile bag mfr.	built 1938, stove heat	textile bag mfrs	1985, 1989-90	1950, 1969	2-story office building, built 1996, space heaters			SC	solv, pet
400.1	400.1-1	furniture mfg., bulk petroleum storage	furniture factory, built 1909, oil burner/1920s-1995 bulk petroleum storage facility. Port of Seattle purchased in 1993 (Pier 34) to be redeveloped for freight container handling facility.			1950	3 buildings: 1) 1-story industrial, built 1909, no heat; 2) 1-story industrial, built 1909, no heat; 3) 1-story industrial, built 1942, no heat		Moderate	RP	solv, metals, pet, gas
400.1	400.1-2	foundry supplies, painting		foundry supplies	1965 / 1989-90				Moderate	RP	solv, metals, pet, gas
400.1	400.1-3	machine shops		machine shops		1916, 1950			Moderate	RP	solv, metals, pet, gas
400.1	400.1-4	aluminum business warehouse	aluminum business warehouse, built 1942, stove heat						Moderate	RP	solv, metals, pet, gas
400.1	400.1-5	disposal company	Transfer Station				3 buildings; 1) built in 1991, 1-story government services, warmed & cooled air; 2) 1-story storage warehouse, built in 1991, unknown heating; 3) 1-story office building, built in 1992, warmed & cooled air / - 2 buildings: 1) 1-story multi-purpose, built in 1991, heat pump; 2) 1-story storage warehouse, built 1991, no heat.	Yes	Low	RP	gas, metals, pahs
400.1	400.1-6	ink mfg.	built 1950, oil burner, 1-10,000 gallon fuel oil tank, 2 other large tanks	ink mfg	1951, 1956, 1960, 1970, 1975, 1980, 1985, 1989	1969	1-story industrial building, built 1950, warmed and cooler air, teaching facility	Yes	High	SC	solv, pet

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400.1	400.1-7	Pier 34 (former petroleum company	boiler house w/ stove/oil burner; bulk rail loading rack, bulk truck loading rack, garage, wash rack, pump house, 6 tanks, tank farm, warehouse for drum storage & loading; salt tower (petroleum refining), built 1928	tank farm	1938, 1940, 1951, 1960, 1989	1950, 1969	container yard, vacant / terminal (marine/commercial/fish)	Yes	High	SC	pet, gas
400.3	400.3-1	fuel company	coal bunkers (1946)	(yard)	1956		Railway Company operating property		Low	RP	pet, pah
400.3	400.3-2	oil tanks, railyard co.	garage, built 1926, stove heat	oil tanks		1916			Low	RP	pet, PAHs
400.3	400.3-3	coal bins	1-story warehouse/office building, oil burner, built 1917, shack, 2 coal bins						Low	RP	pet
400.3	400.3-4	paint storage		paint storage		1916				RP	solv
400.3	400.3-5	machinery co.			1965					RP	metals, pet
400.3	400.3-6	metal products co.			1951, 1956, 1960					RP	metals
400.4	400.4-1	oil burner mfr., machine shop	store, built 1927, oil burner	oil burner mfrs	1943, 1956, 1960		3-story storage warehouse, built 1910, space heaters / 1-story industrial, built 1927, space heaters			RP	metals
400.4	400.4-2	paint mfrs.		mfrs	1943		not reviewed, not adjacent			RP	solv
400.4	400.4-3	machine shop	warehouse/store, built 1921	machine shop		1916	3-story office, built 1921, package unit heating			RP	solv, metals, pet
400.4	400.4-4	lithographics	warehouse/store, built 1927, oil burner		1989		1-story industrial, built 1927, space heaters			RP	solv
400.4	400.4-5	plumbing and heating supply warehouse	warehouse, built 1904, oil burner		1938, 1940, 1943/44		1-story storage warehouse, built 1904, space heaters			RP	metals
400.4	400.4-6	gasoline, engine co.	store/warehouse, built 1925, oil burner	gasoline	1965, 1970		1-story storage warehouse, built 1925, space heaters			RP	gas
400.4	400.4-7	blacksmith		blacksmith		1916	not reviewed, not adjacent			RP	metals
400.5	400.5-1	bronze foundry		bronze foundry		1950	not reviewed, not adjacent			SC	metals
400.5	400.5-2	tank and boiler cleaners			1938		not reviewed, not adjacent			RP	solv
400.5	400.5-3	blacksmith		blacksmith		1916	not reviewed, not adjacent			RP	met
400.5	400.5-4	auto wrecking	built 1907		1938, 1940, 1951	1950, 1969	not reviewed, not adjacent			SC	pet
400.5	400.5-5	sheet metal works	built 1907, oil burner		1943, 1951, 1956, 1965	1916, 1950	not reviewed, not adjacent			RP	metals
400.5	400.5-6	blacksmiths, carriage mfr.		blacksmiths	1938, 1940 / 1938, 1940		not reviewed, not adjacent			RP	metals
400.5	400.5-7	machine shop, junk yard	built 1918, stove heat, fourth business is supply/cleaning company				not reviewed, not adjacent			RP	pet
400.5	400.5-8	retail and warehouses						Yes		RP	pet
410.1	410.1-1	Terminal 30	built 1913: 1-story garage (2), maintenance shop,	tank farm	1943-44, 1951, 1956,	1916, 1950,	Port Terminal 30	Yes	Moderate	SC	pet
410.1	410.1-2	gas station	1-story service station, built 1950, stove heat; 2-1,000 gallon and 1-550 gallon tanks	gas station	1938, 1943-44, 1951, 1956, 1960, 1965	1950, 1969			Low	RP	gas
410.2	410.2-1	oil tank, railroad	railroad operating property: fuel tank, sanding tower, locker/wash/office, filter house (1922)	steel oil tank		1969	railroad operating property - commercial rail terminal		Low	RP	pet

