Chapter 5 The Environment

This chapter describes the expected environmental effects of building and operating the SR 519 Phase 2 project and compares them with the effects of the No Build Alternative. To identify and evaluate the effects of the project and the No Build Alternative, WSDOT conducted 11 different studies of relevant components of the built and natural environment. The project team documented their detailed analyses in discipline reports and technical memoranda, attached to this EA as Appendices E through O, on the following topics:

Looking east along South Royal Brougham Way from First Avenue South

- Geology and soils
- Air quality
- Water resources
- Noise
- Hazardous materials
- Land use
- Cultural resources
- Social and economic elements
- Transportation
- Public services and utilities
- Visual quality

What is a discipline report?

A discipline report focuses on an environmental topic (discipline) or concern, such as wildlife, noise, water quality, or other built or natural resource. It presents an analysis of the environment with respect to the discipline, describes how the project may affect the environment, and recommends how best to avoid or minimize adverse effects to the environment. A technical memorandum is similar to a discipline report, but less detailed.

The discussions emphasize those environmental components most likely to be vulnerable to effects from project construction or operation. Other topics, such as fish and wildlife, wetlands, and farmlands, are not discussed because they are not present in the study area and would not be directly, indirectly, or cumulatively affected by the project. As noted in Chapter 1, threatened and endangered species listed or eligible

for listing under the Endangered Species Act are discussed but will not be affected by the project.

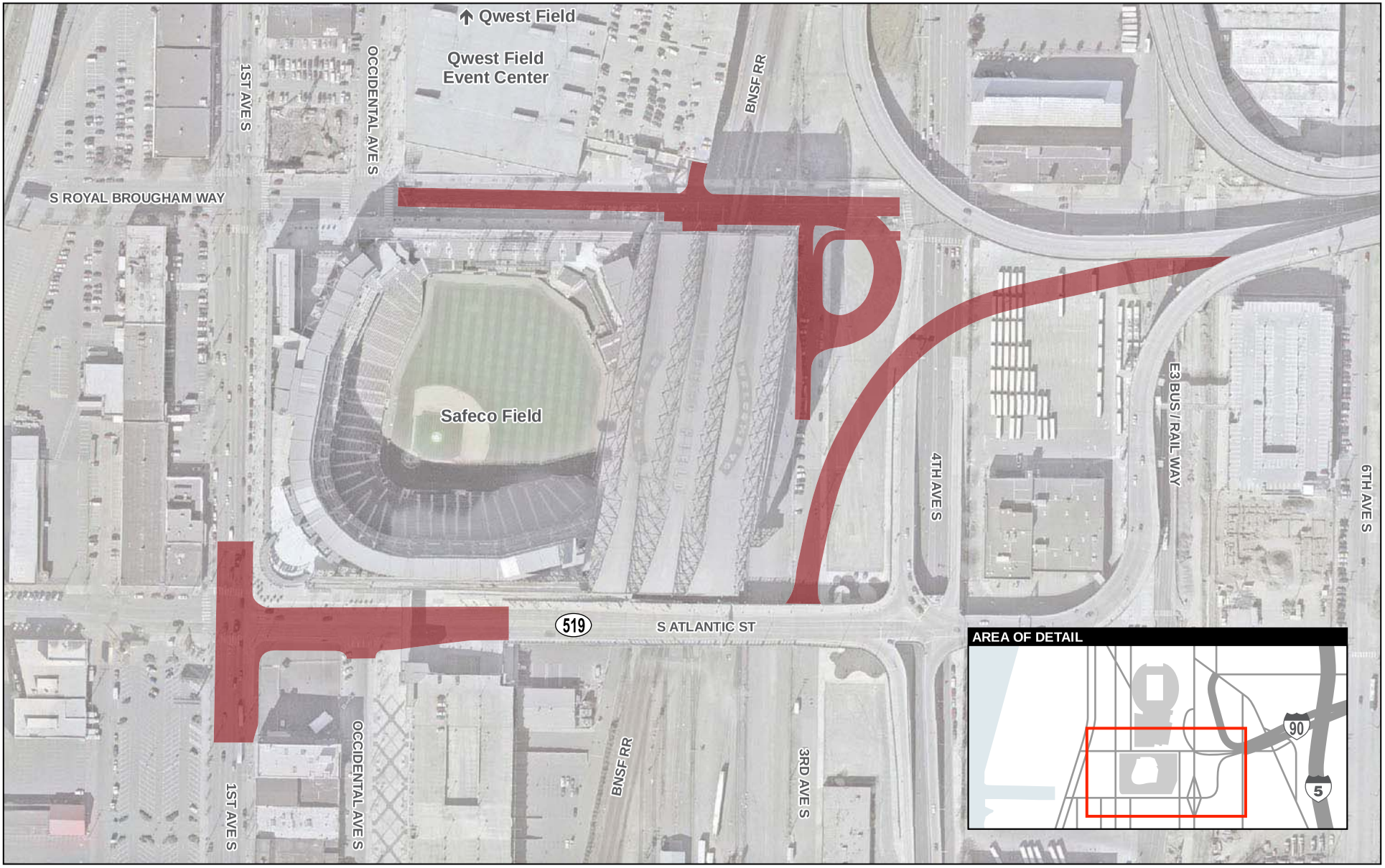
Exhibit 5-1 shows the general study area for this EA. Unless specifically defined, references to the study area refer to this setting, which is bounded by South Atlantic Street to the south, South Royal Brougham Way to the north, First Avenue South to the west, and Fourth Avenue South to the east. In some cases, the project team defined topic-specific study areas with precise boundaries. In each such instance, the study area boundaries are defined and shown on an exhibit.

The Summary in Chapter 1 of this EA briefly describes the results of the analyses discussed in this chapter and in the discipline reports and technical memoranda. The analyses followed federal and state guidance (FHWA, 1987; WSDOT, 2007a) that is designed to ensure compliance with NEPA and other federal, state, and local regulations. The study areas for the above topics varied, depending on the geographic extent of the potential effects being evaluated and the type of data needed for the analysis.

The project team examined short-term effects related to construction as well as longer-term effects that would occur during operation of the proposed SR 519 Phase 2 improvements. For example, scientists evaluated what would happen to air quality, water quality, and traffic noise during construction and through the project design year, 2030.

The **design year** is the year in the future for which a transportation facility is designed to operate, taking into consideration projected volumes of traffic.

The analysis of project effects took into consideration standard construction practices that have been developed to avoid or minimize adverse (harmful or undesirable) effects. For example, exposure of bare ground during construction can lead to erosion and increase sediment loads in stormwater runoff from construction sites. Consequently, WSDOT will use best management practices (BMPs) to control erosion and maintain water quality. These standard practices to reduce unwanted side-effects of construction are considered part of the project.



Project

Exhibit 5-1
General Study Area

Appendix B summarizes examples of measures that WSDOT could use to mitigate adverse effects of project construction and operation, if any, on the environment. These measures could extend beyond the standard BMPs that WSDOT will follow during construction. During engineering design and construction planning, WSDOT will determine the mitigation measures that will actually be used as project details become more specific.

This chapter summarizes the project's effects as documented in the discipline reports and technical memoranda. All of the studies found that the SR 519 Phase 2 project will not cause significant adverse effects on the environment. More detailed information is available in the discipline reports and technical memoranda included with this EA as Appendices E through O.

What federal, state, and local environmental laws and regulations apply to the project?

The laws and regulations listed in Exhibit 5-2 provide the legal framework for the analyses described in this EA. In many cases, these interrelated laws and regulations set thresholds that provide a basis for evaluating how the project will affect a particular resource, such as air quality or water quality, and whether the effect will be significant.

Exhibit 5-2. Regulatory Framework

Statutes/Regulations/Ordinances	Discipline Reports
Federal	
42 USC 4231 and 40 CFR 1500-1508 National Environmental Policy Act - promotes the desire for a sustainable environment balanced with other essential needs of the present and future. Established a supplemental mandate for federal agencies to consider potential environmental consequences of proposals and to provide the public an opportunity to comment prior to implementation.	All
16 USC 470 (Section 106 National Historic Preservation Act) – requires federal agencies to take into account the effects of their undertakings on historic or potential historic properties, and afford the Advisory Council on Historic Preservation an opportunity to comment.	Historical, Cultural, and Archaeological Resources
49 USC 303 Section 4(f) of 1966 DOT Act – preserves the beauty and integrity of public parks and recreation areas, waterfowl and wildlife refuges, and historic sites considered to have national, state, or local significance.	Historical, Cultural, and Archaeological Resources; Social and Economic Elements
23 USC 109(h) Federal Aid Highway Act – calls for uniform interstate design standards to accommodate traffic forecast in the future 20 years.	Transportation; Social and Economic Elements

Exhibit 5-2. Regulatory Framework

Statutes/Regulations/Ordinances	Discipline Reports
23 USC 128 Highways – provides the community an opportunity for a public hearing at or near the project.	Social and Economic Elements
23 USC CFR 771 FHWA Right of and Environment – provides requirements to FHWA to implement NEPA for highway projects.	All
42 USC Safe Water Drinking Act – protects public health by regulating the public drinking water supply including its sources.	Water Resources
33 USC 1251 Clean Water Act – mandates the identification and protection of waters in each state. Makes it unlawful for any person to discharge pollutants from a point source into navigable waters, unless a permit is obtained.	Water Resources
Endangered Species Act of 1973 – provides for the conservation of endangered and threatened species of fish, wildlife, and plants.	No Effect Letter prepared by WSDOT
42 USC 4905-4913 Noise Control Acts – intends an environment free from noise that jeopardizes health or welfare.	Noise
23 CFR 772 Noise Abatement – provides procedures for noise studies and noise abatement measures to help protect the public health and welfare, supplies noise abatement criteria, and establishes requirements for information to be given to local officials for use in the planning and design of highways.	Noise
42 USC 103 Comprehensive Environmental Response, Compensation, and Liability Act –Superfund Cleanup – addresses abandoned, accidentally spilled, or illegally dumped hazardous waste that pose current or future threats to human health or the environment.	Hazardous Materials
40 CFR Resource Conservation and Recovery Act – provides procedures and standards for hazardous/chemical waste management.	Hazardous Materials
USC 7401 Clean Air Act – sets national pollution control standards; allows individual states to have stronger pollution controls, not weaker pollution controls than those set for the nation.	Air Quality
Relocation – allows for reimbursement for payment of costs incurred under all Federal Highway Administration (FHWA) utility agreements.	Public Services and Utilities
45 CFR 91 Age Discrimination Act – prohibits discrimination on the basis of age in programs or activities receiving federal financial assistance. The Age Discrimination Act applies to persons of all ages.	Social and Economic Elements
N-4720.6 Civil Rights Restoration Act – prohibits discrimination throughout an entire agency if any part of the agency receives federal financial assistance.	Social and Economic Elements
29 USC Section 504 Rehabilitation Act – prohibits an otherwise qualified handicapped individual to be excluded from participation in a program or activity receiving federal financial assistance.	Social and Economic Elements
49 CFR American Disabilities Act – prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, state and local government services, public accommodations, commercial facilities, and transportation.	Social and Economic Elements
42 USC 2000(d) Title VI of Civil Rights Act – prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance.	Social and Economic Elements

Exhibit 5-2. Regulatory Framework

Statutes/Regulations/Ordinances	Discipline Reports
PL 91-646, as amended Uniform Relocation Assistance and Real Property Acquisition Act – assures that the unique circumstances of any displaced person are taken into account and that persons in essentially similar circumstances are accorded equal treatment.	Social and Economic Elements
President's Executive Order 12898 Environmental Justice – requires each federal agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.	Social and Economic Elements
President's Executive Order 13166 Improving Access for those with Limited English Proficiency – requires federal agencies to examine the services they provide, identify any need for services to those with limited English proficiency (LEP), and develop and implement a system to provide access to those services.	Social and Economic Elements
State	
Chapter 197-11 and Chapter 468-12 WAC State Environmental Policy Act – requires the state and local agencies to consider the likely environmental consequence of a proposal before approving or denying the proposal.	All
Chapter 70-107 RCW Noise Control – provides the state statutory authority for establishing maximum noise levels permissible in identified environments, and thereby provides use standards relating to the reception of noise within such environments.	Noise
RCW 47.40.010 Roadside Improvement and Beautification – declares as a proper highway purpose, the planting and cultivating of any shrubs, trees, hedges, or other domestic or native ornamental growth, the improvement of roadside facilities and view points, and the correction of unsightly conditions, upon the right-of-way of any state highway.	Visual Quality
Chapter 36.70 RCW Growth Strategies Act – guides and regulates the physical development of a county or region through connecting both public and private projects and coordinates their execution.	Land Use
RCW 36.70A.070 as amended Growth Management Act – guides the development and adoption of comprehensive plans and development regulations for counties and cities.	Geology and Soils; Land Use
Chapter 90.48 RCW Water Pollution Control Act – requires the use of all known, available, and reasonable methods by industries and others to prevent and control the pollution of the waters of the State of Washington.	Water Resources
Chapter 173-200 WAC Ground Water Quality Standards – establishes water quality standards for groundwater and applies to all groundwaters of the state that occur in a saturated zone or stratum beneath the surface of land or below a surface water body.	Water Resources
Chapter 173-201A WAC Surface Water Quality Standards – establishes water quality standards for surface waters of the State of Washington consistent with public health and public enjoyment of the waters and the propagation and protection of fish, shellfish, and wildlife.	Water Resources
Chapter 220-110 WAC Hydraulic Code – establishes regulations for the construction of hydraulic project(s) or performance of other work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state, and sets forth procedures for obtaining a hydraulic project approval (HPA).	Water Resources

Exhibit 5-2. Regulatory Framework

Statutes/Regulations/Ordinances	Discipline Reports
Chapter 246-290 WAC Public Water Supplies – defines basic regulatory requirements that protect the health of consumers using public drinking water supplies.	Water Resources
Chapter 47.44 RCW Franchises – requires rules to be adopted to provide for a hearing or an opportunity for a hearing with respect to any franchise application involving the construction and maintenance of utilities or other facilities within the highway right-of-way.	Public Services and Utilities
Chapter 468.34 WAC Utility Franchises and Permits – provides the application requirements for franchises and permits.	Public Services and Utilities
Chapter 70-105 RCW Hazardous Waste Management Act – establishes a comprehensive statewide framework for the planning, regulation, control, and management of hazardous waste. The intention of this framework is to prevent pollution and conserve resources of the state.	Hazardous Materials
Chapter 173-303 WAC Dangerous Waste – implements the Hazardous Waste Management Act and provides processes and standards for management of dangerous and extremely hazardous waste.	Hazardous Materials
Chapter 173-360 WAC Underground Storage Tank – addresses the threat posed to human health and the environment by leaking underground storage systems containing petroleum and other regulated substances.	Hazardous Materials
Chapter 70.105D RCW Model Toxics Control Act – raises sufficient funds to clean up all hazardous waste sites and to prevent the creation of future hazards due to improper disposal of toxic wastes into the state's lands and waters.	Geology and Soils; Hazardous Materials
Chapter 173-340 WAC Model Toxics Control Act – addresses the releases of hazardous substances caused by past activities.	Geology and Soils; Hazardous Materials
Chapter 173-326 WAC Commercial Low-level Radioactive Waste – institutes a user permit system and issues site use permits for generators, packagers, or brokers using the Hanford low-level radioactive waste disposal facility.	Hazardous Materials
Governor's Executive Order 93-07 Commitment to Diversity and Equity in Service Delivery and in the Communities of the State – directs all executive agencies and institutions of higher education to initiate actions to integrate the principles of diversity into all facets of workplace community and in the delivery of services to the people of Washington. Reaffirms the commitment to the elimination of all barriers to employment that artificially restrict hiring, promotion, recruitment, and tenure on the basis of any physical, cultural, religious, language, or other status that is not directly related to the performance of a job.	Social and Economic Elements
WSDOT Highway Runoff Manual – guides WSDOT, engineering consultants, and many local agencies in design of stormwater systems for transportation projects.	Water Resources
Local	
Seattle Municipal Code - manages and protects environmental quality and human health and welfare.	All
City of Seattle Technical Codes including but not limited to: • Building • Fire • Mechanical • Energy • Stormwater, Grading, and Drainage Control	All

Exhibit 5-2. Regulatory Framework

Statutes/Regulations/Ordinances	Discipline Reports
King County Code 20.62 King County Landmarks – protects, enhances, and perpetuates the use of buildings, sites, districts, structures, and objects of historical, cultural, architectural, engineering, geographic, ethnic, and archaeological significance located in King County.	Historical, Cultural, and Archaeological Resources

Notes: Discipline reports and technical memorandums include: Transportation; Noise; Water Resources; Geology and Soils; Air Quality; Visual Quality; Social and Economic Elements; Land Use; Historical, Cultural, and Archaeological Resources; Public Services and Utilities; Hazardous Materials

5.1 Geology and Soils

The project will be built in a seismically active area, but the new structures will be designed to current seismic standards and will be supported by deep foundations to minimize damage during earthquakes. Soil compression beneath the elevated structures, particularly the fill embankments for the approaches to the South Royal Brougham Way overpass, could lead to long-term ground settlement and lateral movement of soil. Although project construction will produce localized soil erosion and intermittent ground vibration from heavy equipment operation, these effects will be minimized by BMPs.

Ramp structures in the study area

What does the existing information tell us about the geology in the project vicinity?

The geomorphology in the Puget Sound region is primarily the result of multiple glaciations that occurred from 2 million to 10,000 years ago, a period referred to by geologists as the Pleistocene Epoch. Each advance and retreat of the glaciers resulted in modification of the land from erosion and deposition of soils. This process led to the topography that we see today.

Geomorphology is the branch of geology that examines the formation and structure of the features of the surface of the Earth.

The repeated glaciation left a thick deposit of unconsolidated soil in the region. These glacial deposits overlie bedrock. The depth to bedrock in the project footprint is between 800 and 900 feet below ground surface (Yount et al., 1985).

Unconsolidated soil is loose sediment lacking cohesion or cement.

The geology maps and geotechnical reports for the study area tell us that the study area is underlain by the following soil deposits, starting at the ground surface: fill, tideflat deposits (consisting of alluvium, estuarine deposits, and beach deposits), reworked glacial deposits, and dense glacial soils consisting of outwash and glaciomarine deposits. Dense glacial soils are typically encountered at about 50 feet below the surface (North American Vertical Datum of 1988) within the project footprint. The fill in the study area—which is of primary interest for project development—ranges in thickness from 20 to 45 feet thick and occurs in two distinct zones. The upper zone is either engineered or non-engineered fill, and the

Alluvium, outwash, and glaciomarine deposits are terms used by geologists to describe the characteristics of different soil deposits. Often the description provides some information about the origin. For example, glaciomarine soils were deposited by glaciers in a marine environment. Outwash soils are deposits left by meltwater from glaciers. Alluvium is material deposited by flowing water such as rivers.

lower zone was placed by dumping dredged material from the Duwamish River and Elliott Bay or by sluicing of the nearby hillsides during the early 1900s. Engineered fills are those placed in construction. Typically they are composed of sand and gravel that have been compacted during placement, and they generally provide excellent support for buildings, roads, or other developments.