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410.2	410.2-2	railroad repair shop	1-story tool and motor car house, built 1955, stove heat						Low	RP	pet
410.2	410.2-3	railroad, tank	500-BBL tank						Low	RP	pet
410.2	410.2-4	railroad repair shop, blacksmith	1-story shop, built in 1954; sand house, garage, blacksmith, built 1945-46; 2-story yard office, oil burner						Low	RP	metals
410.2	410.2-5	railroad machine shop, power house, storage tank, garage	1-story locker house, machine shop, storage shed, lumber shed, power house, bar car, storage shed, 5 car garage (2), box car (2), and storage tank						Low	RP	solv, metals, pet
410.2	410.2-6	railroad oil shed	1-story oil shed						Low	RP	pet
410.3	410.3-1	railroad workshop, wire rope co., freight terminal	1-story warehouse built 1925, 1-story warehouse built 1944, workshop built 1966, oil burners/stove	wire rope / operating department, freight terminal	1938 / 1943, 1951		Railway company operating property			RP	metals, pet
410.4	410.4-1	gas station, auto repairs	1-story gas station, built 1935, 2-3,000 gallon, 1-8,000 gallon, 1-1,000 gallon tanks	gas station / auto repairs	1940, 1943, 1951, 1956, 1960, 1965, 1970, 1975, 1980	1950, 1969	not reviewed, not adjacent			RP	gas
410.4	410.4-2	mill, equipment co.	1-story mill, built 1938, stove heat							RP	metals
410.4	410.4-3	scientific company	1-story office/retail building, built 1937							RP	solv
410.4	410.4-4	auto service, welding apparatus		auto service / welding apparatus	/ 1951	1969	not reviewed, not adjacent			RP	pet, metals
410.4	410.4-5	dye, pattern makers		dye/pattern makers	1970, 1975		not reviewed, not adjacent			RP	metals
410.4	410.4-6	mfr. and steel plating works	1-story warehouse, built 1914, stove heat	mfrs and plating works	1951		not reviewed, not adjacent			SC	metals, solv
410.4	410.4-7	machinery mfr.		machinery mfrs	1940		not reviewed, not adjacent			RP	solv, metals
410.4	410.4-8	soap and grease mfrs.	1-story factory, built 1914, 2-story warehouse, built 1920, oil burner and stove heat		1938, 1940		not reviewed, not adjacent			RP	solv
410.4	410.4-9	auto salvage	3-story retail/warehouse, built 1910		1975		not reviewed, not adjacent			SC	pet
410.4	410.4-10	brass and copper co.	1-story retail/warehouse, built 1922, stoker		1940		not reviewed, not adjacent			RP	metals
410.4	410.4-11	chocolate factory						Yes[4]		RP	pet
410.5	410.5-1	truck rentals & repair		truck rentals & repair		1969	not reviewed, not adjacent			RP	pet
420.1	420.1-1	railyard roundhouse, track dept, car dept, oil tank, pump house		yard office, roundhouse, track dept, car dept, oil tank, pump house	/ 1943, 1951	1969	Railway company operating property			RP	pet
420.1	420.1-2	railyard, parking garage	14,000 gallon diesel oil tank, built 1960				railway company operating property / Parking Garage 2 buildings: 1) 7-story parking garage, built 1976, space heaters; 2) 7-story parking garage, built 2002, unknown heat source			RP	pet

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420.1	420.1-3	railroad property	1-story shop, built 1970				railway company operating property / Parking Garage 2 buildings: 1) 7-story parking garage, built 1976, space heaters; 2) 7-story parking garage, built 2002, unknown heat source			RP	pet
420.2	420.2-1	chemical co.			1940, 1943		not reviewed, not adjacent			RP	solv
420.2	420.2-2	blacksmith, wagon shop, painting		blacksmith, wagon shop, painting		1916	not reviewed, not adjacent			SC	metals, solv
420.2	420.2-3	salvage and metal co.	2-story warehouse/office, built 1910, stove heat				not reviewed, not adjacent			SC	solv
420.2	420.2-4	mill	2-story warehouse/office, built 1910				not reviewed, not adjacent			RP	solv
420.2	420.2-5	furniture store	2-story warehouse/machine shop/office, built 1910, oil burner, hide & wool products business				not reviewed, not adjacent	Yes		RP	solv, metals, pet
420.2	420.2-6	gas station	1-story service station, built 1939, 3-1,000 gallon tanks, 1-550 gallon tank, stove heat, torn down 1949	gas station	1940, 1943		not reviewed, not adjacent			RP	gas
420.3	420.3-1	chemical co., oil refiners, grinding and metal perforating	4-story wholesale grocery, built 1909, oil burner. 2-250 T. Cap. ammonia machine	mfrs / refiners / grinding and metal perforating	1943 / 1938, 1940, 1951, 1956, 1960	/ / 1969	not reviewed, not adjacent			RP	pet
420.3	420.3-2	auto repairs	1-story service garage, built 1930, oil burner	auto repairs	1938, 1940, 1943, 1956, 1960, 1965, 1975, 1980, 1985, 1989 / 1938	1950, 1969	not reviewed, not adjacent			RP	solv, metals, pet
420.3	420.3-3	textile mfg.	1-story office/warehouse, built 1925		1980, 1985, 1989-90		not reviewed, not adjacent			RP	solv
420.3	420.3-4	machine shop	1-story store, built 1918				not reviewed, not adjacent			RP	pet
420.3	420.3-5	auto wrecking	2-story office/store/warehouse, built 1900		1940	1950	not reviewed, not adjacent			SC	pet
420.3	420.3-6	chemical warehouse		chemical warehouse		1969	not reviewed, not adjacent			RP	solv
420.3	420.3-7	gas station, auto repairs	1-story gas station, built 1930; remodeled 1953, 2-4,000 gallon & 1-550 gallon tanks, 2 deep wells, stove heat	gas station / auto repairs	1938, 1940, 1943, 1951, 1956, 1960, 1965, 1970, 1975	1950, 1969	not reviewed, not adjacent			RP	gas

1 Site Listed in Environmental Records (databases)

2 RP = Reasonably Predictable; SC = Substantially Contaminated

3 Site Listed in Environmental Records; however, this site is not identified on Exhibit 4-1 because it encompasses sediments from Block 220.05 to 290.1.

4 Site Listed in UST database only, installed prior to 1980; no known release.

PET = petroleum

MET = metals

SOLV = solvents

GAS = gasoline

PCBs = polychlorinated biphenyls

Blank cells in Polk Directory, Sanborn Map, Description Archive, and Listed Site columns indicate there was no environmental problem identified.