The available geotechnical reports also show that in many areas engineered fills have been placed above dredged materials. In those areas, the consistency of the dredged material is such that deep foundations must be used to support building bridges and similar structures. The deep foundations are used to transfer loads to glacially consolidated soils located below the dredge fill, thereby protecting the structures from settlement and reducing their vulnerability to earthquakes.

Sluicing is performed by using highly pressurized water to move soils and lower the grade of hillsides.

Geologic maps and geotechnical reports also tell us that the groundwater table is located between 2 and 8 feet below the ground surface. Zones of perched groundwater may be encountered at shallow depths above low-permeability clay layers. Close to Elliott Bay, groundwater levels may fluctuate by about 6 inches with the tide. See Section 5.3 for more information about groundwater in the project vicinity.

Perched water is groundwater accumulated on top of a clay layer. Zones below the perched water will generally be unsaturated.

Are there any geological hazards in the study area?

City of Seattle 2006 geographic information system (GIS) maps and Washington State Department of Natural Resources (WDNR) maps show that the project is within a liquefaction-prone area and a seismic hazard area. The liquefiable deposits occur in the saturated, loose fills and some tideflat deposits. The seismic hazards identified by the City and WDNR are vibratory ground motions, the Seattle Fault Zone, tsunamis, and seiches.

During seismic shaking, sandy soils that are loose and located below the water table can become fluid-like in consistency, leading to loss in soil strength and eventually settlement. This process is referred to as **liquefaction**.

Earthquakes in the Puget Sound region can result from three sources: the Cascadia subduction zone interplate off the coast of Washington, the deep intraslab subduction zone located 20 to 40 miles beneath Puget Sound, or shallow crustal faults. The study area is mapped as being within the Seattle Fault Zone (SFZ) (City of Seattle, 2006a; Troost et al., 2005; U.S.

Seiches are water waves that develop during earthquakes in restricted basins such as lakes, bays, and rivers. In contrast to tsunamis, which result from large underwater landslides or fault displacements, these waves result from the shaking of the ground.

Geological Survey [USGS], 2007a), which is a crustal source for earthquakes.

Earthquakes in the Pacific Northwest are primarily the result of the movement of the earth crustal plates. Off the coast of Washington, one of the plates is diving under the continental plate. This is referred to as **subduction**. The stresses associated with this process result in earthquakes.

Are these seismic hazards important?

If no effort is made to mitigate seismic hazards, they can do serious damage to structures and endanger people. The possible effects of these hazards are described below.

Strong Ground Shaking

An earthquake from one of the above-mentioned source mechanisms could result in strong ground motions within the study area. Web-based maps developed by USGS can be used to estimate the likely level of ground shaking at the site based on probability methods. Ground shaking can be amplified or reduced depending on the strength of the ground shaking and the consistency of the soil. Detailed review of the tendency for amplification or de-amplification is part of the design process that will be performed for the project.

The ground shaking can lead to instability of embankments as well as liquefaction in saturated, cohesionless soil layers. The consequences of liquefaction can include lateral spreading of soils toward Elliott Bay, loss in bearing support, ground settlement from soil densification, additional loads on piles from earthquake-induced soil settlement, and flotation, rupture, or settlement of utilities.

Bearing support is a term used by engineers to describe the ability of a soil to support loads. During liquefaction, the soil can become fluid-like in consistency, which results in loss of bearing support. This response is potentially very serious if a building is being supported on the soil that liquefies.

Seattle Fault Movement

The project is within the 2.5- to 4.5-mile-wide SFZ, which is considered an active fault (Johnson et al., 1999; Johnson, 2004; USGS 2007a, b). In the last 10,000 years, SFZ activity has been well documented with the most recent known surface-faulting event occurring about 1,050 to 1,020 years before present (yr B.P.) during a large magnitude (inferred magnitude greater than 7) earthquake. Rupture of the Seattle Fault could result in permanent ground shifts.

Tsunamis and Seiches

Tsunamis and seiches are possible secondary seismic effects. The project is within a tsunami inundation zone, with a potential inundation depth of up to 6.5 feet in the study area from a large event on the Seattle fault. The risk of tsunami

Seiches can attain heights of tens of feet, although they are usually a few inches to a few feet.

inundation is generally thought to be low, given the low annual frequency of large earthquakes on the Seattle Fault. If an earthquake were to occur off the coast of Washington or from another source along the Pacific Ocean, Seattle is far enough from the ocean that only small waves would enter Elliott Bay.

Earthquakes may also induce seiches in lakes, bays, and rivers. While seiches may develop in Elliott Bay, which is the closest body of water to the project, it is highly unlikely that the size of the seiche would cause flooding of the project site because of the large volume of Elliott Bay and the distance of the project from the water.

Refer to the *Geology and Soils Discipline Report* prepared for this EA for more details.

What methods were used to evaluate the project's effects on geology and soils?

The project team used information about the geology and soils of the study area to evaluate the probable effects of the project on local geology and soils as well as the potential effects of geologic hazards on the project. The team determined the effects of the project through a mostly qualitative review of the project features relative to the local geological characteristics, soil types and consistency, and groundwater conditions. They also conducted a visual reconnaissance of the project vicinity.

What would geology and soils be like without the project?

Without the project there would be no construction-related effects on geology and soils. Under the No Build Alternative, there would be no potential for adverse ground vibrations from construction, the aggregate supplies needed for the project could be used for other purposes, and there would be no potential for erosion of exposed soils located in fills and stockpiles.

Aggregate refers to sand and gravel used for construction backfill and as one of the primary ingredients in concrete. Sand and gravel are mined in gravel pits and hauled to the site for use.

If the project were not built, some of the long-term operational effects of the project would not occur, such as vibrations related to traffic. However, some would remain. For example, seismic hazards and the related secondary effects would be present whether the project was built or not.

What direct effects will construction of the project have related to geology and soils?

The project will result in a number of direct effects related to geology and soils, and these effects could have adverse environmental consequences if they are not appropriately evaluated and mitigated. The SR 519 Phase 2 project could have a range of direct effects on geology and soils, such as the following:

- During construction, sediment could mix with stormwater and create turbid (muddy) water. Sources of turbidity include uncovered and exposed soils, trucks spilling soil, and the tracking of mud from truck tires onto the roadway.
- Past activities in the project vicinity have resulted in soil and groundwater contamination. Contaminated soils could be harmful to people, and therefore special regulations have been written to protect the public from these risks. As soils are excavated during the construction of bridge and roadway foundations, it is likely that some contaminated soils will be exposed. If encountered, these soils will require special handling, transport, and disposal at offsite locations.
- When fills are added to an area, the soil beneath the fill begins to compress. The zone of compression occurs not only below the fill but extends outside the new load, potentially affecting nearby pavements, sidewalks, and buried utilities such as sewer and water lines, fiber optic cables, and gas lines. Where fills are more than a few feet in height, settling will occur under and/or adjacent to the fill or stockpile. If adequate precautions are not taken, this settling can damage nearby utilities or pavement. Lateral movement of soil at the toe of the embankment can also occur as the embankment settles. If the lateral movement is large enough, it can damage adjacent features.
- During construction of the drilled shafts, loosely compacted sand and clay could be encountered below the groundwater table. In some locations bricks, timber pilings, or other materials dating from the late eighteenth or early nineteenth

century could be present. As discussed in Section 5.7, measures to protect cultural resources could apply to such materials if encountered. Cobbles and boulders are also known to exist in the glacial deposit under the sand and gravel layer. These conditions have the potential to delay or cause technical problems during construction.

- Many utilities are located along South Royal Brougham Way, Third Avenue South, and Fourth Avenue South. If excavations for elevated structure foundations and utility relocations are not adequately supported, buried utilities and structures or roadways adjacent to the excavations could be damaged.
- Construction could require use of stone columns, jet grouting, or cement-soil mixing to mitigate the potential of liquefaction occurring. These construction methods normally generate earth spoils and water with high sediment content and pH. Special containment and disposal procedures will be required to prevent these types of spoils and water from contaminating nearby areas.

Stone columns are built of gravel and sand, while **jet grouting** and **soil mixing** create zones made up of cement and soil. Stone columns are more porous than soil-cement columns.

- Construction vibrations could be annoying to people nearby. The vibrations could cause loose soils near the source of the vibrations to settle and damage structures and utilities.
- Construction of the proposed new roadway and structures will require removal of small sections of existing roadway and existing bridge structures. The demolition of the existing roadway and structures will generate small amounts of concrete and asphalt that will be reprocessed into usable construction material. If the concrete and asphalt cannot be reprocessed, it will be disposed in landfills.
- An earthquake could occur during construction, resulting in embankment slope failures, liquefaction, ground settlement, or damage to partially completed structures. If an earthquake occurred and there were damage to completed

Ground vibrations result when equipment impacts the ground. The level of vibration decreases with distance from the source. People feel the vibration at much lower levels than will damage structures or most equipment.

work, there would be schedule delays as damaged areas were repaired.

What direct effects will operation of the project have related to geology and soils?

With the proposed project built and in operation, long-term direct effects relating to geology and soils could include:

- Soil settlement beneath the earth fills for the approaches to the railroad overpass at South Royal Brougham Way.
- Damage on the new elevated structures and approach fills at South Royal Brougham Way from traffic-induced vibrations. The damage to elevated structures could include fatigue of structural connections. The damage to approach fills could be settlement of loose, cohesionless soil.
- Modification of groundwater flow paths in areas where ground improvement methods are used to mitigate potential effects of seismic loading, such as at the South Royal Brougham Way approaches.
- Ground settlement and increased loads caused by earthquake shaking on new elevated structures.
- Damage to transitions between new and old elevated structures during seismic loading (where the new I-90 off-ramp connects to the existing westbound I-90 off-ramp and to the existing South Atlantic Street overpass).

Ground improvement methods are used to improve the strength of the subgrade. Some ground improvement techniques include stone columns, lightweight fills, and vibro-compaction.

Seismic loading results from the ground vibrations that occur as a result of an earthquake. The vibrations result in added forces in structures and in the ground. These forces can cause soil to become fluid-like in consistency, referred to as liquefaction, or settle as the soil densifies.

What measures are proposed to mitigate the effects of the project?

WSDOT will mitigate adverse effects of construction activities relating to geologic features and soils by implementing standard design and construction procedures. These mitigation measures range from applying BMPs to reduce erosion and control sediment during construction to modifying design requirements to minimize effects of settlement. Specific measures will be determined during detailed engineering design and construction planning, and will include the following types of measures:

Best management practices (BMPs) are procedures that are implemented during construction to avoid certain environmental impacts. Various published documents summarize BMPs that have been successfully used in the local area.

- Before starting construction, WSDOT will prepare a temporary erosion and sediment control (TESC) plan identifying what BMPs will be used and where they will be used. During construction, this plan will be implemented and modified. A water quality monitoring plan will also be implemented during construction.
- Contaminated soil and groundwater are known to occur within the study area. If these are encountered they will require proper identification, handling, and disposal at a facility licensed to receive the material.
- WSDOT will prepare a spill prevention, control, and countermeasures (SPCC) plan that will establish procedures to be followed in the event of a spill that could enter soils, surface water, or groundwater.
- If vertical or lateral movements of the earth from new fill are predicted to be excessive, they will be mitigated through the use of ground improvement methods such as jet grouting. In locations where ground settlement cannot be mitigated, utilities will be relocated or protected.
- Unfavorable soil and groundwater conditions (such as loose silts and sands below the groundwater table, or old timber pilings and other construction debris from the early 1900s) might be encountered in areas where deep foundations will be constructed. These conditions will be mitigated through the use of foundation drilling equipment specifically designed to provide borehole support and capable of removing debris during drilling.
- If the potential for vertical or horizontal ground movement next to excavations is determined to be excessive during design, the construction methods might have to incorporate retaining walls or lateral supports using earth anchors or structural bracing.
- In areas requiring ground improvement to mitigate potential effects of liquefaction or settlement, controls will be imposed on construction methods to contain grout

In **jet grouting**, high-pressure jets of cement mixed with water are discharged sideways into the borehole wall to simultaneously excavate and mix concrete with the soil to stabilize it.

and/or earth spoils and excess water produced by the ground improvement methods.

- At locations where ground vibrations will potentially be of concern, standard construction practice is to monitor the levels of vibrations during construction, If the levels of vibration exceed predetermined limits, WSDOT is required to stop operations and propose new construction methods that result in lower vibrations.
- To mitigate the effect of ground vibrations during construction, where required, construction documents will specify that equipment be selected and operated to minimize the potential for vibration.
- The amount of construction debris and excess earth that must be disposed of at landfills will be limited by reprocessing concrete into aggregate to the extent practicable. This reprocessed aggregate could be re-used in concrete or as fill.
- The likelihood of an earthquake during construction is very low, and nothing can be done to mitigate for its occurrence. However, if an earthquake occurs, mitigation strategies will be developed to revise construction schedules or rebuild damaged facilities.

Mitigation measures for operational issues such as long-term fill settlement, traffic-induced vibrations, and seismic hazards will be implemented. Examples of these mitigation measures include the following:

- To avoid the risk of long-term ground settlement, the proposed structures will be constructed on deep foundations that extend through the compressible soils to denser bearing material.
- The potential for traffic-induced vibrations from use of the new South Royal Brougham Way structure or new approaches will be mitigated by minimizing the source of vibrations, such as construction joints or rapid changes in roadway grade.

- New structures at risk from earthquake-induced liquefaction and ground settlement will be designed to resist seismic loading by carrying the seismic loads to suitable bearing materials using deep foundations.
- To anticipate seismic hazards on existing structures resulting from induced loading from the proposed South Atlantic Street off-ramp structure, the new structure will be designed to be structurally isolated from the existing structures, or will be designed with sufficient stiffness to minimize additional seismic load on the existing structure.
- WSDOT will evaluate and, if necessary, mitigate the potential for additional loading to existing large-diameter pipes from the seismic response of foundations supporting the new South Royal Brougham Way structure.

What indirect effects will the project have related to geology and soils?

Indirect effects associated with geology and soils occur later in time or farther from the project footprint than direct effects. For example:

- Trucks used to bring equipment or construction materials to the site or to remove excess soils and construction debris could cause deterioration of nearby streets and roadways if the loads exceeded the strength of the roadway base material, leading to cracking or rutting of pavements.
- Increased maintenance of surface streets and utilities close to the project could be required because of fill settlement over the long term resulting from the project.
- Traffic-induced vibrations could occur on the adjacent stadiums from use of the new elevated structure at South Royal Brougham Way. The vibrations could result in added maintenance to facilities or annoyance to sports fans using the facilities.
- Project requirements for aggregate will reduce supplies of material that might be used elsewhere for other projects.

Aggregate refers to gravel and sand that is used as roadbed material or is mixed with cement and water to make concrete. Gravel and sand are mined from gravel pits in the Puget Sound area.

Will the project contribute to any cumulative effects related to geology and soils?

The project could make very small contributions to cumulative effects on the availability of local aggregate and on seismic risk, as summarized in Exhibit 5-3.

Exhibit 5-3. Summary of Expected Cumulative Effects Related to Geology and Soils

Type Of Cumulative Effect	Description Of Cumulative Effect
Project	
Seismic Risk	The project will introduce elevated structures that will connect to previously built structures, some of which are also elevated. Seismic loading during an earthquake could put these existing structures at risk. The cumulative effect on structures by seismic-induced ground shaking and liquefaction will be mitigated through appropriate design, construction, and operational procedures.
Reduction in the availability of local aggregate	The use of gravel aggregate for roadway construction and approach fills will incrementally reduce the availability of fill material from existing aggregate resources. Although requirements for gravel aggregate will be minimal relative to the regional supply, the project, in combination with other reasonably foreseeable construction projects in the Seattle area, will contribute to the gradual reduction of aggregate material available from nearby aggregate sources, requiring longer import distances. These longer distances will add to the regional construction costs. Re-using demolition debris will help offset these increased regional costs.
No Build Alternative	
Seismic Risk	Seismic hazards and the related secondary effects will occur whether or not the project is implemented.
Improved local aggregate supplies	Under the No Build Alternative, aggregate supplies would be used for other purposes, and there would be no need for fills and stockpiles.

5.2 Air Quality

The project will improve traffic flow, reducing vehicle idling times and slightly improving air quality over expected future conditions without the project. The project will comply with National Ambient Air Quality Standards, the State Implementation Plan for carbon monoxide, and all requirements of the federal Clean Air Act and the Washington Clean Air Act. Dust and odors will be produced at times during construction, but these effects will be minor and temporary, and minimized by BMPs.

What air pollutants are generated by transportation projects?

The major airborne pollutants of interest for transportation projects are carbon monoxide (CO), particulate matter, ozone, and oxides of nitrogen (NO_X). These are defined by the U.S. Environmental Protection Agency (USEPA) as criteria pollutants. USEPA uses six criteria pollutants as indicators of air quality, and has established for each of them a maximum concentration above which adverse effects on human health may occur. Criteria pollutants are regulated by federal and state standards. Volatile organic compounds (VOCs) are also regulated as they contribute to the formation of ozone. Sulfur dioxide (SO_2) and lead are criteria pollutants, but because they are not pollutants of concern for transportation projects, they are not addressed in this EA.

Mobile source air toxics (MSATs) generated in vehicle exhaust, particularly from diesel-fueled vehicles, have been addressed in both local and national studies. MSATs are known or suspected to cause cancer or other serious health effects. For example, benzene is a known carcinogen found in gasoline. MSATs can also cause other environmental effects, such as damage to plants and animals.

Another substance generated by fuel combustion in motor vehicles is carbon dioxide (CO_2), one of several substances classified as a greenhouse gas that traps heat within the earth's atmosphere. CO_2 accounts for more than 80 percent of the

greenhouse gases emitted in the United States. CO_2 is not directly harmful to human health; however, increasing emissions of CO_2 and other greenhouse gases result in increased global temperatures, leading to environmental effects such as rising sea levels and altered weather patterns.

What standards apply to air quality in the study area?

Washington State is subject to air quality regulations issued by the U.S. Environmental Protection Agency (USEPA), Washington State Department of Ecology (Ecology), and the Puget Sound Clean Air Agency (PSCAA). USEPA's National Ambient Air Quality Standards (NAAQS) set limits on concentration levels of the criteria pollutants. Concentration levels of the criteria pollutants must not exceed the NAAQS over specified time periods. Ecology and PSCAA monitor air quality in the Puget Sound region by measuring the levels of criteria pollutants found in the atmosphere and comparing them with the NAAQS.