Blank cells in tax parcel number column indicate that the site is not adjacent.

ATTACHMENT D

Windshield Survey

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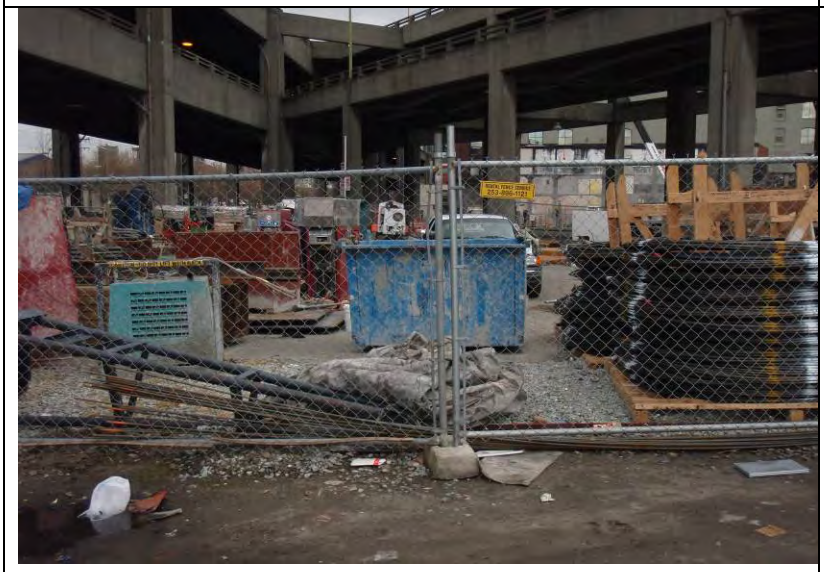
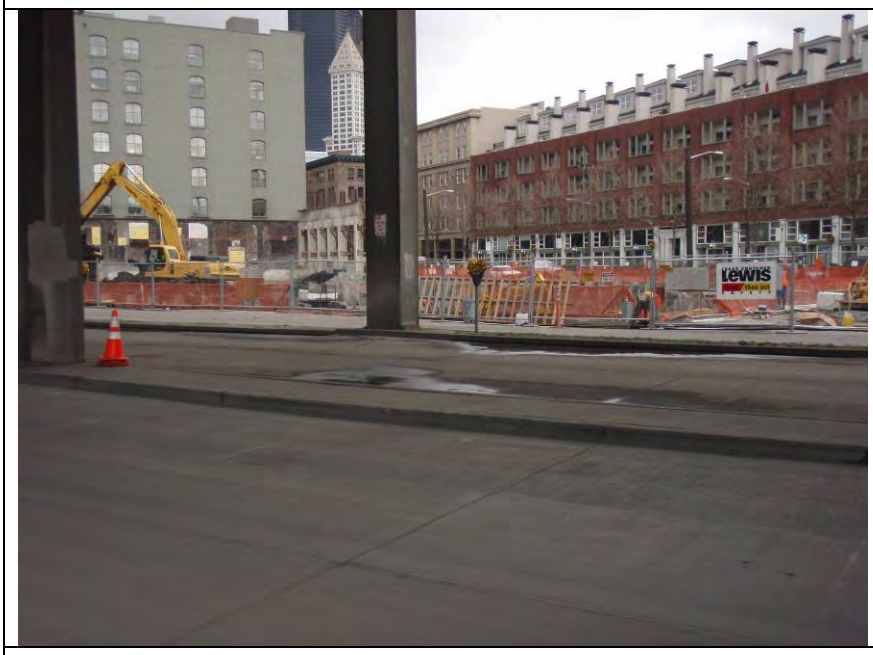
ATTACHMENT D

WINDSHIELD SURVEY

BLOCK NO. 360.1	**Bounding Streets:** Terminal 46 (S. King Street), Alaskan Way S., S. Royal Brougham Way, and Elliott Bay.
	**Property Description:** The block is occupied by Terminal 46. The administrative building is located at approximately Site 360.1-4. An entrance is located across from S. Dearborn Street. The site is paved and used as a container terminal. A single-track rail line is located between the sidewalk on the west side of Alaskan Way S. and the terminal fence. Storm drains are visible on the east side of the tarmac. Acquisition Plan: Partial; the east side of the block will be acquired.
Photo Description: Looking southwest at railroad track and containers at Terminal 46.	

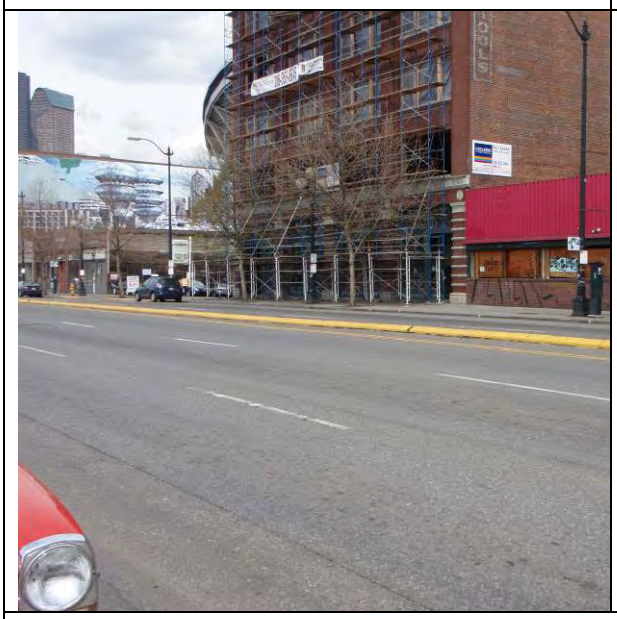
BLOCK NO. 360.15	**Bounding Streets:** Railroad Way S., S. Dearborn Street, Alaskan Way S.
	**Property Description:** The south end of the block is unpaved and used as a parking lot. The north end of the block, which is partially paved and fenced, is used as a laydown area for the construction site located across the street (directly east of the block; Sites 360.2-2,-3, -4). Ecology blocks, pipe, spools of wire, and timbers were observed in the fenced area. Acquisition Plan: Full. The block has been acquired by WSDOT for the Project. A Phase I ESA was conducted prior to purchasing the property.
Photo Description: Looking north at construction laydown area.	