The NAAQS comprise two sets of standards: the primary standards are intended to protect public health, and the secondary standards are intended to protect the natural environment. In addition to these standards, Ecology and PSCAA have adopted state and local ambient air quality standards that are equivalent to or more stringent than USEPA's NAAQS. Exhibit 5-4 summarizes the air quality standards applicable to transportation projects in the state of Washington.

The central Puget Sound region is currently in attainment for all criteria pollutants. USEPA designated the central Puget Sound region as a maintenance area for CO in 1996.

What is a maintenance area?

A region previously designated as nonattainment for a criteria pollutant and subsequently redesignated as attainment is called a maintenance area. It is being managed to continue to meet the NAAQS.

At present, no standards establish allowable concentrations of toxic air pollutants (of which MSATs are a subset) in the air. Ecology conducted a study to monitor several air toxic compounds in 2000 to 2001. The study indicated that the primary contributors to air toxics are diesel exhaust and wood smoke (Ecology, 2001a). USEPA's ongoing National Air Toxic Assessment indicates that the air toxics risk in the Puget Sound area is similar to that of other major urban areas in the top five percent in the nation for lifetime cumulative cancer risk

(USEPA, 2006b). The diesel exhaust contribution to the area's toxic air pollutants should be reduced in the near future as a result of a federal regulation that requires cleaner-burning diesel fuel for off-road diesel engines by 2010.

CO_2 is not currently subject to federal or state ambient air quality standards.

Exhibit 5-4. Ambient Air Quality Standards

Pollutant	Standard	Averaging Period
Nitrogen dioxide	0.05 ppm	annual
Carbon monoxide	9 ppm	8 hours
	35 ppm	1 hour
Ozone	0.08 ppm	8 hours
Lead	1.5 µg/m³	quarterly
Sulfur dioxide	0.02 ppm	annual
	0.10 ppm	24 hours
	0.05 ppm	3 hours
	0.40 ppm	1 hour
Particulate matter (PM_{10})	150 µg/m³	24 hours
	50 µg/m³	annual
Particulate matter ($PM_{2.5}$)[a]	15 µg/m³	annual
	35 µg/m³	24 hours
Total suspended particulates	60 µg/m³	annual
	150 µg/m³	24 hours

Source: USEPA (2007), PSCAA (2006), and Washington State Standards.
[a] The 24-hour $PM_{2.5}$ standard was reduced to 35 ppm from 65 ppm (effective December 17, 2006).
µg/m³ = micrograms per cubic meter
PM_{10} = particulate matter smaller than 10 microns in diameter
$PM_{2.5}$ = particulate matter smaller than 2.5 microns in diameter
ppm = parts per million

What are conformity requirements?

In Washington State, transportation projects that are located in maintenance and nonattainment areas must meet the conformity requirements set out in the federal Clean Air Act,

which are codified in law in Title 40 of the Code of Federal Regulations, Parts 51 and 93 (40 CFR 51 and 93), and in the Washington Clean Air Act, codified in the Washington Administrative Code, Sections 173-420 (173-420 WAC). The project is subject to these conformity requirements because it is a transportation project that is located in a maintenance area for CO.

In nonattainment and maintenance areas, the federal Clean Air Act and the Washington Clean Air Act require transportation projects to conform to the State Implementation Plan (SIP), the state's plan for meeting and maintaining compliance with the NAAQS. Conformity with the SIP means that transportation activities will not produce new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS.

How do climate and weather affect air quality?

Weather directly influences air quality. Important meteorological factors include temperature and sunlight intensity. Temperature inversions, which are associated with higher air pollution concentrations, occur when warmer air overlies cooler air. During temperature inversions in late fall and winter, particulates and CO from wood stoves and vehicle sources can be trapped close to the ground, leading to violations of the NAAQS. Ozone formation requires warm weather and direct sunlight. In the Puget Sound area, the highest ozone concentrations occur from mid-May until mid-September, when urban emissions are trapped by temperature inversions followed by intense sunlight and high temperatures.

Supporting information on air quality is available in the *Air Quality Discipline Report* prepared for this EA.

What methods were used to evaluate the project's effect on air quality?

The air quality analysis included a review of the existing air quality in the region, a qualitative assessment of construction effects, and a quantitative analysis of the effects of project operation. The project team considered local and regional effects, and made a determination of the conformity of the project with air quality standards for the Puget Sound region.

The project is located in a carbon monoxide maintenance area and requires a quantitative analysis in order to show compliance with the State Implementation Plan (SIP).

What is the SIP?

The State Implementation Plan (SIP) is a plan developed by state government to attain and maintain compliance with the National Ambient Air Quality Standards.

Local operational effects were quantified in terms of CO concentrations from tailpipe exhaust in the vicinity of intersections likely to be affected by the project. CO is the pollutant most associated with the localized effects of motor vehicle emissions. Regional operational effects were considered by comparing project emissions with the NAAQS established by the USEPA. The project team also qualitatively analyzed Mobile Source Air Toxics (MSATs) in the study area.

What would air quality be like without the project?

If the project were not constructed, projected increases in traffic volumes on local streets would increase delays and lower the travel speeds of motor vehicles, both of which would mean higher emissions from vehicle exhaust. By design year 2030, however, CO concentrations would not exceed the NAAQS under the No Build Alternative.

What direct effects will construction of the project have on air quality?

Construction activities could have short-term effects on air quality. During construction, there is a potential for generation of fugitive dust during excavation and from any activity that involves the movement or disturbance of soils.

Fugitive dust is composed of fine soil particles released into the air during construction. It usually occurs under dry conditions and can be mitigated by spraying the construction site with water during dry weather and by covering exposed soil surfaces.

Air pollutants will be emitted from the exhaust of vehicles traveling to and from the construction site as well as from vehicles and construction equipment operating onsite. Emissions could also increase around a construction project as a result of detours and delays to local traffic traveling in the vicinity of construction areas. Traffic congestion will create increased exhaust emissions due to increased idling time, when motor vehicle emissions are highest.

Paving of roadways produces emissions from the paving material and the equipment that applies the new pavement. Where asphalt is used, these emissions will result in temporary hydrocarbon odors in the project vicinity.

Best management practices are well established for minimizing dust released from construction sites, and include watering or covering exposed soil surfaces. The project's construction management plan, which will contain provisions for traffic management, will minimize traffic congestion near the project during construction.

What direct effects will operation of the project have on air quality?

Project operation will change the amount of emissions from motor vehicles using the project roadways because traffic patterns will change with the project in place. The air analysis indicated that the roadway improvements proposed by this project will not result in adverse effects on air quality from air pollutants. This is because the project will have an overall effect of improving traffic flow, thereby reducing idling time.

Localized concentrations of CO were evaluated in the vicinity of several high-volume signalized intersections. All of the scenarios analyzed indicated that with the project, concentrations will be below applicable ambient air quality standards. For the five analyzed intersections, CO concentrations were predicted to be slightly better for the project than for the No Build Alternative, as shown in Exhibits 5-5 and 5-6.

Exhibit 5-5. Maximum 1-Hour Carbon Monoxide Concentrations (PPM)

Intersection Name	2007 Existing Conditions	2011 No Build	2011 with Project	2030 No Build	2030 with Project
South Atlantic Street & First Avenue South	9.6	9.1	9.2	8.0	8.0
South Lander Street & First Avenue South	8.7	8.2	8.2	7.2	7.3
South Spokane Street & Fourth Avenue South	9.7	8.8	8.8	7.8	7.8
South Royal Brougham Street & Fourth Avenue South	10.9	9.1	8.8	8.0	7.9
South Royal Brougham Street & First Avenue South	10.5	9.6	9.4	8.0	7.5
CO NAAQS	35 ppm				

Exhibit 5-6. Maximum 8-Hour Carbon Monoxide Concentrations (PPM)

Intersection Name	2007 Existing Conditions	2011 No Build	2011 with Project	2030 No Build	2030 with Project
South Atlantic Street & First Avenue South	8.2	7.9	7.9	7.1	7.1
South Lander Street & First Avenue South	7.6	7.2	7.2	6.5	6.6
South Spokane Street & Fourth Avenue South	8.3	7.7	7.7	7.0	7.0
South Royal Brougham Street & Fourth Avenue South	9.1	7.9	7.7	7.1	7.0
South Royal Brougham Street & First Avenue South	8.8	8.2	8.1	7.1	6.8
CO NAAQS	9 ppm				

The project team evaluated air toxic emissions on a regional level in accordance with the FHWA's *Interim Guidance on Air Toxic Analysis in NEPA Documents* (FHWA, 2006). The results indicate that changes in traffic volumes, vehicle mix, or other factors resulting from the project will not cause an increase in emissions relative to the No Build Alternative.

Consequently, the FHWA Interim Guidance indicates that the project will generate minimal air quality effects for Clean Air Act criteria pollutants. In addition, the project has not been linked to any special MSAT concerns; therefore, this EA is exempt from further analysis for MSATs.

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

For temporary effects during construction, state law requires construction site owners and/or operators to take reasonable precautions to prevent fugitive dust from becoming airborne. Fugitive dust may become airborne during material transport, grading, driving of vehicles and machinery on and off the site, and through wind events. WSDOT will comply with the procedures outlined in the Memorandum of Agreement between WSDOT and the PSCAA for controlling fugitive dust (WSDOT, 1999). Controlling fugitive dust emissions could require any of the following actions:

- Spray exposed soil with water or other suppressant to reduce emissions of PM_{10} and deposition of particulate matter.
- Cover all soils that are not being worked.
- Use phased development to keep disturbed areas to a minimum.
- Minimize dust emissions during transport of fill material or soil by wetting down or by ensuring adequate freeboard (space from the top of the material to the top of the truck bed) on trucks.
- Promptly clean up spills of transported material on public roads.
- Schedule work tasks to minimize disruption of the existing vehicle traffic on streets.
- Restrict traffic onsite to reduce soil upheaval and the transport of material to roadways.
- Locate construction equipment and truck staging areas away from sensitive receptors as practical and in consideration of potential effects on other resources.
- Provide wheel washers to remove particulate matter that would otherwise be carried offsite by vehicles to decrease deposition of particulate matter on area roadways.
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris.
- Minimize odors onsite by covering loads of hot asphalt.

Emissions of $PM_{10,}$ VOCs, NO_X, oxides of sulfur, and CO will be minimized to the extent practicable. Since these emissions primarily result from construction equipment, machinery engines will be maintained in good mechanical condition to minimize exhaust emissions.

Federal regulations require the use of ultra-low-sulfur diesel fuel in on-road trucks and will require the ultra-low-sulfur diesel for construction equipment by 2010. This will reduce the

sulfur content of diesel fuel from its current level of 500 ppm to 15 ppm million, a 97 percent reduction, and will result in a decrease in both SO_2 and PM emissions from these engines.

Operational Mitigation

No measures to avoid or minimize effects of operation of the project will be required because its operation is not anticipated to cause any adverse effects on air quality.

What indirect effects will the project have on air quality?

The project will have no indirect effects on air quality.

Will the project contribute to any cumulative effects on air quality?

During the 2009-2012 timeframe, the project and the Alaskan Way Viaduct and Seawall Replacement Project from South Holgate Street to South King Street will be under construction, and each will contribute airborne emissions of gases and particles that will decrease local air quality at times. This cumulative contribution will add to the vehicle and rail emissions from freight and commuter trips through the study area.

Over the long term, the project will make a positive contribution to the existing cumulative effect on air quality discussed above. This positive contribution will be a reduction in cumulative vehicle emissions resulting from more efficient traffic flow and reduced vehicle idle times in the study area.

5.3 Water Resources

The project will add 0.93 acre of new impervious surface and convert 0.82 acre of non-pollution-generating surface to pollution-generating surface. Basic water quality treatment will be provided for stormwater runoff from the project, reducing the quantities of pollutants discharged to levels below current amounts. WSDOT will apply and monitor BMPs during construction to minimize erosion, sedimentation, and the risk of petroleum products or other contaminants entering the stormwater collection system.

Looking north from South Atlantic Street at Third Avenue South

What water resources are in the study area?

Water resources in the study area consist of urban surface drainage and stormwater collection systems, and groundwater.

Surface Water Bodies

Apart from Elliott Bay, there are no streams or other natural surface water features in the study area. Elliott Bay is an estuary about one-half mile west of the project site. It is on the Washington State Department of Ecology 303(d) List of Impaired and Threatened Water Bodies that exceed the state water quality standards. Elliott Bay exceeds fecal coliform standards at several nearshore locations along the east side of Elliott Bay. This includes the area around the study area's Connecticut Street outfall, which discharges combined sewer overflows discussed below. In addition, the bottom sediments of Elliott Bay have exceeded numerous sediment quality criteria.

What is the Ecology 303(d) List?

The federal Clean Water Act, adopted in 1972, requires states to restore their waters to be "fishable and swimmable." The Clean Water Act established a process to identify and clean up polluted waters. Every 2 years, all states are required to prepare a list of water bodies that do not meet water quality standards. This list is called the 303(d) list because the process is described in Section 303(d) of the Clean Water Act.

Ecology has prepared a preliminary assessment of water quality in Washington. The assessed waters are listed in categories that describe the status of water quality. For those waters that are in the polluted category, beneficial uses—such as drinking, recreation, aquatic habitat, and industrial use—are impaired by pollution.

Stormwater

Stormwater runoff from the study area is conveyed within two piped stormwater collection systems, a stormwater-only system and a combined sewer-and-stormwater system that conveys both stormwater runoff and sanitary sewage (Exhibit 5-7). Most of the stormwater in the study area is collected in the combined sewer-and-stormwater system, which conveys flows via the Elliott Bay Interceptor (EBI) pipeline to the regional wastewater treatment plant at West Point, which is operated by

King County. However, occasional intense rainstorms can result in flows that exceed the capacity of the EBI. These excess flows, referred to as combined sewer overflows, are discharged to Elliott Bay via the Connecticut Street Outfall, located west of South Royal Brougham Way.

What is a combined sewer system?

A pipe system that carries both sanitary sewage and stormwater runoff.

The stormwater-only system carries no sanitary sewage. All of the runoff generated within the project footprint drains to this system. The project footprint includes the proposed I-90 off-ramp, the South Royal Brougham Way overpass above the BNSF Railway tracks, and intersection improvements at and along South Royal Brougham Way, South Atlantic Street, and First, Third, and Fourth Avenues South, immediately surrounding Safeco Field. Most of the time this separated system conveys stormwater flows to the EBI and then the water is treated at the West Point Treatment Plant. However, during intense storms the separated system also discharges untreated stormwater runoff directly to Elliott Bay via the Connecticut Street Outfall.

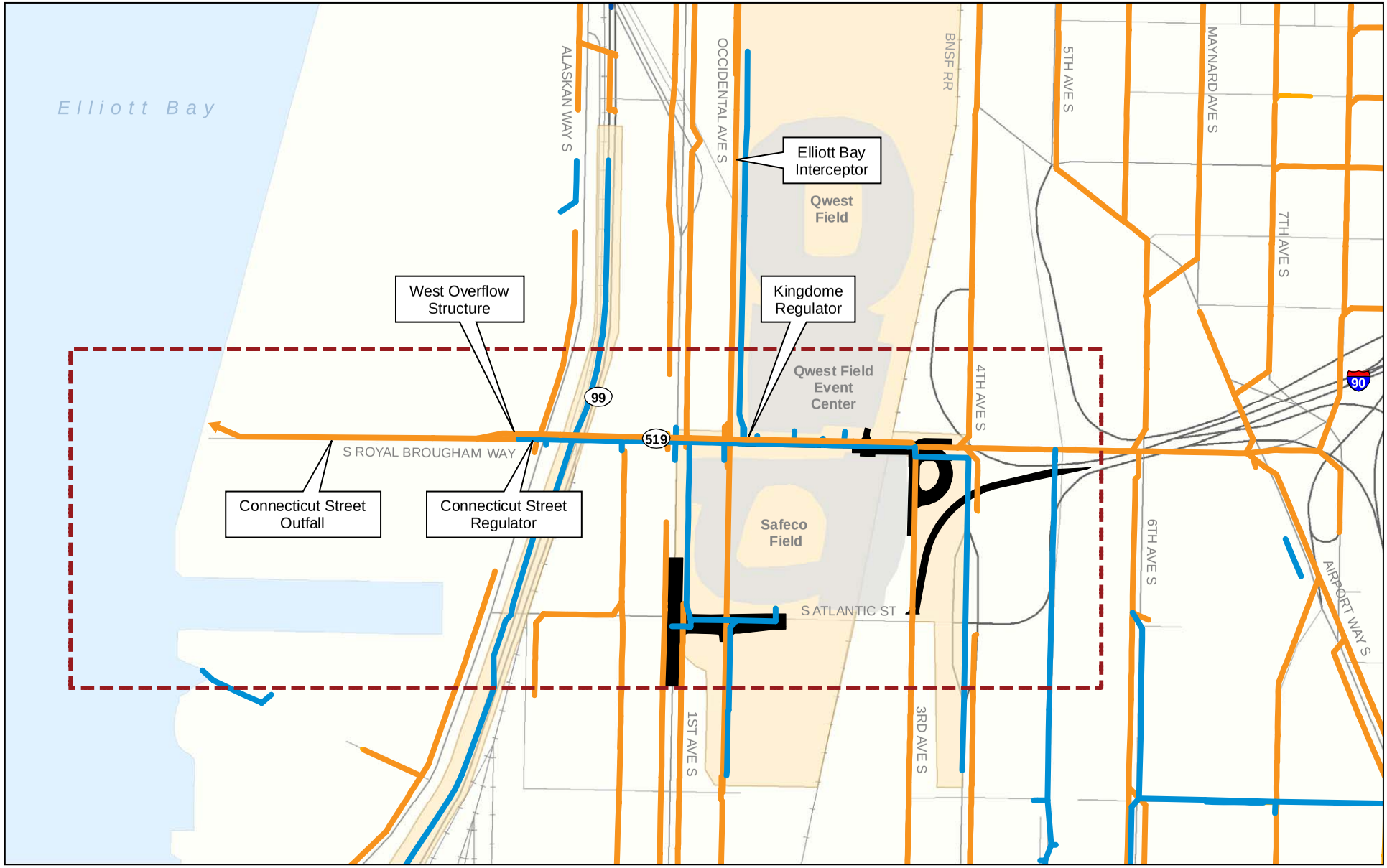
What is a separated sewer system?

A pipe system that carries only stormwater runoff.

Groundwater

Nearly all of the surfaces in the study area are impervious. There is minimal stormwater infiltration or groundwater recharge. In addition, there is little or no groundwater withdrawal by wells. Groundwater in the study area is generally found at between 2 and 8 feet. It flows westward toward Elliott Bay. Daily fluctuations in the water table of up to half a foot can occur in the western portion of the study area because of tides, although this does not likely extend to the project footprint.