BLOCK NO. 360.2	**Bounding Streets:** S. King Street, First Avenue S., and Railroad Way S.
	**Property Description:** The middle portion of the block is a construction site. A brick building is located at the southern end of the block. The excavation at the time of the windshield survey was approximately 25 feet deep. No standing water was observed in the excavation. The material being removed from the excavation consisted of a dark silty sand and wood debris and timbers (approximately 50% wood debris). Acquisition Plan: No, Block 360.2 is located adjacent to the WSDOT property (Block 360.15).
Photo Description: Looking northeast at construction area.	

BLOCK NO. 360.3	**Bounding Streets:** S. King Street, Occidental Avenue S, and Railroad Way S., First Avenue S.
	**Property Description:** Block 360.3 is a mix of newer and old buildings (four stories). Good housekeeping practices were observed outside these buildings. Acquisition Plan: No, Block 360.3 is located two blocks east of the project footprint.
Photo Description: Looking southeast at mix of new and old brick buildings, retail and residential.	

BLOCK NO. 370.1	**Bounding Streets:** S. Dearborn Street, First Avenue S., S. Royal Brougham Way, Alaskan Way S.
 **Photo Description:** Looking northwest at asphalt patches.	**Property Description:** Formerly known as the WOSCA and Gerry Sportswear sites. Unpaved and paved parking areas are located on the west side and middle portion of the block. Three buildings are located along the east side of the block and parallel First Avenue S. Storm drains that trend north-south are located in the parking area west of the buildings. Monitoring wells for the Project are located in the parking area. A monitoring well that did not appear to be associated with the Project was located about 50 feet west of the WOSCA warehouse, approximately midblock. Asphalt patches trend north-south and appear to be a result of subsidence along a utility line. Rail lines that trend north-south were located on the west edge, middle, and east edge of the property. A fenced area approximately midblock, along the western edge of the property, is used to store investigation-derived waste from the Project geotechnical exploration program. Acquisition Plan: Full. WSDOT has acquired the property for the Project. Phase I and Phase II ESAs were conducted prior to acquisition. Localized petroleum contamination has been documented at the northwest end of the Gerry Sportswear Building (see Section 3.6, Environmental Site Assessment Conducted for the Project).
 **Photo Description:** Looking northeast at area of known petroleum contamination.	

BLOCK NO. 370.2	**Bounding Streets:** Railroad Way S., Occidental

	Avenue S., S. Royal Brougham Way, and First Avenue S.
	**Property Description:** The block is a mix of new buildings and older brick buildings. Good housekeeping practices were observed outside of the buildings. Acquisition Plan: No, the block is located across the street from Block 370.1, which has been acquired as a laydown area and diagonally across the intersection (northeast) of the project footprint.
Photo Description: Looking northeast at older brick buildings.	

BLOCK NO. 370.1-380.2 (WEST SIDE OF BLOCKS)	**Bounding Streets:** S. Dearborn Street, First Avenue S., S. Atlantic Street, and Alaskan Way S.
	**Property Description:** A bike path is located directly east of Alaskan Way S.; farther east is a rail line. Dark stained soils are located between the rails. Three observation wells for the Alaskan Way Viaduct and Seawall Replacement Program are located along the bike path. Storm drains are located on the west side of Alaskan Way S. located beneath the viaduct, which is elevated through this section of the project footprint. The area underneath the viaduct is used for parking, and numerous small stains were observed, most likely associated with oil dripping from parked cars. Storm water drain pipes from the upper roadway are attached to support columns and penetrate the ground surface. It is assumed that they connect with the stormwater drainage system. Acquisition Plan: Right-of-way owned by WSDOT and/or the City.
Photo Description: Looking north at oil staining between the rails.	

BLOCK NO. 370.1-380.2 (WEST SIDE OF BLOCKS) [Continued]	**Bounding Streets:** S. Dearborn Street, Blocks 370.1 and 380.2), S. Atlantic Street, and Alaskan Way S.

	
Photo Description: Looking south at unpaved area under the viaduct, adjacent to the west rail line.	**Photo Description:** Looking south at paved area under the viaduct, adjacent to the west rail line. Project observation well and storm drain grate in foreground.

BLOCK NO. 380.1	**Bounding Streets:** Terminal 46 (S. Royal Brougham Way), Alaskan Way S., Terminal 46 (S. Atlantic Street), Elliott Bay.
	**Property Description:** The block is occupied by Terminal 46. The site is paved and used as a container terminal. A single-track rail line is located between the sidewalk on the west side of Alaskan Way S. and the terminal fence. Storm drains are visible on the east side of the tarmac. Acquisition Plan: Partial; the east side of the block will be acquired.
Photo Description: Looking west at container transfer area.	

BLOCK NOS. 380.2 AND 380.3	**Bounding Streets:** S. Royal Brougham Way, First Avenue S., S. Atlantic Street, and railroad tracks.

Photo Description: Looking northeast at red warehouse and unpaved loading area.

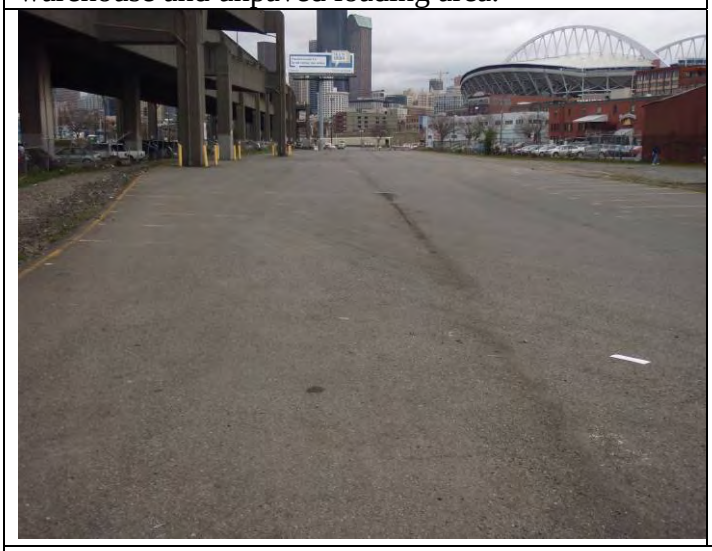


Photo Description: Looking northeast at parking area, west of Pyramid Alehouse.