Most of the groundwater flow in the project vicinity occurs within the fill material, in the coarser-grained alluvial and beach deposits, and in the coarse-grained glacial soils. In the western portion of the study area, groundwater becomes increasingly saline as it mixes with the estuarine waters of Elliott Bay. No active drinking-water wells have been identified in the study area, no sole-source aquifers are located in the general area, and the study area is not in a wellhead protection area.



Source: City of Seattle (2007)

Exhibit 5-7
Separated Stormwater and Combined Sewer Pipe Systems

What are the regulations governing water resources in the study area?

The federal Clean Water Act of 1972 regulates water discharges under National Pollutant Discharge Elimination System (NPDES) Permits. In Washington State, the Department of Ecology issues NPDES permits. King County has a permit for its publicly owned treatment works, West Point Wastewater Treatment Plant, and its combined sewer system (permit No. WA-002918-1). King County and the City of Seattle also have Phase 1 NPDES municipal permits for discharges from their separated stormwater systems. . Additionally, an NPDES general construction permit is required for all construction sites that disturb 1 acre or more of soil.

The Department of Ecology designates water quality standards in Washington Administrative Code 173-201A-030. Revisions to these standards are currently under review by the USEPA. WSDOT provides highway stormwater treatment guidance in the *Highway Runoff Manual* (HRM) (WSDOT, 2006b). WSDOT has an Implementing Agreement on Surface Water Quality with the Department of Ecology. WSDOT will comply with this agreement and with all water-related permit language.

The City of Seattle's 2000 Drainage Code regulates stormwater management requirements for new development and redevelopment, which can include detention and treatment of stormwater.

King County regulates and issues permits for discharge of groundwater from construction dewatering activities into the sewer system.

Supporting information on surface water and groundwater is available in the *Water Resources Technical Memorandum* prepared for this EA.

What methods were used to evaluate the project's effects on water resources?

To identify potential project effects on water resources, the project team superimposed computer-aided design and drafting (CADD) files of the preliminary roadway plans on an aerial

photo of the project site. Pervious areas, pollution-generating areas, and other impervious areas were calculated. These areas were verified through field observations. The team also reviewed the drawings of the existing combined sewer and separated drainage systems provided by Seattle Public Utilities.

Preliminary stormwater management facilities for the proposed project were sized using the method identified by WSDOT. The pre- and post-project pollutant loads associated with the project road surfaces were calculated conservatively using guidance presented in the WSDOT document, *BA Writers Guidance for Preparing the Stormwater Section of Biological Assessments* (WSDOT, 2006a), as instructed by the WSDOT *Environmental Procedures Manual* (WSDOT, 2007a).

What would water resources be like without the project?

With the No Build Alternative, the stormwater treatment facilities associated with the project would not be installed. There would be no change in stormwater pollutant loadings, and no change in the volume of stormwater runoff flow.

What direct effects will construction of the project have on water resources?

The study area has minimal slope, and there are no surface water bodies immediately adjacent to the project footprint. The closest surface water body is Elliott Bay, about 0.5 mile west of the project. The disturbed soil conditions resulting from areas graded for new pavement or re-paving will be temporary, and soils will generally be disturbed for only a few months. Without mitigation there is the potential that during a rain storm, soil would erode and be carried from the construction site into the stormwater system. During intense storm events it could overflow the sewer system and enter Elliott Bay. Other potential sources of construction-related water pollution include concrete wash water, spills or leaks of petroleum products used to refuel and maintain construction equipment, and interception of soils and groundwater contaminated with hazardous materials (see Section 5.5 for more discussion of hazardous materials).

Stormwater regulations require a number of actions to be incorporated into project designs to protect water quality. These best management practices (BMPs) are employed during construction to minimize the risk of erosion, and of sediment, petroleum products, or other contaminants reaching the stormwater system. BMPs commonly used to control construction runoff and reduce erosion potential include excavation and grading during the dry season, covering stockpiles, and using straw wattles and silt fencing to prevent sediment runoff. Additional control of sediment can be provided by sediment settling ponds or tanks and catch basin inserts that filter out solids. Concrete wash water is alkaline and toxic to fish. It will be treated onsite to reduce alkalinity and suspended solids to acceptable levels for discharge to the local sewer if permission is granted, or will be collected and treated or disposed of at an offsite disposal facility.

Since the project is over 1 acre in size, WSDOT must have an NPDES general construction stormwater permit from Ecology. This permit requires the preparation of a project-specific stormwater pollution prevention plan. To meet this requirement, WSDOT will prepare and submit to Ecology a temporary erosion and sediment control (TESC) plan for the project. The TESC plan will describe BMPs that will be implemented to control erosion. WSDOT will also prepare a spill prevention, control, and countermeasures (SPCC) plan that identifies potential spill sources and hazardous materials at the site and measures that will be taken to prevent, minimize, and respond to spills. One of the requirements of the NPDES permit is inspection of the BMPs on a regular basis to ensure that they are in place and performing properly.

Contaminated soils may be encountered during construction (for more details refer to Section 5.5). Contaminated groundwater may also be encountered. Runoff from disturbed contaminated soils or seepage from contaminated groundwater would degrade the quality of construction runoff and could impact the stormwater system. WSDOT may prepare a temporary dewatering plan if a dewatering permit is necessary. The permit will state the flow rate and water quality

requirements at the points of discharge from the project site, as well as any monitoring requirements. The dewatering plan will contain contingency measures for segregation and treatment of contaminated water, should it be encountered. These contingency measures will also be included in the stormwater pollution prevention plan mentioned above.

What direct effects will operation of the project have on water resources?

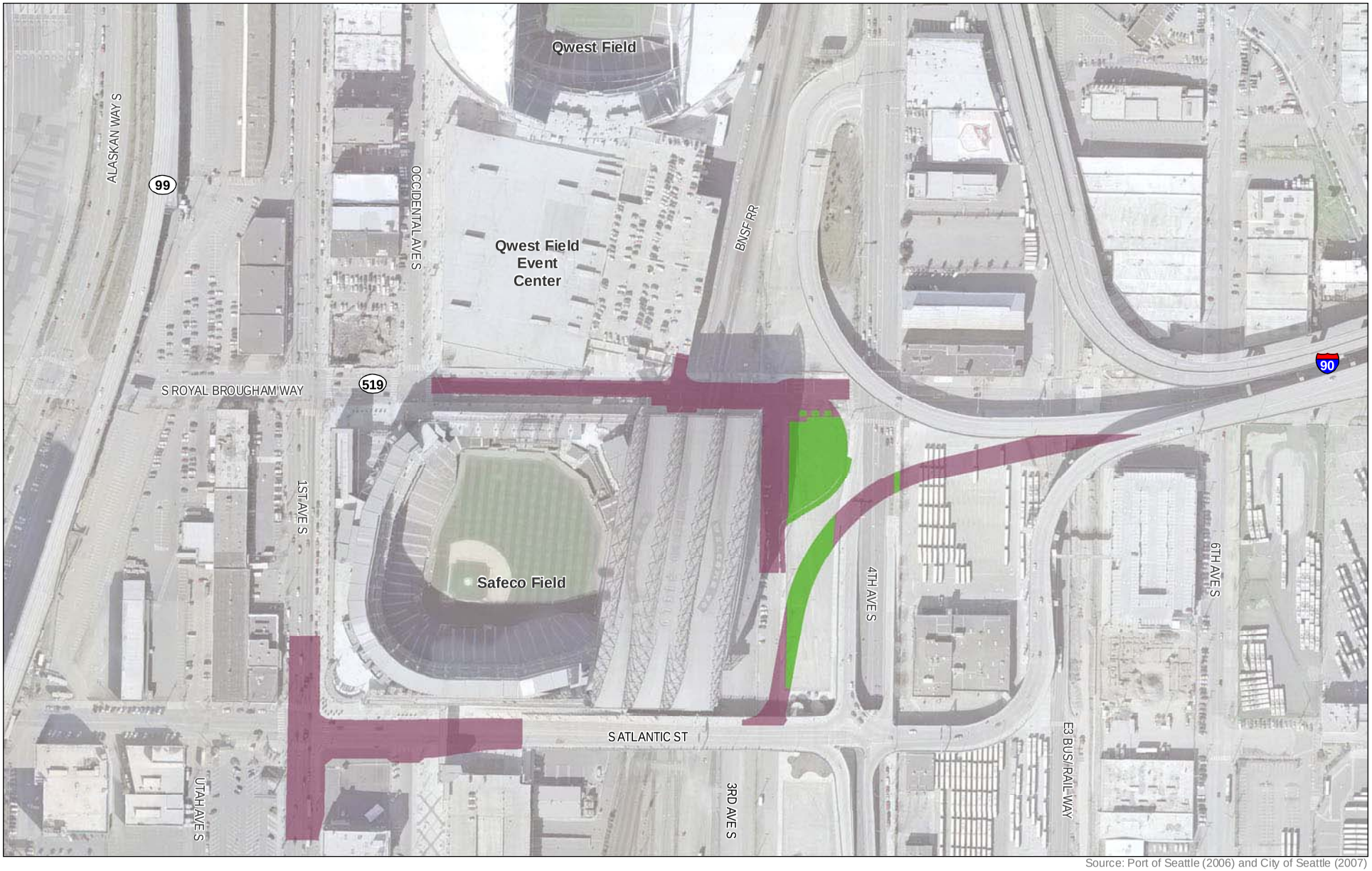
Over the long term, the main effect of the project on water resources relates to stormwater runoff from the project and any influence it might have on water quality, as discussed later in this section.

Impervious and Pollution-Generating Surfaces

The quantity of stormwater runoff from an area is directly related to its amount of impervious surface. The project footprint is 5.05 acres, most of which is currently impervious surface (Exhibit 5-8). However, part of the footprint lies across a pervious 2.3-acre fenced gravel lot (owned by WSDOT) that is bounded by Third and Fourth Avenues South and South Royal Brougham Way and South Atlantic Street. A portion of this gravel lot will be converted to impervious area for the new I-90 off-ramp structure. For purposes of this analysis, any bridged portion of a project road that overlies a pervious surface is considered to be converted to impervious area. The project will result in an increase in impervious area of 0.93 acre, with most of this due to project construction over the gravel lot.

Third Avenue South east of Safeco Field; WSDOT's gravel lot on the right

The roads that will be directly affected by the project (South Royal Brougham Way, South Atlantic Avenue, Third Avenue South, and Fourth Avenue South) are considered pollution-generating surface (PGS). The existing PGS associated with these roads is 3.40 acres. The remainder of the project footprint (1.66 acres) consists of sidewalks and the fenced gravel lot, which are not considered pollution-generating surfaces. Post-project PGS is shown in Exhibit 5-9. After project construction, PGS will increase by 0.82 acre to 4.22 acres. Most of this increase will be from the construction of the new I-90 off-ramp over the existing gravel lot.



Source: Port of Seattle (2006) and City of Seattle (2007)

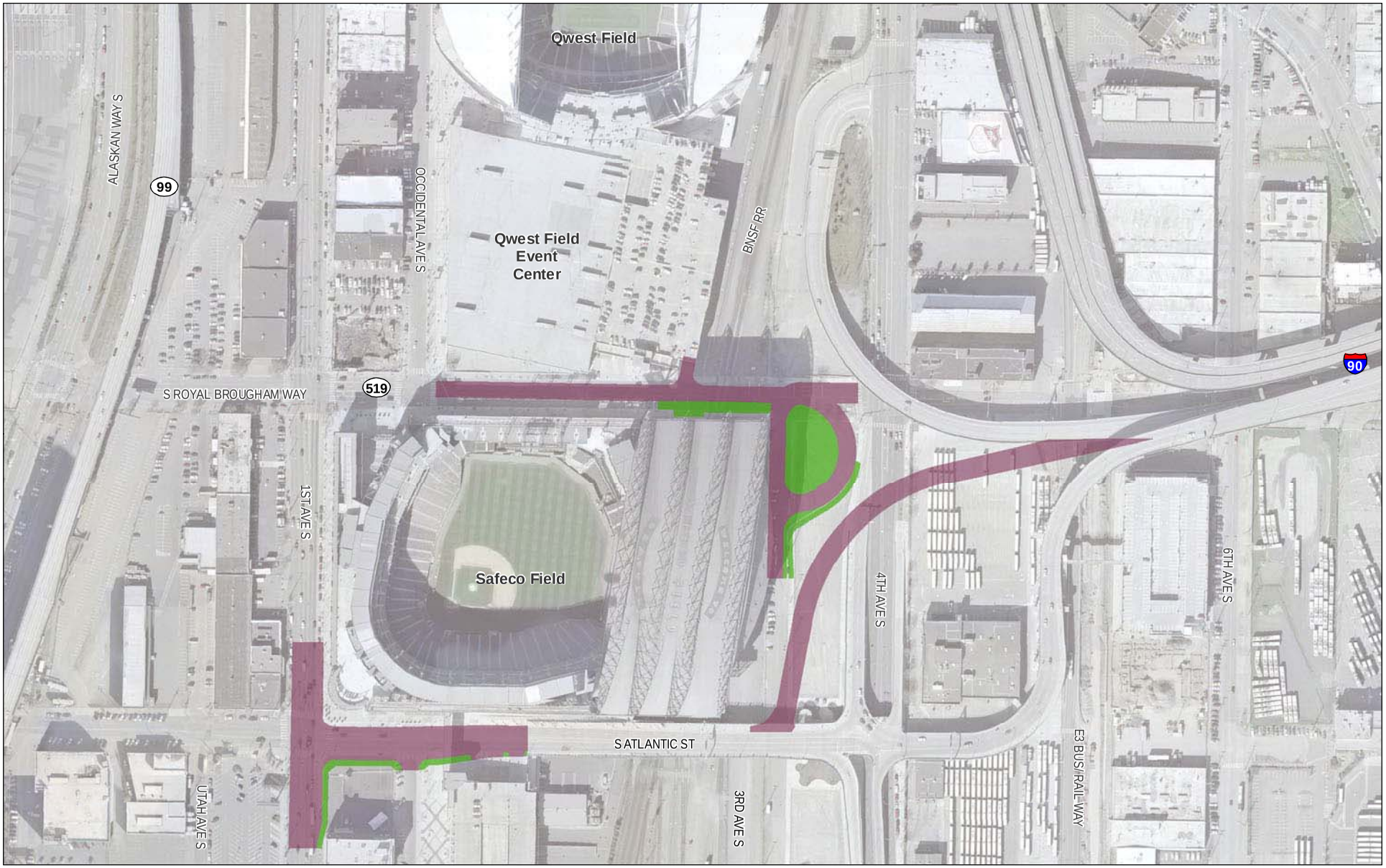
Existing Pervious Area to Be Converted to Impervious Area

Existing and Post-Project Impervious Area

N

0 300 Feet

Exhibit 5-8
Existing and Post-Project Impervious Areas



Source:Port of Seattle (2006) and City of Seattle (2007)

Non-Pollution-Generating Surface

Pollution-Generating Surface

N

0 300 Feet

Exhibit 5-9
Pollution-Generating Surface
Post-Project Conditions

Stormwater runoff from the project flows into the separated stormwater system. During high flows this system discharges directly to Elliott Bay. Salt water bodies are exempt from flow control, and therefore none will be needed for the project. For this same reason, and given the operation of the separated and combined sewer systems serving the study area, the City of Seattle has stated that it will not require stormwater detention for this project.

Stormwater Treatment

Stormwater treatment is required for runoff from new and replaced impervious surfaces. The project will provide basic water quality treatment, which primarily targets removal of suspended solids. Typical basic treatment BMP facilities include wet vaults, wet ponds, and biofiltration swales. Oil control is required for all major intersections with an average daily traffic (ADT) of 25,000 vehicles or more on the major street and 15,000 ADT or more on the intersecting street. The intersection of First Avenue South and South Atlantic Street has an ADT that exceeds this criterion, and therefore oil control must be provided here.

Wetponds and **wet vaults** are drainage facilities for water quality treatment that contain permanent pools of water that are filled during the initial runoff from a storm. They are designed to optimize water quality by providing retention time in order to settle out particles of fine sediment and to allow biologic activity to occur that metabolizes nutrients and organic pollutants.

Biofiltration swales are ditches that treat water quality as a biofilter. The combination of soil and vegetation creates a system for filtration, infiltration, adsorption, and biological uptake of pollutants when runoff flows through it.

The proposed I-90 off-ramp will be a WSDOT-owned roadway. All the runoff will be treated in a facility operated by WSDOT. The remaining elements of the project will be constructed within City of Seattle right-of-way and the City will operate the associated stormwater treatment facilities. The City may elect to use proprietary stormwater treatment BMPs such as filter cartridges and curbside planters.

The project footprint is not continuous, and the various project components will discharge at a number of locations. Stormwater treatment will be provided for each discharge prior to conveying the runoff into the separated storm sewer system. Treatment options for most of the project are likely to be limited to below-ground facilities such as vaults due to the lack of available area above ground for surface treatment facilities. The WSDOT gravel lot is currently open land and may provide an opportunity for surface treatment facilities such as a biofiltration swale or a water quality pond.

A **water quality pond** is a reservoir where stormwater is retained, allowing sediments to settle and water to be released at a slower pace before moving downstream.

Pollutant Loads

The stormwater treatment provided by the project will target the removal of total suspended solids from stormwater runoff. Because many other pollutants, such as nutrients and heavy metals, are adsorbed to suspended solids, removal of total suspended solids will reduce the levels of those other pollutants. The loads for the pollutants of concern associated with the project's PGS are shown in Exhibit 5-10. Pollutant loads are expressed as the mass of a pollutant over a given time period, typically pounds per year.

Exhibit 5-10. Stormwater Pollutant Loads for Key Water Quality Parameters (pounds per year)

Pollutant	Pre-Project	Post-Project	Difference	Percent Reduction
Total suspended solids	1,921	893	-1,028	54%
Total zinc	3.74	2.32	-1.42	38%
Dissolved zinc	1.36	1.14	-0.22	16%
Total copper	0.68	0.46	-0.22	32%
Dissolved copper	0.18	0.18	0.00	0%

The basic stormwater treatment provided by the project will reduce existing pollutant loads within the study area. For example, total suspended solids loads will be reduced to less than one-half of the existing 1,900 pounds per year. Smaller reductions will be achieved for copper and zinc, since some of these metals are dissolved in the runoff. There will be net load reductions for all of the pollutants of concern with the exception of dissolved copper, whose annual loading will remain at 0.18 pound per year. More information on pollutant load reduction can be found in the *Water Resources Technical Memorandum*.

Groundwater

As previously noted, there will be a small increase (0.93 acre) in impervious surface within the study area. This could result in a minor decrease in groundwater recharge in the study area. However, no measurable effects on groundwater are anticipated.

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

Stormwater regulations require a number of actions, known as conservation measures, to be incorporated into project design to protect water quality. During project construction, WSDOT will prepare a temporary erosion and sediment control (TESC) plan and a temporary dewatering plan. These plans will specify BMPs to minimize the possibility of contaminants reaching marine waters. These BMPs will likely include silt fences, catch basin inserts, sediment ponds or tanks, and settling and contaminant testing of dewatering water and sediment prior to discharge from the construction site. These measures will greatly reduce the potential for sediment to leave the project site. WSDOT will inspect the BMPs at least once per week to ensure that they are functioning properly.

Operational Mitigation

As discussed previously, during project operation, stormwater runoff will receive basic water quality treatment, reducing the amount of pollutants discharged to Elliott Bay and the West Point Treatment Plant. As a result, there will be a net benefit to water quality.

What indirect effects will the project have on water resources?

The project will have no indirect effects on water resources.

Will the project contribute to any cumulative effects on water resources?

By adding basic stormwater treatment to an area that currently does not receive any treatment, the project will reduce the total amount of pollutants discharged annually to Elliott Bay. This reduction will make a small beneficial contribution to water quality in the study area. Reasonably foreseeable future actions include the Alaska Way Viaduct and Seawall Replacement Program and the ongoing combined sewer overflow control program by the City of Seattle. The stormwater management components in these projects will likely reduce the magnitude and frequency of cumulative pollutant discharges to Elliott Bay.

5.4 Noise

By 2030, noise levels at three studied locations will decrease slightly because the project will reduce traffic congestion. At two other locations, where there are outdoor dining facilities, the cumulative noise level from all sources will approach or exceed FHWA Noise Abatement Criteria by 2030, with or without the project. All predicted changes in noise levels during project operation will be too small to be detectable. While the project is being built, WSDOT will follow BMPs to minimize construction noise.

The sports stadium-exhibition center complex at the core of the study area

What is the study area for the noise analysis?

The study area for the noise analysis consists of the area bounded by South Massachusetts Street to the south, South Dearborn Street to the north, Alaskan Way South to the west, and Fifth Avenue South to the east. Surrounding land uses are primarily heavy and light industry, freight, transportation, and manufacturing, with railroad mainline tracks and spur lines to local businesses. These are discussed in greater detail in the *Land Use Discipline Report* prepared for this EA.

How is noise regulated in the project vicinity?

Traffic noise from highway and transit projects is regulated by federal and state agencies. FHWA has established noise abatement criteria (NAC) (23 CFR 772), that apply to federally funded highway projects. The criteria are summarized in Exhibit 5-11. The noise levels are expressed in A-weighted decibel (dBA) hourly-equivalent sound levels ($L_{eq(h)}$). The *Noise Discipline Report* prepared for this EA presents additional acoustical fundamentals and regulatory information.

WSDOT considers adverse noise effects from vehicle traffic to occur if existing or predicted levels exceed or approach (are within 1 dBA of) the NAC. The particular land use involved determines which noise levels are compatible with that use.

What is a decibel?

The decibel (dB) scale is a common measure of sound noise. A decibel is one-tenth of a Bel. The scale is logarithmic, so each unit increase in Bels (or 10 decibels) equates to a tenfold increase in the magnitude of sound noise.

Land use categories adjacent to the project are classified under Activity Category B for outdoor dining locations, Activity

Exhibit 5-11. FHWA Noise Abatement Criteria

Activity Category	$L_{eq\ (h)}$	Description of Activity Category
A	57 dBA (exterior)	Lands on which serenity and quiet are of extraordinary significance
B	67 dBA (exterior)	Residences, motels, schools, churches, parks, play fields, hospitals
C	72 dBA (exterior)	Developed lands not included in A or B
E	52 dBA (interior)	Residences, motels, schools, libraries, hospitals, auditoriums

Source: FHWA Traffic Noise Abatement Criteria (23 CFR 772, 1997)
$L_{eq\ (h)}$ = the equivalent average sound level of noise over a one-hour period

Category C for commercial and industrial properties, and Activity Category E for one residential non-profit institution, the Salvation Army Adult Rehabilitation Center (Salvation Army residence), located on the east side of Fourth Avenue South opposite the end of the existing I-90 off-ramp.

WSDOT is responsible for applying FHWA regulations to state highway projects and has developed the guidelines essential to performing highway noise studies. WSDOT guidance states that noise effects occur when project noise levels approach or exceed the FHWA NAC. Substantial increases are defined as being 10 dBA above existing levels. WSDOT's policies are set forth in *Traffic Noise Analysis and Abatement Policy and Procedures* (WSDOT, 2006d).

The City of Seattle limits noise levels at property lines of neighboring properties (Seattle Municipal Code 25.08.410). The maximum permissible sound level depends on the land uses of both the source noise and the receiving property. The maximum permissible sound levels apply to construction activities only if they occur between 10 PM and 7 AM on weekdays and 10 PM and 9 AM on weekends. The *Noise Discipline Report* prepared for this EA presents additional information regarding the Seattle Municipal Code.

What noise-sensitive properties are in the study area?

The project team identified two Category B and one Category E noise-sensitive properties in the study area. The Category B properties are an outdoor dining patio at the Pyramid Alehouse and a seasonal outdoor dining area used by Ivar's Clambake, near the southeast corner of First Avenue South and South Atlantic Street. Ivar's Clambake is open only during 3-hour periods up to the opening pitches at home baseball games. The Category E property is the Salvation Army residence.

The Salvation Army residence provides short-term housing and is adjacent to a Salvation Army Thrift Store. Because it has no designated outdoor use areas and is a non-profit institution, the interior noise levels were included in the noise analysis.

Although Seattle's stadium district is the core of the study area, the stadiums themselves were not considered noise-sensitive properties because they are used for sporting events that attract large crowds.

The Silver Cloud Inn on South Royal Brougham Way has an outdoor swimming pool on the tenth floor. Based on its vertical distance from project roadways, this facility will not likely be affected by the project and was not, therefore, considered a noise-sensitive property.

The defined noise-sensitive properties in the study area, therefore, are the outdoor dining areas at the two restaurants, the Pyramid Alehouse and Ivar's Clambake, which are both classified as Category B receptors, and interior noise at the Salvation Army residence, which is classified as Category E.

What are the existing noise levels?

Existing noise levels were measured with noise monitoring equipment and also calculated using traffic volumes provided by traffic engineers. Modeled existing noise levels were compared to future modeled noise levels and used to determine if there would be an increase as a result of the project. Exhibit 5-12 presents a description of monitoring and modeling locations. Receiver locations starting with M are both a monitoring and modeling location. Receiver locations starting with R are locations used for modeling only. Since measured

noise levels are typically only used for calibration and validation of the model, noise measurements are not required at all modeling locations.

Exhibit 5-12. Measured and Modeled Receiver Locations

Receiver	Address	Description
M1	Corner of Fourth Avenue and I-90 off-ramp	20-minute measurement located adjacent to the Salvation Army Thrift Store and Adult Rehabilitation Center. There are no outdoor use areas at this location. The dominant noise is from traffic traveling on Fourth Avenue South.
M2	Corner of South Royal Brougham Way and First Avenue South	20-minute measurement located adjacent to the Silver Cloud Inn. There are no outdoor use areas at this location. The dominant noise is from traffic traveling on South Royal Brougham Way and First Avenue South.
M3	Corner of South Royal Brougham Way and First Avenue South	20-minute measurement located on the dining patio of Pyramid Alehouse. The patio area is 2 feet above ground level. The dominant noise is from traffic traveling on South Royal Brougham Way and First Avenue South.
M4	Corner of Fourth Avenue South and South Atlantic Street overpass	20-minute measurement located west of Fourth Avenue South and directly beneath the South Atlantic Street overpass. There are no outdoor use areas at this location. The dominant noise is from traffic traveling on Fourth Avenue South.
R1	South Royal Brougham Way between Occidental and Third Avenues South	Adjacent to the south side of the parking lot for Qwest Field. There are no outdoor use areas at this location. The dominant noise is from traffic traveling on South Royal Brougham Way.
R2	First Avenue South between South Atlantic Street and South Massachusetts Street	Temporary Ivar's Clambake dining area on the east side. The dominant noise is from traffic traveling on First Avenue South.

Source: *Transportation Discipline Report.*

Exhibit 5-13 presents modeled noise levels and compares them with the NAC appropriate for each location's land use category. Interior noise levels at M1 were calculated by using the building noise reduction factor of 25 dBA applied to the outdoor modeling noise level at M1. Under existing conditions, noise levels at the one outdoor dining area, the Pyramid Alehouse dining patio (M3), equal the NAC at 67 dBA; on the sidewalk adjacent to the Silver Cloud Inn (M2), noise levels approach the NAC (71 dBA).

Exhibit 5-13. Existing Traffic Noise Levels

Receiver	Land Use Category	Traffic Noise (dBA L_{eq})		Existing Approaches or Exceeds NAC?
		WSDOT NAC	Existing Conditions	
M1	Category C	72	67	No
M1	Category E	52	42	No
M2	Category C	72	**71**	**Yes**
M3	Category B	67	**67**	**Yes**
M4	Category C	72	64	No
R1	Category C	72	63	No
R2	Category B	67	65	No

Note: Existing noise levels were modeled using existing traffic data prepared by the Transpo Group for the *Transportation Discipline Report*.

Bold type indicates sound level approaches or exceeds NAC.

What methods were used to evaluate the project's effect on noise?

The noise analysis followed procedures and used criteria developed by FHWA and WSDOT to assess the probable noise effects from vehicular traffic associated with the project. The project team also took noise measurements to calibrate the FHWA's noise model. The project team used peak-hour traffic volumes for each alternative to calculate both existing and future noise levels using FHWA's noise model.

Background (existing) noise levels were field-measured, then using the FHWA TNM 2.5 traffic noise model and concurrent traffic volumes measured in the field, the project team calibrated the noise model. Once the noise model was determined to be accurate, it was used to predict noise levels associated with the existing conditions, project, and No Build Alternative.

Modeled future noise levels were compared to the Noise Abatement Criteria (NAC) and the modeled increase in noise levels above existing conditions were compared to the substantial increase level. WSDOT has special conditions for examining substantial increases, discussed in the *Noise Discipline Report* prepared for this EA.

The noise receiver sites discussed in this assessment are identified and described in Exhibit 5-12. WSDOT noise specialists worked with the project team to select the noise modeling and monitoring locations.

What would noise be like in the study area without the project?

Under the No Build Alternative, future noise levels would increase by up to 2 dBA in the study area. Exhibit 5-14 presents existing and predicted future noise levels under the No Build Alternative for each location and compares the expected change between the two.

Exhibit 5-14. Future No Build Alternative Traffic Noise Effects

Receiver		Traffic Noise (dBA L_{eq})		
ID	Description	Existing	2030 No Build	No Build Change vs. Existing
M1	Parking Lot	67	68	1
M1	Interior Residential	42	43	1
M2	Sidewalk	71	70	-1
M3	Restaurant	**67**	**67**	0
M4	Overpass	64	66	2
R1	Parking Lot	63	63	0
R2	Restaurant	65	**66**	1

Source: Transportation Discipline Report.
*Note: **Bold** type indicates sound level approaches or exceeds NAC.*

What direct effects will construction of the project have on noise?

While the project is being built, noise levels will temporarily increase near the project site from the use of heavy equipment and transport of construction materials. Noise levels generated during construction will vary widely, reflecting differences in site conditions and phased construction activities.

WSDOT performance standards require construction noise levels to be below local, state, and federal thresholds. In cases where construction noise will occur at night and will exceed

the City of Seattle maximum permissible sound levels, temporary noise variances for nighttime construction will be requested from the City of Seattle.

The variance allows WSDOT to exceed the local noise ordinance levels for nighttime work. For work between the hours of 10:00 PM and 7:00 AM Monday through Friday or between 10:00 PM and 9:00 AM Saturday and Sunday that is expected to exceed the local ordinance noise levels, WSDOT will minimize construction noise via planned mitigation measures. The City of Seattle noise ordinance (SMC 25.08.425) regulates sounds produced by construction equipment during daytime hours as well as at night.

What direct effects will operation of the project have on noise?

Future noise levels under the project will be equal to or slightly less than future noise levels under the No Build Alternative throughout the study area except at receiver R1, where the noise level will be 4 dBA less. This modeled reduction is a result of the new elevated Royal Brougham Way railroad overpass, which will raise the roadway approximately 30 feet above the current grade at the receiver location. The new elevated roadway will shield R1 from the traffic noise.

Exhibit 5-15 compares future noise levels with the project operating to existing noise levels. Interior noise levels at M1 were calculated by using the building noise reduction factor of 25 dBA applied to the outdoor modeling noise level at M1. The modeled noise level at M3 (67 dBA), an outdoor dining area, equals the NAC level, and the modeled level at R2 (66 dBA), also an outdoor dining area, approaches the NAC.

In summary, the changes in modeled noise levels for the project are 2 dBA or less over existing levels and will not be perceptible (FHWA, 1995).

Exhibit 5-15. Project Traffic Noise Effects

Receiver		Traffic Noise (dBA L_{eq})		
ID	Description	Existing	2030 with Project	Project Change vs. Exist
M1	Parking Lot	67	67	0
M1	Interior Residential	42	42	0
M2	Sidewalk	71	69	-2
M3	Restaurant	**67**	**67**	0
M4	Overpass	64	66	2
R1	Parking Lot	63	59	-4
R2	Restaurant	65	**66**	1

Source: Transportation Discipline Report.
*Note: **Bold** type indicates the sound level approaches or exceeds the NAC for its location.*

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

Because construction of the project will include nighttime construction activities, a temporary noise variance will be requested from the City of Seattle. A temporary variance is required when the maximum permissible sound level is exceeded based on the location of noise source and receiving property. At night, construction noise from the project in a commercial district is subject to a maximum permissible noise limit of 47 dBA at residential properties, which include the Salvation Army residence and the Silver Cloud Inn in the study area. A table of the permissible sound levels by noise district and property is in the *Noise Discipline Report*. Construction noise mitigation requirements will be developed in coordination with the City and specified in the temporary noise variance. The temporary noise variance will comply with all requirements of the Seattle Municipal Code (25.08.410). WSDOT performance standards require construction noise levels to be kept below local, state, and federal thresholds.

Construction noise effects could be mitigated by measures including, but not necessarily limited to, the following:

- Developing a construction management plan during design, incorporating specific established construction activities as high-impact noise-generating. Those activities are then assigned noise level limits that can not be exceeded during specific periods.
- Crushing and recycling of concrete off-site, away from noise sensitive locations, to decrease construction noise effects. If concrete is crushed and recycled on-site, an operation plan will be required to define the locations and hours of operations.
- Installing temporary noise walls around stationary equipment and long-term work areas, where feasible.
- Limiting the noisiest construction to between 7 AM and 10 PM on weekdays and between 9 AM and 10 PM on weekends to reduce construction noise levels during sensitive nighttime hours. A temporary noise variance would be required from the City of Seattle for construction between 10 PM and 7 AM on weekdays and between 10 PM and 9 AM on weekends.
- Sequencing construction to avoid the simultaneous use of multiple noisy machines and to avoid the loudest tasks (such as pile driving) during stadium or exhibition center events and at night.
- Using OSHA-approved backup alarms, which use ambient sound level sensing; this could reduce disturbances to nearby residents from backup alarms during quieter periods.
- Maintaining all equipment and ensuring that equipment operators are properly trained; this will reduce noise levels as well as increase operational efficiency.
- Minimizing idling of power equipment.
- Where possible, locating stationary equipment away from sensitive receiving properties.

- If necessary, notifying the Silver Cloud Inn and Salvation Army residence prior to periods of intense nighttime construction.
- Providing a 24-hour noise complaint line.
- Using utility-supplied electric power rather than diesel-powered electric generators, whenever practicable.

Operational Mitigation

After construction is completed and the project becomes operational, no noise mitigation will be applied.

WSDOT recommends that noise abatement measures be considered when the predicted noise levels approach or exceed the NAC, which for outdoor dining locations is 66 dBA. The predicted future noise level (for year 2030) at outdoor dining location M3, 67 dBA, equals the NAC under either the No Build Alternative or the project. At outdoor dining location R2, the predicted 2030 noise level of 66 dBA (with or without the project) approaches the NAC.

Whether or not these particular locations are still used for outdoor dining in future decades, potential traffic noise abatement measures that could be considered for these or other types of outdoor use areas include the following:

- Acquisition of property rights for construction of noise barriers
- Construction of noise barriers between the roadway(s) and parks or residential locations where future peak-hour noise levels exceed the NAC
- Realignment of the roadway(s)
- Implementation of traffic management measures (reduced speed limits or restrictions on truck traffic)
- Acquisition of buffer zones between the highway and affected properties
- Noise insulation of public use or nonprofit institutional structures

Of the above mitigation measures, the noise barrier option is usually the most practical and effective choice. Acquisition of property rights is costly and time-consuming. Given the current density of commercial and industrial developments throughout the study area, realigning of the roadways would not be feasible without extensive property acquisitions. Traffic management measures, such as lowering the speed limit or limiting truck traffic, would not be consistent with the project's purpose and need (see Chapter 2) and would not be practicable, given the already low speed limits and high density of industrial and commercial activities in the study area. Creation of buffer zones would not be feasible without extensive property acquisition. Interior noise levels are below the NACs and therefore no insulation of non-profit institutional or public use buildings is necessary.

Noise abatement in the form of noise barriers is typically not recommended for commercial or industrial areas. Commercial establishments rely on visibility to attract customers and to provide convenient access to their facility. In addition, noise abatement is usually provided for areas where a lowered noise level would be of particular benefit, such as parks, schools, and churches. In the SR 519 study area, customers dining outdoors might expect to hear traffic and industrial noise, as well as sounds from the crowds attending sporting events, when these two facilities are most active. In addition, noise barriers are not considered to be consistent with commercial or industrial zoning.

A noise wall at either outdoor dining location is not feasible because the driveways adjacent to the outdoor dining areas would create gaps in any noise wall and reduce its effectiveness. Installing noise walls at either outdoor dining location would not achieve a 5-dBA reduction. Noise walls at these locations would introduce safety issues by reducing drivers' views from driveways and making it difficult to merge into traffic.

Because noise barriers would not be feasible at the outdoor use locations, the project team did not perform a reasonableness

analysis. A reasonableness analysis compares the estimated costs of potential noise barriers to the costs allowed in WSDOT guidelines.

Exhibit 5-16 summarizes the feasibility and reasonableness discussion for the two outdoor use areas. Based on the lack of feasibility and reasonableness for a noise wall, noise walls will not be required for this project. Additional information regarding WSDOT feasibility and reasonableness analyses for noise wall mitigation is provided in Appendix A of the *Noise Discipline Report* prepared for this EA.