Property Description:
The east side of the parcel (Block 380.3) is occupied by buildings for Great Floors and the Pyramid Ale House. Good housekeeping practices were observed outside of these buildings. The area west of these buildings is paved and storm drains trend north-south (in-line with storm drains on Block 370.1). A warehouse located on the southern end of Block 380.2 appears to be vacant (for lease). The area directly west of the warehouse (approximately 100 feet wide tapering to 50 feet wide at the north end of the warehouse) is unpaved. Four loading bays are located in this unpaved area. West of the unpaved area, Block 380.2 is paved and used by Diamond Parking for event parking. WSDOT has acquired the west side of Block 380.2.

The paved parking area extends north the entire length of Block 380.2. An abandoned rail line trends north-south, through the middle of the parking lot. The area west of the parking lot is unpaved. Two rail lines are located between the parking lot and Alaskan Way S. WSDOT has acquired the western edge of Block 380.2.

Acquisition Plan: Partial, the west side of Block 380.2 and an easement on the north end of Blocks 380.2 and 380.3 will be acquired.

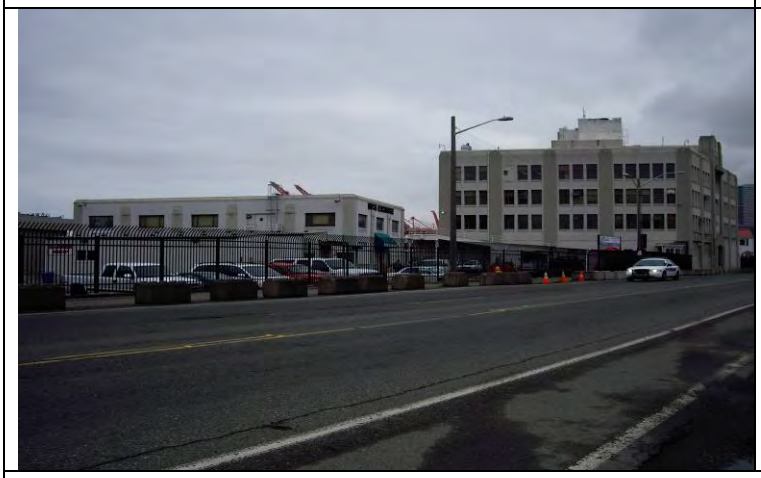
BLOCK NO. 380.4	**Bounding Streets:** S. Royal Brougham Way, Occidental Avenue S., S. Atlantic Street, and First Avenue S.

Property Description:
The entire block has been redeveloped as Safeco Field. Good housekeeping practices were observed outside of the stadium.

Acquisition Plan: No, Block 380.4 is located two blocks east of the project footprint, and diagonally across the intersection of the project footprint.

Photo Description: Looking northeast at Safeco Field.

BLOCK NO. 390.1	**Bounding Streets:** Terminal 35 (S. Atlantic Street,) Alaskan Way S., Terminal 35 (S. Massachusetts Street), and Elliott Bay.



Property Description:
The block is occupied the Federal Warehouse, buildings for the U.S. Coast Guard, and parking lots.

Acquisition Plan: No, Block 390.1 is located adjacent (west) of the project footprint.

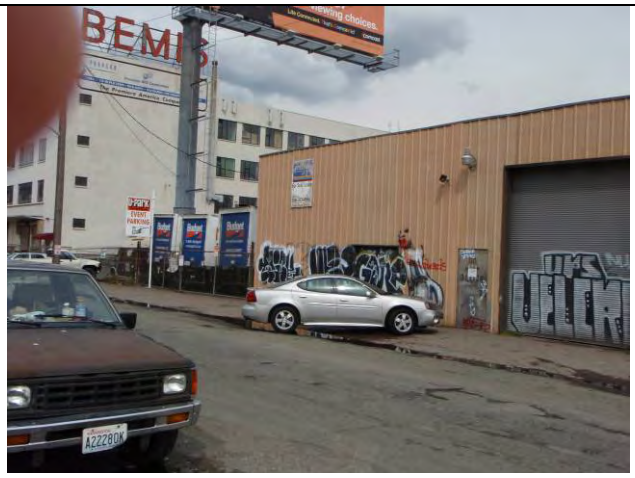
Photo Description: Looking northwest at U.S. Coast Guard building and parking lot.

BLOCK NO. 390.2	**Bounding Streets:** S. Atlantic Street, Colorado Avenue S., railroad tracks (S. Massachusetts Street), Alaskan Way S.

	**Property Description:** The area is unpaved and sparsely vegetated. Ecology blocks are used to block access to the property. The east edge of the property is unpaved and used for parking (along Colorado Avenue S.). The southeast corner of the block is being used as a storage area. A pallet of boxes containing nuts and washers and a pallet with drums containing iron bolts were observed. Railroad ties, bags of sand, and plastic sheeting are also stored in the area. On the western edge of the block, a few scattered piles of debris, including wooden boxes, plastic sheeting, and garbage, were observed. A few small mounds (3 feet high) of gravel were also observed on the east side of the block. The project footprint is on the east, north, and west sides of this block. Acquisition Plan: No, improvements are within the existing right-of-way.
Photo Description: Looking northwest at storage area.	

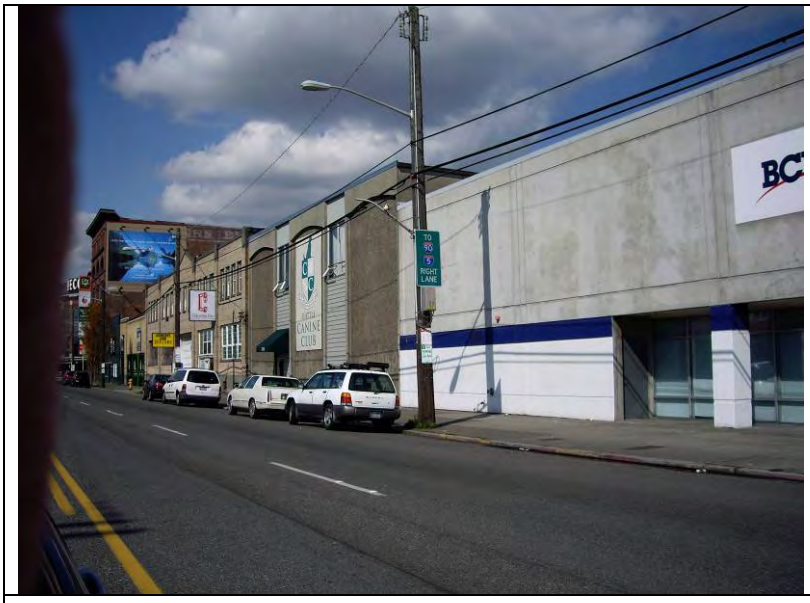
BLOCK NO. 390.3	**Bounding Streets:** S. Atlantic Street, Utah Avenue S., S. Massachusetts Street, and Colorado Avenue S.
	**Property Description:** The north end of the block is used by Sound Produce. Site 390.3-2, fronting on First Avenue S., has a paved parking area. It appears that the site is undergoing a site investigation. Drums containing soil cutting are stored on-site. The drums appear to be in good condition. In addition, spray-painted boring locations were clearly visible on the asphalt. The boring locations were midblock and closer to Utah Avenue S. than Colorado Avenue S. The southern end of the block is occupied by a fully fenced substation. Acquisition Plan: No, improvements are within the existing right-of-way.
Photo Description: Looking southwest at Site 390.3-2. Drums located against the building appear to be associated with a site investigation.	

BLOCK NO. 390.3 (Continued)	**Bounding Streets:** S. Atlantic Street, Utah Avenue S., S. Massachusetts Street, and Colorado Avenue S.

	
Photo Description: Looking east, at gap between building and substation on the east side of Colorado Avenue S.	**Photo Description:** Looking northeast at the east side of Colorado Avenue S.; parking area for Budget trucks.

BLOCK NO. 390.4	**Bounding Streets:** S. Atlantic Street, First Avenue S., S. Massachusetts Street, and Utah Avenue S.
	**Property Description:** The block is used as a paved parking lot. Acquisition Plan: Partial; the north end of the block will be acquired.
Photo Description: Looking northwest at parking lot.	

BLOCK NO. 390.5	**Bounding Streets:** S. Atlantic Street, Occidental Avenue S., S. Massachusetts Street, and First Avenue S.



Property Description:
Older retail and warehouse type buildings were observed. Good housekeeping practices were observed outside the buildings. Dumpsters were located on Occidental Avenue S.

Acquisition Plan: No, the block is located one block southeast of the project footprint.

Photo Description: Looking northeast at retail and warehouse type buildings.

BLOCK NO. 400.1	**Bounding Streets:** S. Massachusetts Street, Alaskan Way S., and Elliott Bay

Property Description:
The block is occupied by older one-story buildings (Masters, Mates and Pilots building) and parking lots.

Acquisition Plan: No, located adjacent (west) of project footprint.

Photo Description: Looking southwest at parking lots and older buildings.

BLOCK NO. 400.2	**Bounding Streets:** Railroad tracks (S. Massachusetts Street), Seattle International Gateway (SIG) Railyard, railroad tracks (S. Holgate Street), and Alaskan Way S.

Property Description:
The block is unpaved and used by the railroads. Numerous rail lines are located on the block. A storage area is located on the west side of the block and extends north to Block 390.2. The west side of the block fronts on Alaskan Way S.

Acquisition Plan: No, Block 400.2 is located adjacent to the project footprint.

Photo Description: Looking southwest at laydown area and railyard.

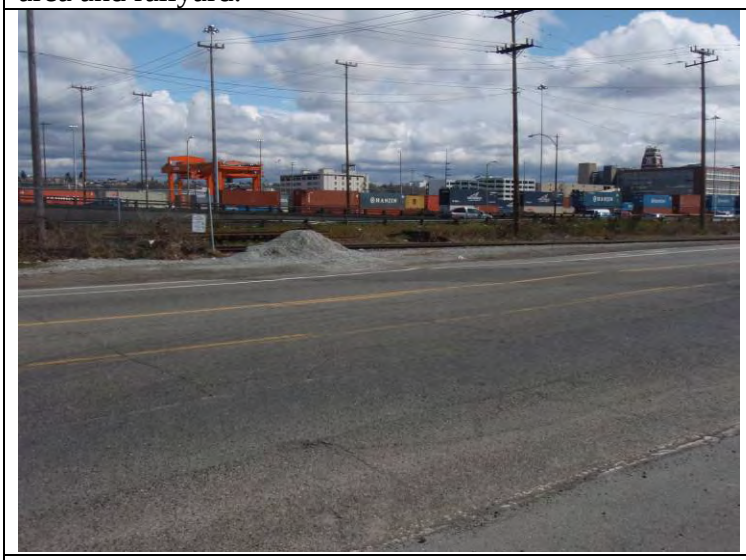
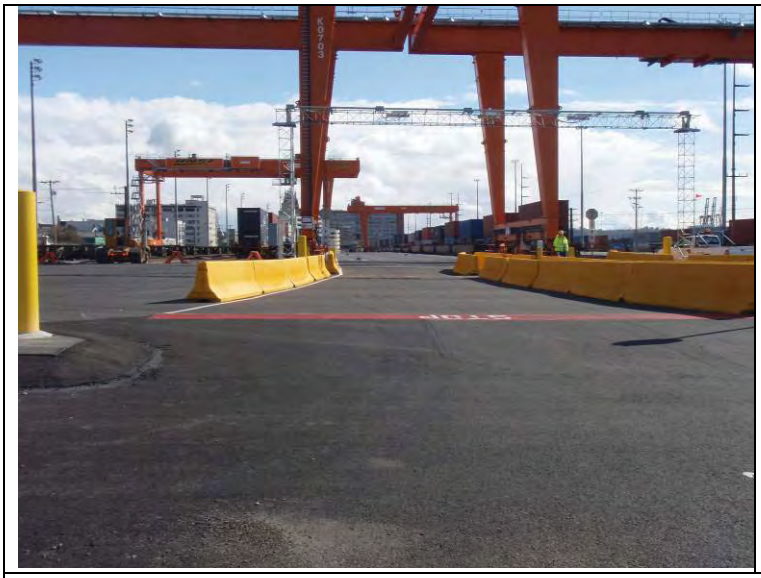


Photo Description: Looking east at rail lines and the transition of the viaduct from an elevated structure to an at-grade structure.