Exhibit 5-16. Summary of Feasible/Reasonable Noise Barrier Determination

Receiver	Feasible	Reasonable	Comments
M3	No	No	This property has three wide driveways that would create gaps in a noise wall and reduce the noise reduction effect. One driveway is adjacent to the outdoor dining area and therefore no wall could be placed at this location. A noise wall at this location would not be feasible. Since no feasible noise wall could be constructed at this location, no reasonable analysis can be conducted for this location. A noise barrier at this location would not meet the reasonable and feasible criteria.
R2	No	No	This property has driveways that would create gaps in a noise wall and reduce the noise reduction effect. A noise wall at this location would not be feasible. Since no feasible noise wall could be constructed at this location, no reasonable analysis can be conducted for this location. A noise barrier at this location would not meet the reasonable and feasible criteria.

What indirect effects will the project have related to noise?

No long-term indirect effects are expected from traffic noise under the project.

Will the project contribute to any cumulative effects related to noise?

Historically, many sources of noise have been introduced during the urban development of the study area since the mid-nineteenth century, including industrial activities associated with the Greater Duwamish Manufacturing and Industrial Center, the Port of Seattle terminals, the Washington State Ferries terminal at Colman Dock, commercial waterfront

developments, the I-5 and I-90 freeways, truck and rail freight traffic, the Ryerson Bus Base, and, most recently, stadium district events. By 2030, the project, in combination with reasonably foreseeable future actions, will contribute to a barely perceivable increase in the cumulative noise level of the study area. A similar increase would occur under the No Build Alternative.

In the short term, from 2009 to 2012, construction-related noise from the Alaskan Way Viaduct and Seawall Replacement Project from South Holgate Street to South King Street will add to construction-related noise effects of the project, because both projects will be under construction at the same time. A short-term cumulative effect relating to construction noise levels will result from both projects during this time.

5.5 Hazardous Materials

The project will lower the potential for hazardous material spills from collisions and other transportation-related incidents between the I-5/I-90 freeway system and the Seattle central waterfront by improving traffic flow and reducing the number of required vehicle turns. The project will require acquisition of small land parcels in three locations that might be contaminated from past uses. WSDOT will investigate these properties for the presence of contaminants before they are acquired and will take all appropriate actions to ensure that construction does not release any contamination.

Are there any hazardous materials in the project vicinity?

The SR 519 Atlantic Access Corridor was historically an industrial area. The industrial history of the project vicinity and the recent environmental data from evaluations performed for other projects in the vicinity indicate that hazardous materials are present in the area.

The project team searched environmental regulatory databases to identify sites in the project vicinity that handle hazardous materials or wastes, or that have the possibility or history of contamination. The database search findings are described in the *Hazardous Materials Discipline Report* prepared for this EA.

The team identified 24 sites on the regulatory agency databases as sites of concern. In general, the sites of concern are those that have had substantial contamination that could affect or be affected by the project. Forty-three other sites located within the study area were also evaluated but were not considered to be sites of concern.

The project team determined that three of the 24 sites of concern should be investigated further because they fall directly within the project construction area and there is a high potential for encountering contaminated materials. The selection criteria for and detailed descriptions of these sites are

included in the *Hazardous Materials Discipline Report*. These three sites are:

- King County Metro Transit Ryerson Bus Base (1213-1220 Fourth Avenue South), which is bordered by South Royal Brougham Way to the north, South Atlantic Street to the south, Fifth Avenue South to the east, and Fourth Avenue South to the west
- The west and east sides of the railroad tracks west of Third Avenue South in the vicinity of South Royal Brougham Way southward to South Atlantic Street, including a small parcel to be acquired west of Third Avenue South and immediately north of South Royal Brougham Way
- The site of a former machine shop on the southeast side of the intersection of First Avenue South and South Atlantic Street

These areas have not been fully investigated for the presence of hazardous materials; however, the potential for contaminated soil to be present is high. The Ryerson Base location warrants further investigation because there have been numerous documented hazardous materials releases to the environment that were near or within the proposed project limits. Although there have not been any documented releases from the railroads in the study area or the old machine shop located on the southeast side of First Avenue South and South Atlantic Street, these businesses have historically had generally poor housekeeping practices and hazardous materials releases.

What methods were used to evaluate the project's effect on hazardous materials?

The project team conducted the following activities for the hazardous materials analysis:

- Identified the range of potential contamination for properties within the study area through a review of regulatory agency database lists and supplemental historical research.
- Evaluated all properties near and within the study area for the potential presence of hazardous materials based on their

location relative to the project site, and considered additional site-specific environmental data available in regulatory agency files and previous studies.

What hazardous materials effects would occur without the project?

Under the No Build Alternative, traffic congestion in the study area would increase, as discussed in Section 5.9, Transportation. With more traffic congestion, there would be a greater probability of collisions involving trains, trucks, and cars, with an increased potential for spills of hazardous materials that could enter the environment.

Contaminated soil and groundwater that might be encountered and removed during project construction would not be removed under the No Build Alternative. Instead, such contaminated soil could continue to contaminate groundwater.

What direct effects will construction of the project have on hazardous materials?

Effects on hazardous materials that might occur during construction are generally considered short-term in comparison to the life-span of the completed project. Most of the construction effects will end when construction is complete.

The following subsections describe effects that could occur during construction.

Contaminated Environmental Media

Contaminated environmental media, consisting of contaminated soil and groundwater, are likely to be encountered during the construction of the project.

WSDOT Liability

WSDOT might be liable for the cleanup of contamination on properties that it acquires to construct the project. The history of properties to be acquired indicates that there is a high potential for encountering contaminated soil and groundwater. The properties of concern that are proposed for partial acquisition include:

- King County Metro Transit Station – Ryerson Base (1213-1220 Fourth Avenue South), which is bordered by South

Atlantic Street on the south, by South Royal Brougham Way on the north, by Fourth Avenue South on the west, and by Fifth Avenue South on the east

- The west and east sides of the railroad lines located to the west of Third Avenue South and between South Royal Brougham Way and South Atlantic Street, including a small parcel of land to be acquired west of Third Avenue South and north of South Royal Brougham Way
- The site of a former machine shop on the southeast side of the intersection of First Avenue South and South Atlantic Street

Underground Storage Tanks

There are no known underground storage tanks within the project construction footprint. Although extensive excavation is not planned as part of the project, it is possible that construction equipment or new foundations could encounter previously unidentified underground storage tanks along with their associated contents and piping.

Unknown underground storage tanks pose explosion and spill hazards to the project. If flammable vapors trapped within an underground tank have reached explosive levels, a spark created by construction equipment could cause an explosion. A spill could occur if the tank contains hazardous materials and is ruptured during construction activities.

Hazardous Materials Spills

If the measures used to prevent hazardous material spills onsite are inadequate, hazardous materials could be accidentally released to the environment. For example, there could be an accidental spill of fuels and lubricants used for heavy equipment operation and maintenance that could overwhelm the containment measures.

Worker Safety and Public Health

Construction workers and the public could be exposed to hazardous materials uncovered, released, or spilled during construction if safety measures are inadequate or fail. Workers will be more at risk than the public because of their proximity

to spills during construction operations. A spill of materials brought onsite or encountered during construction, including dust, could expose workers and the public to hazardous substances that pose a health risk.

Further discussion of potential construction effects is included in the *Hazardous Materials Discipline Report* prepared for this EA.

What direct effects will operation of the project have on hazardous materials?

After construction is complete and the proposed Phase 2 improvements to SR 519 are operational, the traffic flow from I-5 and I-90 to the Seattle waterfront and adjoining industrial district will be improved. There will be less traffic congestion, which will reduce the potential for collisions and for spills of hazardous materials, such as fuels and lubricants.

What measures are proposed to mitigate the effects of the project?

Recommended mitigation measures for identified effects of the project during construction and operation are summarized below. The *Hazardous Materials Discipline Report* presents further discussion on mitigation measures.

Contaminated Environmental Media

As noted previously, the project will require several small partial property acquisitions for right-of-way. There is a high potential for encountering contaminated media on the three properties listed above under WSDOT Liability. WSDOT will prepare a contaminated soil management plan. This plan will identify procedures and chains of responsibility to effectively manage any encountered contaminated soil so that delays will be minimized.

Contaminated groundwater could also be encountered during construction. If dewatering of excavations is needed, WSDOT will develop a dewatering plan addressing the potential for encountering contaminated groundwater and the treatment and disposal of encountered contaminated groundwater.

Underground Storage Tanks and Associated Pipelines

Prior to construction, WSDOT could conduct a geophysical survey to locate pipelines or underground storage tanks in the excavation locations. If any underground storage tanks are located, appropriate regulatory guidelines will be followed for safe removal.

Hazardous Material Spills

WSDOT will prepare an SPCC plan to address a potential spill of contaminated soil, petroleum products, contaminated water, or other hazardous substances during construction.

Worker Safety and Public Health

WSDOT will plan and manage risks related to hazardous substances throughout construction to keep workers safe. If hazardous substances used or encountered onsite are not managed properly, workers could be exposed to them. Proper employee training, the use of protective equipment, contingency planning, and secondary containment for hazardous materials will reduce the risk of exposure. To minimize potential public health concerns, public access to the project construction zone, contaminated environmental media, and hazardous substances will be restricted.

How will WSDOT minimize long-term liability?

WSDOT will attempt to minimize long-term liability associated with the small acquisitions necessary for right-of-way. Historical contamination at the three sites of concern warrants further investigation before acquisition. WSDOT will meet with the landowners to discuss the contamination issues at each site. By engaging the landowner early in the process, WSDOT will have the opportunity to verify the history of each site and minimize any liability to WSDOT that might be associated with acquisition of the property.

What indirect effects will the project have on hazardous materials?

Some hazardous materials in the study area, including contaminated soil or groundwater, could be removed during construction, and the potential for uncontrolled migration of existing contaminants will be reduced.

During operation of the project, the potential for collisions and hazardous material spills (such as fuels and lubricants) from transport trucks will be reduced as a result of the improved traffic flow.

Will the project contribute to any cumulative effects on hazardous materials?

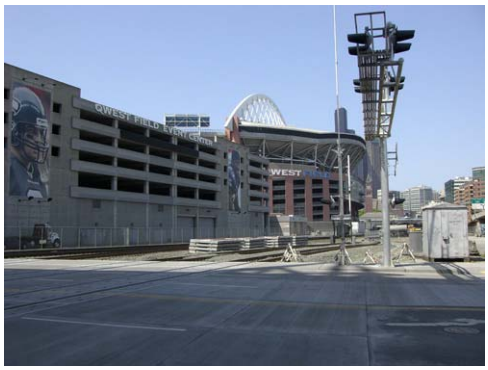
In the short term, from 2009 to 2012, construction-related effects of the Alaskan Way Viaduct and Seawall Replacement Project from South Holgate Street to South King Street could add to construction-related effects of the project because both projects might be under construction at the same time. A cumulative effect relating to hazardous materials could result primarily from the following:

- Accidental spills of fuels, lubricants, or other hazardous materials
- Exposure of workers or members of the public to hazardous materials associated with the concurrent construction activities

In the long run, the beneficial effect of the project in reducing traffic congestion and increasing safety will help to reduce any long-term cumulative effect relating to hazardous materials, as new spills will be less likely to occur than they are under present conditions.

5.6 Land Use

The project will not directly or indirectly change land use patterns or zoning. WSDOT will acquire a small amount of new right-of-way for the project to widen the roadway and place support structures; this will change about 5,415 square feet from existing land uses to transportation-related use. The project complies with the goals and objectives of relevant land use plans and policies. During construction, temporary lane closures and detours could affect local businesses and public use of the project vicinity.



Qwest Field and Qwest Field Event Center parking garage see from the South Royal Brougham Way railroad crossing

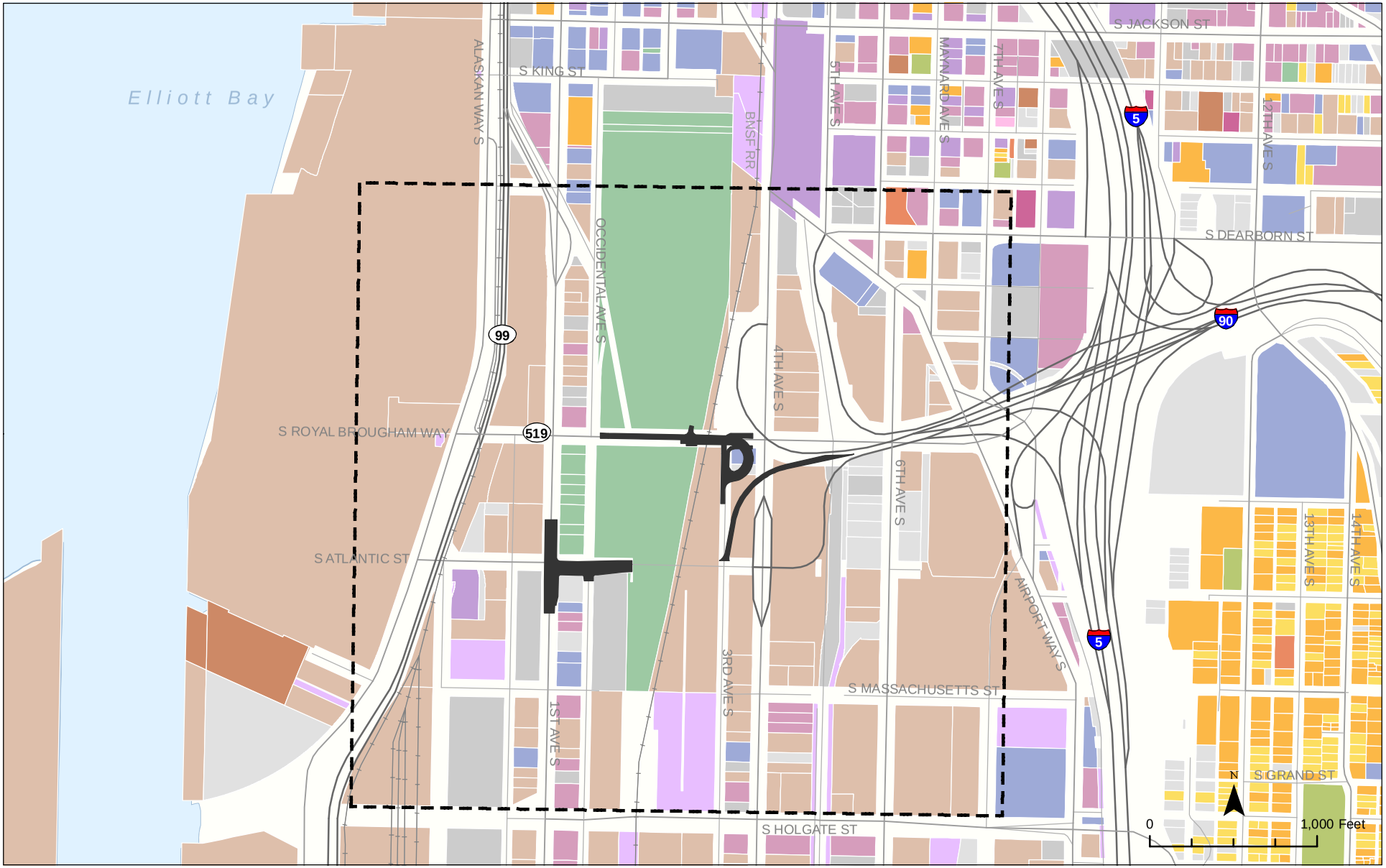
How was information on land use collected?

The project team reviewed geographic information system (GIS) maps to verify the existing and planned future land uses in the study area. Applicable transportation and land use plans and development regulations were reviewed to determine whether the project is consistent with those plans. The project team met with planners from the City of Seattle to discuss the proposed project and review current land uses and potential future land uses in the study area. The project team also visited and thoroughly explored the project site and the immediate vicinity.

What are the current land uses within the study area?

The primary land uses in the immediate area of the project are industrial/terminal/warehouse (Port of Seattle terminals, King County Metro bus bases), recreational/entertainment (Qwest Field, Qwest Field Event Center, Safeco Field), and office and parking uses (Exhibit 5-17). Other uses in the study area include retail/service businesses and a small number of multi-family residences.

The project team defined the study area as approximately the area bounded by I-5 to the east, South Dearborn Street to the north, SR 99 to the west, and South Holgate Street to the south. The affected environment includes the footprint of the project, all construction and staging areas, and all areas where direct and indirect effects could occur.



Source: City of Seattle (2007)

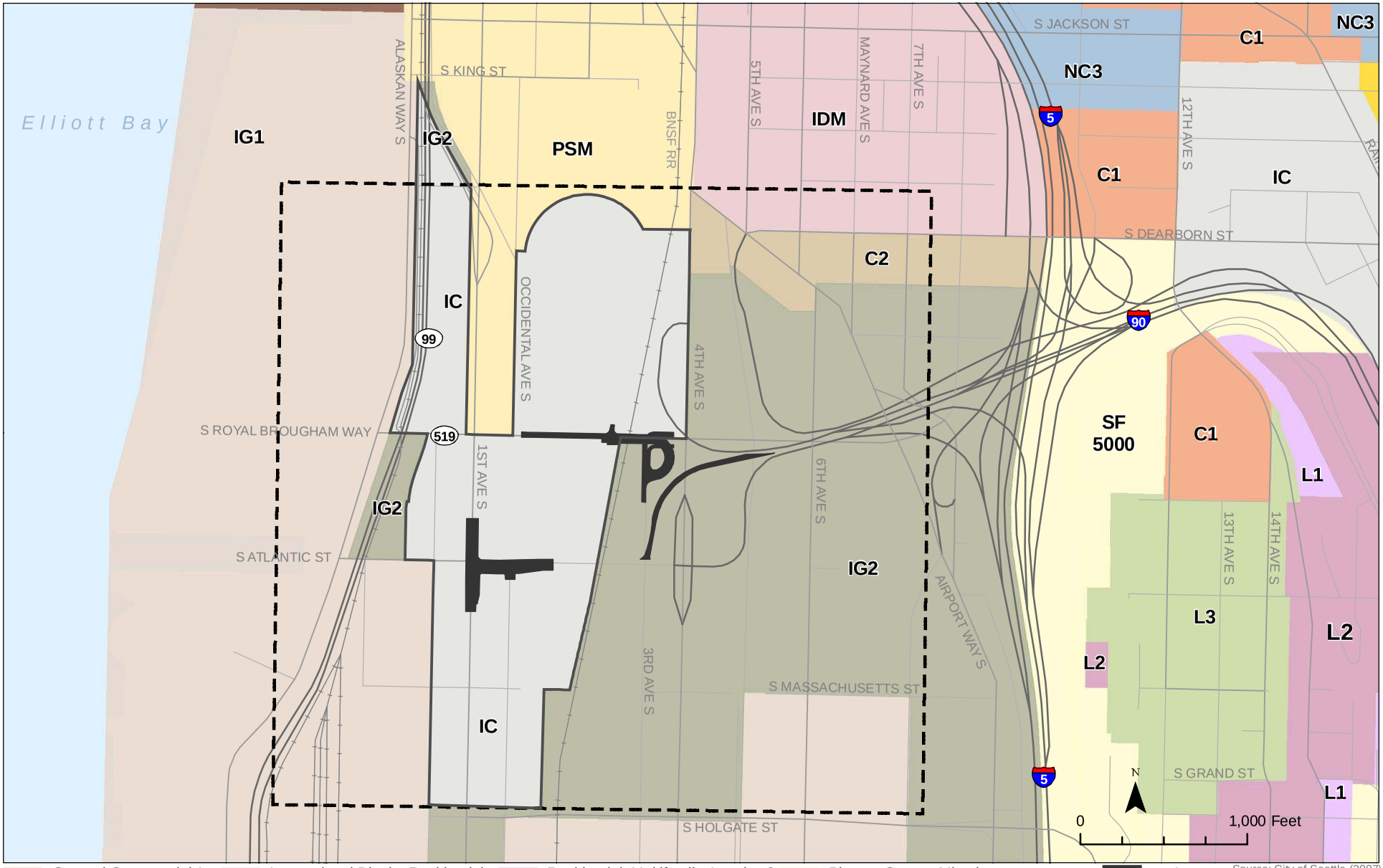
Exhibit 5-17
Existing Land Use

The Proposed Project is located within an area designated by the City of Seattle as the Greater Duwamish Manufacturing and Industrial Center, the largest center for industry in Washington State and the location of approximately 72,700 jobs. The boundaries of this center extend from approximately the Tukwila city limit in the south to South Dearborn Street in the north, and Elliott Bay in the west to Interstate 5 in the east. The neighborhood plan for this area, the *Greater Duwamish Manufacturing and Industrial Center Plan* (Greater Duwamish Planning Committee, 1999), indicates that primary land uses consist of manufacturing and industrial activities.