BLOCK NO. 400.3	**Bounding Streets:** S. Massachusetts Street, Utah Avenue S., railroad tracks (S. Holgate Street), and railroad tracks.



Property Description:
The property is a container loading terminal where containers are transferred from trucks to rail. The railyard is paved.

Acquisition Plan: No, the block is located one block south and east of the project footprint.

Photo Description: Looking south at the container transfer facility (SIG Railyard).

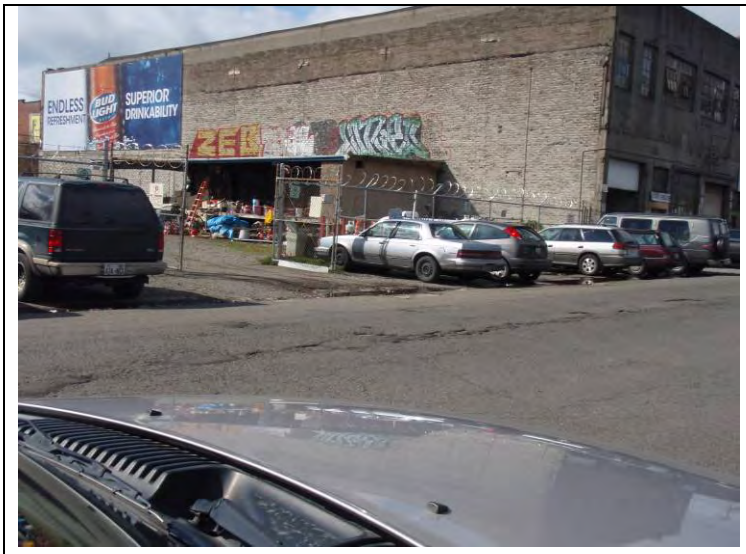
BLOCK NO. 400.4	**Bounding Streets:** S. Massachusetts Street, First Avenue S., S. Holgate Street, and railroad tracks.

Property Description:
The property is occupied by older one-to four-story retail and warehouse type buildings and parking lots. Good housekeeping practices were observed outside these buildings.

Acquisition Plan: No, the block is located two blocks east of the project footprint.

Photo Description: Looking southwest at older buildings and parking lot.

BLOCK NO. 400.5	**Bounding Streets:** S. Massachusetts Street, Occidental Avenue S., S. Holgate Street, and First Avenue S.



Property Description:
Older retail and warehouse buildings were observed. Poor housekeeping practices were observed, approximately midblock at 1711 Occidental Avenue S. (Queen City Sheet Metal and Industrial Rebuild). Portable gasoline cans, buckets, mastic cement, fire extinguishers, and tarps were observed in a covered loading dock. The site is unpaved. Large propane tanks were located under a lean-to shed.

Acquisition Plan: No, Block 400.5 is located three blocks east of the project footprint.

Photo Description: Looking southwest at Queen City Sheet Metal and Industrial Rebuild loading dock.

BLOCK NO. 410.1

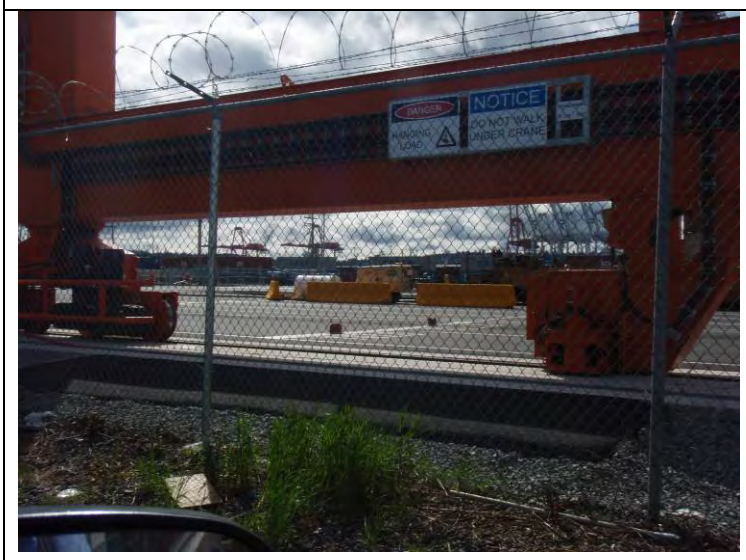
Bounding Streets: Terminal 35, Alaskan Way S., and S. Stacy Street.

Property Description:
Terminal 30, Princess Cruise Line terminal and container transfer. The terminal is paved.

Acquisition Plan: No, Block 410.1 is located one block west of the project footprint.

Photo Description: Looking southwest at the container transfer facility.

BLOCK NO. 410.2	**Bounding Streets:** Railroad tracks (S. Holgate Street), railroad tracks (Colorado Avenue S.), railroad tracks (S. Stacy Street), and Alaskan Way S.
	**Property Description:** Railyard. Acquisition Plan: No, Block 410.2 is located one block east of the project footprint.
Photo Description: Looking east at Alaskan Way S., viaduct, and railyard.	

BLOCK NO. 410.3	**Bounding Streets:** S. Holgate Street, Utah Avenue S., railroad tracks (S. Walker Street), and railroad tracks.
	**Property Description:** The property is a container loading terminal where containers are transferred from trucks to rail (continued south from Block 400.3). The railyard is paved. An above-ground storage tank (AST) was observed within the railyard. A crushed 55-gallon drum was observed outside the east fence. Acquisition Plan: No, Block 410.3 is located one block east of the project footprint.
Photo Description: Looking west at an AST located within the SIG Railyard.	

BLOCK NO. 410.3	**Bounding Streets:** S. Holgate Street, Utah Avenue S., railroad tracks (S. Walker Street), and railroad tracks.