What are the planned future land uses within the study area?

Most of the area south of South Royal Brougham Way is currently zoned industrial, and the area to the north is industrial, commercial, and mixed use (Exhibit 5-18). The industrial zones allow uses such as light manufacturing, research and development facilities, food processing and craftwork, sports and recreation facilities, warehouses, and heavy commercial sales and service, as well as eating and drinking establishments. However, the City of Seattle is conducting a planning study known as Livable South Downtown that examines Pioneer Square, the Chinatown/International District (including the Little Saigon area east of Interstate 5), and the northernmost edges of the Greater Duwamish Manufacturing and Industrial Center (City of Seattle, 2007a).

Livable South Downtown is an effort to identify City land use actions that could result in a more livable community by encouraging residential and job-related development in appropriate ways, and by balancing local and regional uses while respecting the rich culture and history of the area. The Livable South Downtown planning process could result in the rezoning of properties north of South Royal Brougham Way, allowing more commercial and residential uses in an area that is currently zoned for industrial and mixed use. Please see the *Land Use Discipline Report* for more detailed information.



Source: City of Seattle (2007)

Exhibit 5-18
Zoning

What were the methods used to evaluate the project's effects on land use?

The project team used the guidance in Chapter 451 of the WSDOT *Environmental Procedures Manual* (WSDOT, 2007a) to evaluate potential effects of the project and No Build Alternative on land use. The project team analyzed the proposed right-of-way acquisitions and changes in access and circulation to determine if the project will cause any changes in land use from what exists or is planned for the area based on zoning. They also examined regional and local transportation and land use plans and development regulations to determine if the project is consistent with them. The plans and development regulations reviewed by the project team include:

- The Seattle Comprehensive Plan (City of Seattle, 2005a)
- Seattle's Land Use Code (SMC Title 23)
- The Livable South Downtown Reports (City of Seattle, 2006a and b)
- The *Draft Environmental Impact Statement for Livable South Downtown Planning* (City of Seattle, 2007a)
- The Greater Duwamish Manufacturing and Industrial Center Plan (Greater Duwamish Planning Committee, 1999)
- The City of Seattle's Transportation Strategic Plan (City of Seattle, 1998)
- The City of Seattle's Freight Mobility Plan (City of Seattle, 2005c)
- The Port of Seattle's Container Terminal Access Study (Port of Seattle, 2003)
- Puget Sound Regional Council's Destination 2030, the transportation element of Vision 2020 (PSRC, 2007)

The project team also reviewed the City of Seattle's Shoreline Program (SMC 23.60) and Environmentally Critical Areas Regulations (SMC 25.09) to assess their application to the project. The closest shoreline is approximately 2,000 feet from the project limits, so no discussion of the Shoreline Plan is

required. Review of the Environmentally Critical Area Regulations found that environmentally critical areas do exist within the study area. These hazards are discussed in Section 5.1 and evaluated thoroughly in the *Geology and Soils Discipline Report* prepared for this EA.

What would land use be like without the project?

With time, land use in the study area would continue to change under the No Build Alternative. Land use adjacent to the roadways in the study area could be negatively affected by increased congestion due to continuing traffic conflicts between the BNSF Railway and vehicle traffic, raising operating costs of freight movement, and could discourage patronage of local businesses and attendance at stadium events, making these land uses less viable.

What direct effects will construction of the project have on land use?

Construction activities could last approximately 3 years, from 2009 to 2012. Temporary construction easements will be acquired for construction staging and activities. Temporary street closures and detours will be needed to accommodate construction equipment and vehicles. Lane closures could affect adjacent businesses and property owners during construction, as discussed in Section 5.8. Effects such as increases in noise levels or dust from construction activities might also occur and could temporarily discourage the public from visiting the area.

What direct effects will operation of the project have on land use?

The project will require acquisition of several small pieces of property for right-of-way, and the conversion of a vacant WSDOT property currently zoned industrial to transportation use. Operation of the project is not expected to affect or influence any other existing or future land uses.

The small, partial property acquisitions required for right-of-way (Exhibit 5-18) will convert portions of parcels currently in industrial or commercial use to transportation use. These conversions will not require relocations or cause other changes in land use on the remaining parts of the parcels. However, the

small pieces of land acquired for the project will be permanently changed from the existing use to a transportation use. Air rights will also be acquired over a few properties (Exhibit 5-19). Acquisition of these air rights will not affect the current land uses; however, it could limit the height and placement of new structures if any of the properties were redeveloped. The project will support the City of Seattle's goal of protecting South Atlantic Street as a freight route and promoting South Royal Brougham Way as a pedestrian and bicycle route.

Exhibit 5-19. Property Acquisitions Required to Build Proposed SR 519 Roadway Structures

Owner	Current Use	Potential Acquisition (square feet)[a]	Will It Affect Use of the Remaining Land?
Baseball Club of Seattle	Vacant (used during events)	3,799 (land)	No
Washington State Baseball Stadium	Parking	1,817 (land)	No
King County	Metro bus base	505 (land) 6,841 (air rights)	No
Public Stadium Authority	Parking garage	384 (land) 1,151 (air rights)	No

[a]Numbers subject to change.

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

During construction of the project, WSDOT will implement measures to ensure that traffic flow is maintained and negative effects on land uses are minimized. Recommended mitigation measures to avoid or minimize adverse effects include:

- Preparing and implementing a transportation management plan which will include posting signs showing detour routes during any required road and/or lane closures

- Coordinating with the City of Seattle throughout construction
- Coordinating in advance with property owners and businesses within the study area, including the Port of Seattle, BNSF Railway, Safeco Field, Qwest Field, Qwest Field Event Center, King County Metro, and Washington State Ferries, and providing advance notice of construction activities, any required utility disruptions, and any required detours
- Coordinating construction around or during scheduled events, such as baseball and football games and trade shows, at the stadiums and Qwest Field Event Center to prevent conflicts with event traffic

Operational Mitigation

Because the project will support and be consistent with adopted plans and regulations, no mitigation will be required during project operation.

What indirect effects will the project have on land use?

The project will not produce indirect effects on land use because it will not alter the volumes of traffic moving between the freeway system and the Seattle waterfront, or change the destinations of motorists using the improved roadways, as discussed further in Section 5.9.

Will the project contribute to any cumulative effects on land use?

The right-of-way acquisitions noted in Exhibit 5-19 will convert about 5,415 square feet of land from industrial or commercial use to transportation land use, but other aspects of the project could actually help to reduce the cumulative adverse effect on land use of past and future projects in the study area. Past projects, such as Qwest Field, Qwest Field Event Center, Safeco Field, and the restaurants and other businesses that support these uses have contributed to the growth of non-industrial uses in the study area, making it less conducive to sustained industrial use. By improving freight movement, the project could help to offset this effect, making it more likely that industrial and freight-dependent businesses will remain in the area.

5.7 Historical, Cultural, and Archaeological Resources

No adverse effects on historic resources have been determined, conditional on additional archaeological review. The project will not affect any Section 4(f) resources. During construction, WSDOT will follow an Unanticipated Discovery Plan to protect any historic property encountered.

How and where was information on cultural resources collected?

To evaluate cultural resources potentially affected by the project, the project team defined the area of potential effects, conducted research, and did fieldwork within the area of potential effects. WSDOT also coordinated with Native American tribes that have an interest and stake in the project lands because of historical occupation and traditional resource use.

Area of Potential Effects

For cultural resources, the area of potential effects (APE) is the geographic area where the character or use of historic properties (significant cultural resources) may directly or indirectly be affected because of a project undertaking (36 CFR 800.16). The APE for the project was developed by WSDOT in coordination with affected tribes and the Washington State Historic Preservation Officer (SHPO). The APE includes proposed areas of ground disturbance and subsurface construction as well as construction staging areas. To allow the assessment of potential indirect effects, the APE extends approximately one parcel on either side of the proposed areas of ground disturbance. It includes tax parcels and buildings that might be visually affected or subjected to increased noise or vibration as a result of the project. Exhibit 5-20 shows the cultural resources APE.

What are historic properties?

They are properties listed or eligible for inclusion in the National Register of Historic Places.

What are significant cultural resources?

A cultural resource is significant if it is found to meet criteria for eligibility to local, state and national registers landmarks, and if it possesses integrity of its original historical features and characteristics.

Source: Port of Seattle (2006) and NWAA (2007)

Area of Potential Effects

Project

N

0 250 Feet

Exhibit 5-20
Cultural Resouces APE

In addition to its aboveground area, the APE also has an underground, or vertical, component. The vertical APE includes all sedimentary layers that could contain significant archaeological deposits. On the basis of the geology and cultural history of the study area, the project team concluded that sediments below the historical tide flats surface do not have the potential for significant cultural materials.

To further define the APE, the team sampled deposits from the historical fill layers, particularly the upper surface of each fill layer that may have provided a surface to occupy, and down a few feet into the tide land deposits, where Native American resources or early historic materials may have formed or accumulated. For more information, consult the *Cultural Resources Discipline Report*.

Research

The project team conducted a search of records to determine the locations and types of previously documented historical and pre-contact archaeological sites, ethnographic and ethnohistorical sites, traditional cultural properties, and historic buildings and structures in the study area. Sources for this research included the Washington State Department of Archaeology and Historic Preservation (DAHP), the National Register of Historic Places (NRHP), the Washington Heritage Register, the Historic Preservation Office of the City of Seattle Department of Neighborhoods, and the City Historical Buildings and Landmark inventories. The team also did research to determine the environmental and cultural contexts of the study area. Sources for the context research included the project team's library; the Seattle Public Library; the University of Washington libraries; online photograph, map, and document collections of the Library of Congress; the Museum of History and Industry; the King County Assessor's Office; the City of Seattle Archives; History Link; and GeoMapNW archives at the University of Washington. This extensive search of existing information helped the project team to determine the potential for encountering cultural resource materials during project construction and where, in general, such materials might be located, if they were present at all.

What are traditional cultural properties?

A place eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that are (a) rooted in that community's history, and (b) important in maintaining the cultural identity of the community.

Fieldwork

The project team conducted a visual above-ground inspection of the study area to locate previously documented buildings and assess their condition, and to identify and document additional buildings, structures, or objects in the study area that are over 40 years old. The focus on buildings 40 years old or older meets the 50-year federal NRHP eligibility criteria, and also allows a time buffer for project planning, construction, and completion. Buildings that may fall into the 50-year-old eligibility criteria by the time the project is completed are taken into consideration even though they may not meet the 50-year-old eligibility criteria during early project planning stages. Historic buildings within the APE were recorded in the DAHP Historic Property Inventory database.

The project team also conducted a subsurface investigation of locations inside the project footprint where ground-penetrating activities, such as drilling shafts for structural foundations, are likely to occur. The investigation, part of the identification phase required by Section 106 of the National Historic Preservation Act (NHPA), used coring to determine if archaeological historic properties, such as the wooden remains of nineteenth-century structures, are likely to be encountered during construction. Coring locations are shown on Exhibit 5-21.

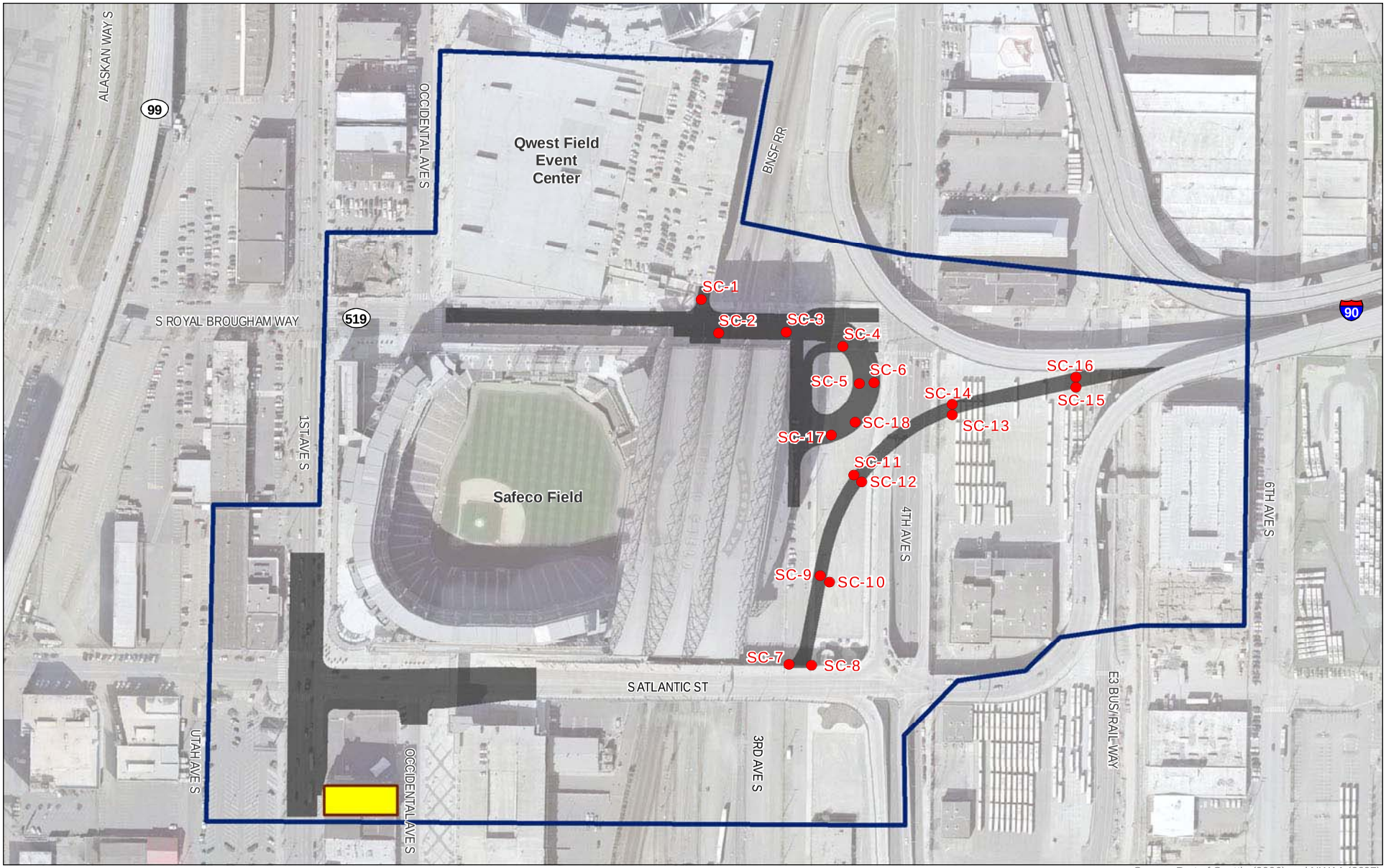
What is Section 106?

Section 106 of the NHPA is a part of the federal legislation that guides, instructs, and provides a way to implement the overall intent of the NHPA by requiring federally funded or permitted projects to undertake cultural resource studies as a part of the project's permitting process.

Tribal Consultation and Coordination

WSDOT initiated tribal consultation for SR 519 Phase 2 in April 2007 with the Suquamish Tribe, the Muckleshoot Indian Tribe, the Tulalip Tribes, the Snoqualmie Tribe, and the Confederated Tribes and Bands of the Yakama Nation. WSDOT is also coordinating with the Duwamish Tribe, a non-federally recognized tribe, concerning the SR 519 Phase 2 project.

The project team contacted all of these tribes to request any information the tribes wanted to share about cultural resource issues of a technical or regulatory nature in the study area. None of the tribes responded regarding cultural resource issues of concern that might be associated with the project.



Source: Port of Seattle (2006) and NWAA (2007)

Core Location

Project

Frederick and Nelson Warehouse

Area of Potential Effects

N

0 250 Feet

Exhibit 5-21

Locations of the Investigational Corings and the NRHP-Eligible Frederick and Nelson Warehouse within the APE

What regulations govern cultural resources in the study area?

Federal Regulations

Several federal laws protect our cultural resources. NEPA states that the federal government must use all practicable means to preserve important historic, cultural, and natural aspects of our heritage.

Section 106

Section 106 of the National Historic Preservation Act requires agencies to take into account project effects on districts, sites, buildings, structures, and objects that are listed in or eligible for inclusion in the National Register of Historic Places. Federal regulations also coordinate the Section 106 and NEPA processes so that both sets of regulations can be followed at the same time. In general, for a cultural resource to be eligible for the NRHP, it must be at least 50 years old, possess integrity of physical characteristics, retain the majority of its integrity (of location, materials, design, workmanship, setting, feeling, and association), and meet at least one of the following four criteria of significance:

A. Associated with events that have made a significant contribution to the broad patterns of our history

B. Associated with the lives of persons significant in history

C. Embodies distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and indistinguishable entity (a district, for example) whose components may lack individual distinction

D. Yielded, or may be likely to yield, information important in prehistory or history

Section 4(f)

Section 4(f) of the Department of Transportation Act of 1966 (49 USC 303) prohibits the FHWA from approving a transportation project that uses land from a significant public park, recreation area, wildlife or waterfowl refuge, or land of a

historic site of national, state, or local significance unless the agency determines that:

1. The project will not have more than a *de minimis* impact on the area; or
2. There is no feasible and prudent alternative; and
3. The project includes all possible planning to minimize harm to the property.