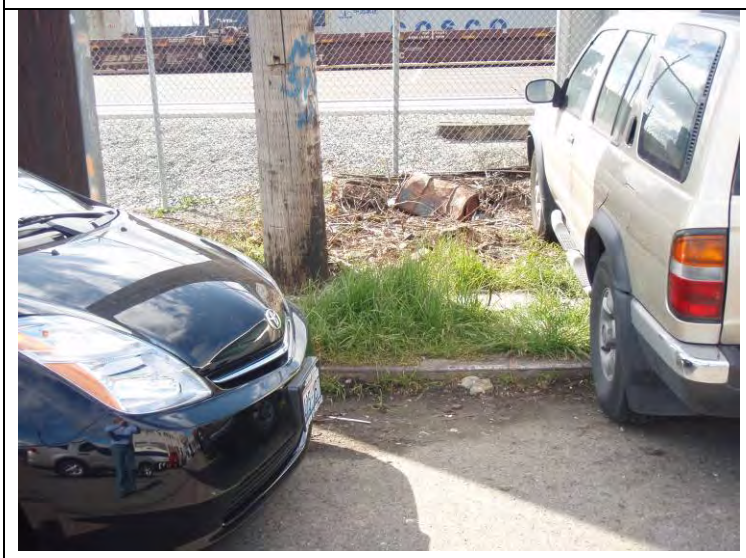
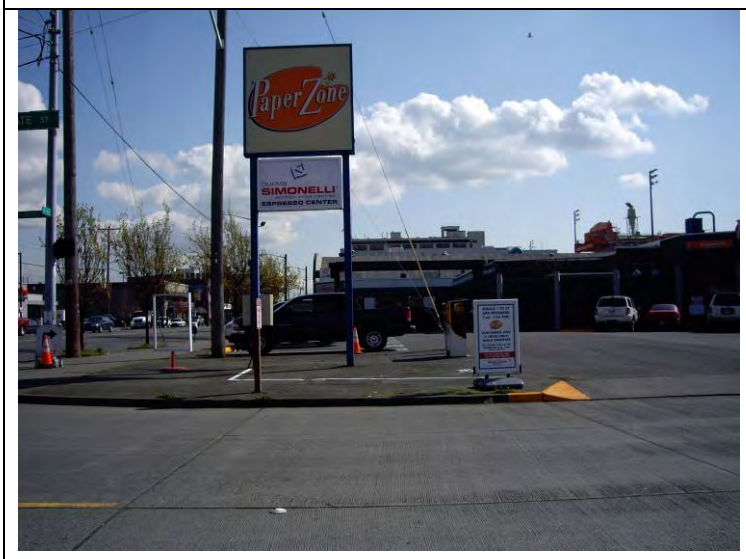



Photo Description: Looking west at a crushed drum located east of the SIG Railyard fence.	

BLOCK NO. 410.4	**Bounding Streets:** S. Holgate Street, First Avenue S., S. Walker Street, and Utah Avenue S.
	**Property Description:** Older retail, warehouse buildings, and parking lots were observed. Dumpsters were located on Utah Avenue S. Good housekeeping practices were observed outside of these buildings. Acquisition Plan: No, the block is located three blocks east of the project footprint.
Photo Description: Looking south at retail business.	

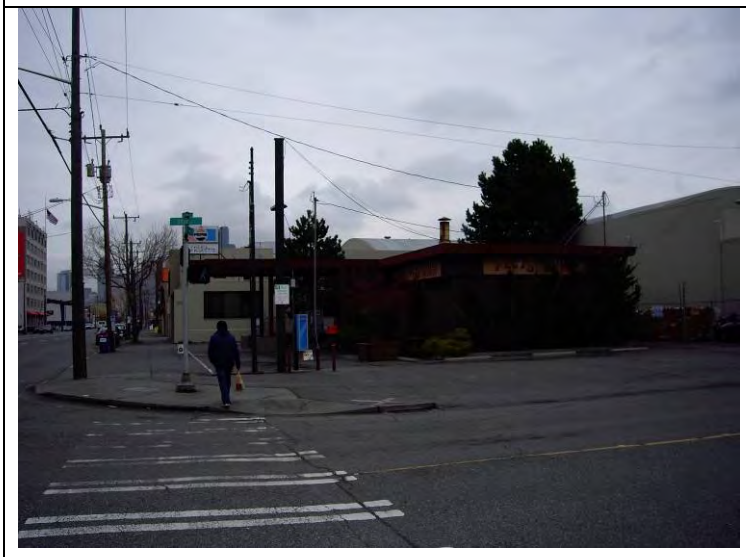
BLOCK NO. 410.5	**Bounding Streets:** S. Holgate Street,

	Occidental Avenue S., S. Walker Street, and First Avenue S.
	**Property Description:** Older retail, warehouse buildings, and parking lots were observed. Dumpsters were located on Occidental Avenue S. Good housekeeping practices were observed outside of the buildings. Acquisition Plan: No, the block is located four blocks east of the project footprint.
Photo Description: Looking northwest at Radiator Business located approximately midblock.	

BLOCK NO. 420.1	**Bounding Streets:** Railroad tracks (S. Walker Street), Utah Avenue S., railroad tracks (S. Stacy Street), railroad tracks.
	**Property Description:** Starbucks parking garage and SIG Railyard. Acquisition Plan: No, the block is located two blocks southeast of the project footprint.
Photo Description: Looking southwest at SIG Railyard.	

BLOCK NO. 420.2	**Bounding Streets:** S. Walker Street, First Avenue S., S. Stacy Street, and Utah

	Avenue S.
	**Property Description:** Older retail buildings and warehouses were observed. Good housekeeping practices were observed outside the buildings. Acquisition Plan: No, Block 420.2 is located three blocks southeast of the project footprint.
Photo Description: Looking southwest at older retail building.	

BLOCK NO. 420.3	**Bounding Streets:** S. Walker Street, Occidental Avenue S., S. Stacy Street, and First Avenue S.
	**Property Description:** Older retail buildings and warehouses were observed. Good housekeeping practices were observed outside the buildings. Acquisition Plan: No, located four blocks southeast of the project footprint.
Photo Description: Looking north at a retail building.	