If the impact will not be de minimis and there is a feasible and prudent alternative that avoids using the Section 4(f) property, then the feasible and prudent alternative must be selected.

Measures that minimize the harm to the resource must be identified and incorporated if use of the Section 4(f) resource is unavoidable.

A Section 4(f) evaluation must be prepared if any resources protected by Section 4(f) are used by a project. The Section 4(f) evaluation:

1. Describes the affected properties.
2. Discusses the specific use(s) of the resources.
3. Identifies and evaluates alternatives that avoid use of Section 4(f)-protected lands.
4. Identifies measures to minimize harm resulting from unavoidable effects to Section 4(f) resources.
5. Includes coordination with officials having jurisdiction over or administering the lands that will be affected.
6. Identifies the applicability or non-applicability of Section 4(f) to a property.

Use of Section 4(f) resources occurs when:

1. Land is permanently incorporated into a transportation facility.

2. The use results in temporary or permanent adverse changes that occur during project construction, such as removing mature vegetation or altering contours.
3. The use is indirect and substantially impairs the activities, features, or attributes of the land. An example of indirect use may be excessive noise level increases or diminished aesthetic features.

Short-term temporary occupancy during construction is not always considered a use if certain conditions are met. Those conditions ensure that the land will be restored to a condition comparable or superior to that prior to the project, changes are minimal, and agency agreements are in place for the temporary use.

State Regulations

The State Environmental Policy Act (SEPA), codified in Title 43 of the Revised Code of Washington, Chapter 43.21C (RCW 43.21C) and in the Washington Administrative Code (197-11 WAC), states that places or objects in or next to a project that are listed in or eligible for national, state, or local preservation registers, or sites that are of archaeological, scientific, or cultural importance must be identified. Under these laws, project proponents must propose actions that will reduce or control impacts on such important resources.

The Archaeological Sites and Resources Act (RCW 27.53) prohibits knowingly excavating or disturbing pre-contact and historical archaeological sites on public or private land without a permit from the DAHP. (No permit would be needed for this project unless archaeological deposits are found to exist within the APE.) The Indian Graves and Records Act (RCW 27.44) prohibits knowingly destroying Native American graves and requires that discovered human remains at such graves be re-interred under supervision of the appropriate tribe. In addition, RCW 42.56.300 states that records, maps, or other information about the location of archaeological sites do not have to be, and should not be, disclosed to the general public. By withholding the locations of these cultural resources, the law seeks to avoid looting or depredation of such sites.

What are pre-contact archaeological sites?

Pre-contact refers to Native American culture prior to the influences or presence of European exploration and settlement in the region.

Local Regulations

The City of Seattle's Historic Landmark Preservation Ordinance (Seattle Municipal Code [SMC] 25.12) protects properties of historic and architectural significance that are more than 25 years old; have significant character, interest, or value as part of the development, heritage, or cultural characteristics of the city, state, or nation; and have integrity or the ability to convey their significance. Such resources also must meet at least one of six criteria (SMC 25.12.350):

What are Seattle's Landmark Criteria?

Property over 25 years old that meets at least one of 6 criteria which are similar in nature to NRHP eligibility criteria but reflect local Seattle cultural values as well as state and national cultural values.

A. It is the location of or is associated with important local, state, or national historic events.

B. It is associated with the life of an important local, state, or national historical figure.

C. It is associated with a significant aspect of local, state, or national cultural, political, or economic heritage.

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

E. It is an outstanding work of a designer or builder.

F. It is prominently located, sited, scaled, or aged, or is an easy visually identifiable feature of its neighborhood or city that also contributes to the quality or identity of the neighborhood or the city.

The City of Seattle meets its responsibilities under SEPA and its Historic Landmark Preservation Ordinance by requiring that properties which are likely to meet City landmark criteria must be formally reviewed before they are torn down. The review decisions are made by the Seattle Landmarks Preservation Board.

Southwest corner of Frederick and Nelson Warehouse

What cultural resources are in the study area?

Historical Built Environment Resources

The project team identified three historic buildings in the APE: the International Harvester Motor Truck Branch, the United States Steel Building, and the Frederick and Nelson

Warehouse. The first two buildings were not found to be historic properties because they do not meet NRHP eligibility criteria and lack integrity of their historic architectural qualities. The Frederick and Nelson Warehouse at 1518 First Avenue South is the only building in the APE that has been determined to be a historic property and eligible for listing in the NRHP.

The Frederick and Nelson Warehouse was determined to be eligible for inclusion in the NRHP because of its association with the important local historical themes of railroading, tideland development, and commercial expansion. The property is most likely eligible as a City Landmark for similar reasons, although a formal determination has not yet been made.

The Frederick and Nelson Warehouse is located on the east side of First Avenue South just south of Safeco Field (see Exhibit 5-21). At six stories high, this 1907 brick veneer commercial block stands out among the buildings along this block. The west-facing façade is three bays wide with windows delineated by wall arches. The building is crowned by an ornate metal cornice with dentil course above the sixth story.

A **cornice** is a decorative architectural molding that crowns the top of a building and projects slightly outward.

A **dentil course** is a decorative architectural molding consisting of a row or rows of small, square, tooth-like blocks.

Historically, the building functioned as a warehouse for the Western Electric Company, Sears, Roebuck and Company, the Taylor-Edwards Warehouse and Transfer Company, and then as a warehouse for the Frederick and Nelson Department Store during the mid-twentieth century.

The project team also studied the Pioneer Square Preservation District (PSPD), located largely to the north of the proposed project site. The PSPD partially overlaps the APE, but there are no significant or contributing cultural resources in the section of the PSPD that overlaps the APE. The only overlapping building in the PSPD is the recently constructed Silver Cloud Inn. The effects of the project on the PSPD were considered under both Section 4(f) and Section 106, as discussed later in this section.

Archaeological Resources

Historical

The project team's research did not find any known historical archaeological sites in the APE. Historical archaeological resources are materials from historical times that could be buried and preserved. In the SR 519 Phase 2 APE, such materials could include evidence of railroad activity such as rails or trestle timbers, remnants of railroad buildings, and railroad-related artifacts such as spikes, nails, ties, glass, brick, and coal. Evidence of tideland filling might also be present.

Such evidence would include historical lumber waste and historical trash deposits. Evidence of early Seattle industry, shipping, and commerce might include such items as building materials, waste from factories and metal-works, glass, ceramics, machinery parts, and automobile parts. Such artifacts, if present, would most likely be located between ground/street surface level and a depth of about 20 feet.

A historical map from 1899 indicates that the project APE is located in an area of historic shipping yards (Exhibit 5-22). Based on such historical documents, subsurface historical archaeological resources in the APE might include evidence of the historical ship-building industry: docks, wharves, piers, pilings, debris used in tideland filling (e.g., stratified dredge

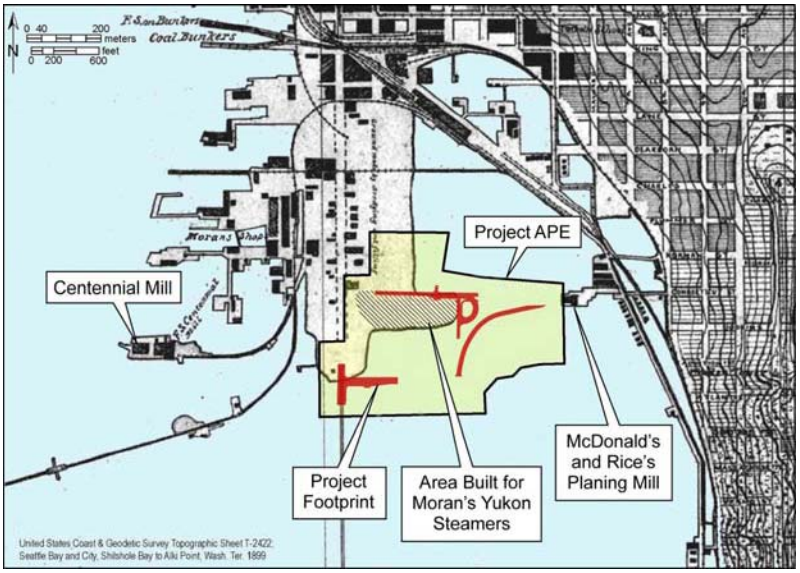


Exhibit 5-22. U.S. Coast and Geodetic Survey Topographic Map of the APE from 1899 Showing Tideland Fill and Historic Industries

spoils and historic refuse), remains of historical industrial buildings, and perhaps advertising signs.

Archaeological materials in the APE could also include evidence of the historical lumber industry; in the 1890s, the Centennial Mill was located near the present APE. Exhibit 5-23 shows the study area as it appeared in 1898, with the ship building area (Moran's Klondike Steamers) near what is today First Avenue South, and the Centennial Mill nearby.

Pre-Contact

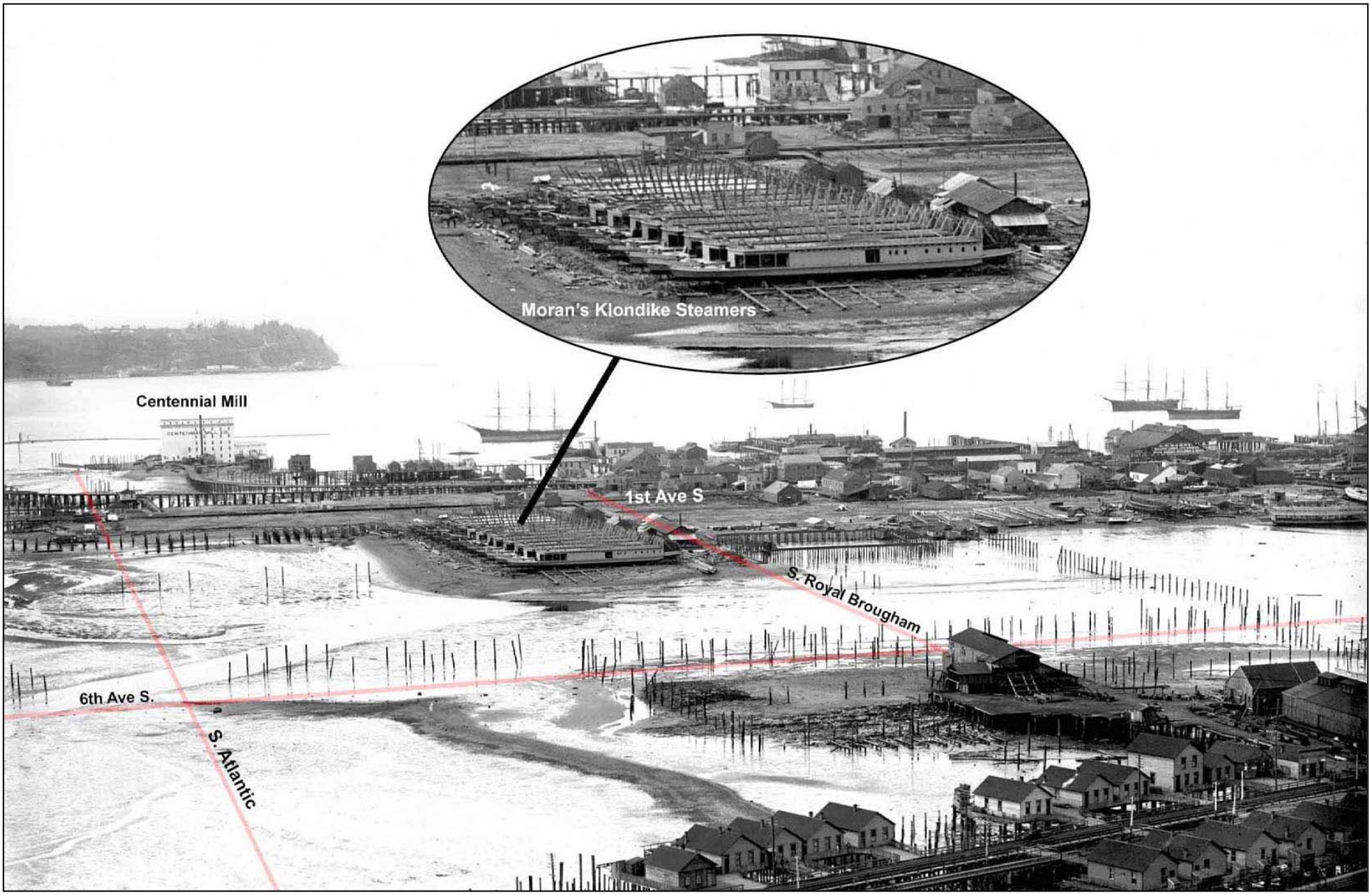
There are no known pre-contact archaeological sites in the APE. Buried pre-contact archaeological materials in the APE would most likely be related to fishing and resource-gathering activities.

Such archaeological materials might include remnants of fish weirs (wooden stakes, rock alignments, fibrous matting) and artifacts or features such as shell concentrations, basketry, or other items related to shellfish processing and tideland resource gathering. If present, such resources would be below the tideland infilling sediments.

Ethnographic Resources and Traditional Cultural Properties

Recent cultural resource studies in and near the APE have explored the ethnographic, ethnohistorical, and historical occupation and use of the tidelands and surrounding area by Native American peoples. No traditional cultural properties have been identified in or adjacent to the SR 519 Phase 2 APE.

The *Cultural Resources Discipline Report* prepared for this EA provides more detailed information on recent studies of historic properties near the site of the project, and on the early history of the project vicinity.



Source: Photo by Anders Wilse archived in the MOHAI photo collection, SHS835.

Exhibit 5-23
Photograph from 1898 Showing Moran's Ship-Building Yard and the Centennial Mill on Tideland Fill in the Study Area

What were the methods used to evaluate the project's effects on historical, cultural, and archaeological resources?

To evaluate potential effects on cultural resources, the project team defined the area of potential effects (APE); collected information on potential historical, cultural, and archaeological resources in the APE; conducted a field reconnaissance survey (a survey of existing or potential historic properties); conducted subsurface investigations; and identified potential effects of the project and No Build Alternative on those resources.

WSDOT also contacted the Duwamish Tribe, Suquamish Tribe, Muckleshoot Indian Tribe, Tulalip Tribes, Snoqualmie Tribe, and the Confederated Tribes and Bands of the Yakama Nation by letter to notify them of the project and request advice on cultural issues.

Under the National Historic Preservation Act, historic properties are subject to additional determination of effects and the design of special mitigation measures. The Criteria of Adverse Effect (36 CFR 800.5) were used to determine whether the project would affect a historic property. The project would have an adverse effect if it changed the characteristics that qualify a historic property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of that property. If a project adversely affects a historic property, then it could significantly affect the quality of the human environment as defined by NEPA, unless the effects can be reduced below the level of significance through mitigation measures. These potential adverse effects include:

- Physical destruction of an entire historic property
- Damage or alteration of a portion of a historic property, or removal of a portion of the property
- Introduction of audible, visible, or atmospheric elements that are out of character with the historic property or alter its setting

The **National Historic Preservation Act** is Federal legislation passed in 1966 and amended most recently in 1992 that is intended to protect and preserve our nation's important cultural heritage for the future by means of stewardship, funding, guidance, and partnership with agencies, tribes, and private parties.

Historic properties are cultural resources that are on or eligible for listing on the National Register of Historic Places. There are several types of historic properties, including prehistoric, ethno-historic, and historic archaeological resources (below-ground), historic resources (above-ground), and traditional cultural properties.

What would historical, cultural, and archaeological resources be like without the project?

Under the No Build Alternative, there would be no known potential for harm or other effects on any type of cultural resource.

What direct effects will construction of the project have on historical, cultural, and archaeological resources?

One NRHP eligible property, the Frederick and Nelson Warehouse, is located in the APE. The City of Seattle Pioneer Square Preservation District (PSPD) partially overlaps the APE. Project construction will not destroy, damage, alter, or cause noise and vibrations severe enough to affect the Frederick and Nelson Warehouse or the PSPD. Project-related construction work near the Frederick and Nelson Warehouse will be limited to roadway surface improvements.

Frederick and Nelson Warehouse

Historical and pre-contact period archaeological resources, if they exist and cannot be avoided, might be directly harmed by construction activities involving support column shafts, foundations, signal standards, soil stabilization, and stormwater facilities. Only support column shaft construction and soil stabilization activities will extend below historical fill and into native sediments. These actions will occur only along the alignment of the I-90 to South Atlantic Street off-ramp and the South Royal Brougham Way railroad overpass.

What direct effects will operation of the project have on historical, cultural, and archaeological resources?

The project team identified no direct effects of operating the project on cultural resources.

What Section 4(f) resources might be affected by the project?

Although the PSPD overlaps the APE, the portion of the PSPD in the APE does not contain significant cultural resources. The project will not affect any Section 4(f) resources and will not result in direct, proximity, or construction effects on any historical, cultural, and archaeological resources. Although the Frederick and Nelson Warehouse is a Section 4(f) resource, the

project will not use or otherwise affect it. The project does not result in the acquisition of any Section 4(f) lands, will not impose any adverse temporary occupancy, and will create no constructive use effects.

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

Construction could result in direct physical damage to, or loss of, currently undetected archaeological sites. Sites discovered during construction will be considered NRHP eligible under Section 106 unless research and documentation prove otherwise, and any such discoveries would need to be documented and addressed through scientific data recovery or other suitable measures determined in consultation with SHPO and the affected tribes.

Section 106 of the National Historic Preservation Act is a part of the federal legislation that guides, instructs, and provides a way to implement the overall intent of the NHPA by requiring federally funded or permitted projects to undertake cultural resource studies as a part of the project's permitting process.

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into account the effects of their undertakings on historic properties, including archaeological sites. WSDOT and FHWA will comply with the Section 106 process by first identifying historic properties that could be affected by the project, then assessing adverse effects that the project could have on those properties.

In 2007, the project team conducted a subsurface investigation of locations inside the project footprint where ground-penetrating activities, such as drilling shafts for structural foundations, are likely to occur. The study was part of the identification phase required by Section 106 of the National Historic Preservation Act. It used coring procedures to determine whether archaeological historical properties, such as the wooden remains of nineteenth-century structures, are likely to be encountered during construction. The results of the subsurface testing indicate that no significant cultural resources are likely to be encountered during project construction.

WSDOT determined that the project will have no adverse effects on historic properties, based on the following conditions:

- Additional archaeological review will be completed during drilling of two shafts.
- Additional archaeological review will be completed during construction of the First Avenue South and South Atlantic Street improvements.
- An Unanticipated Discovery Plan will be followed during construction.

Operational Mitigation

No operational mitigation will be necessary.

What indirect effects will the project have on historical, cultural, and archaeological resources?

The project will have no indirect effects on historical, cultural, or archaeological resources.

Will the project contribute to any cumulative effects on historical, cultural, and archaeological resources?

The project will not contribute to cumulative effects on the historic built environment of the study area.

5.8 Social and Economic Elements

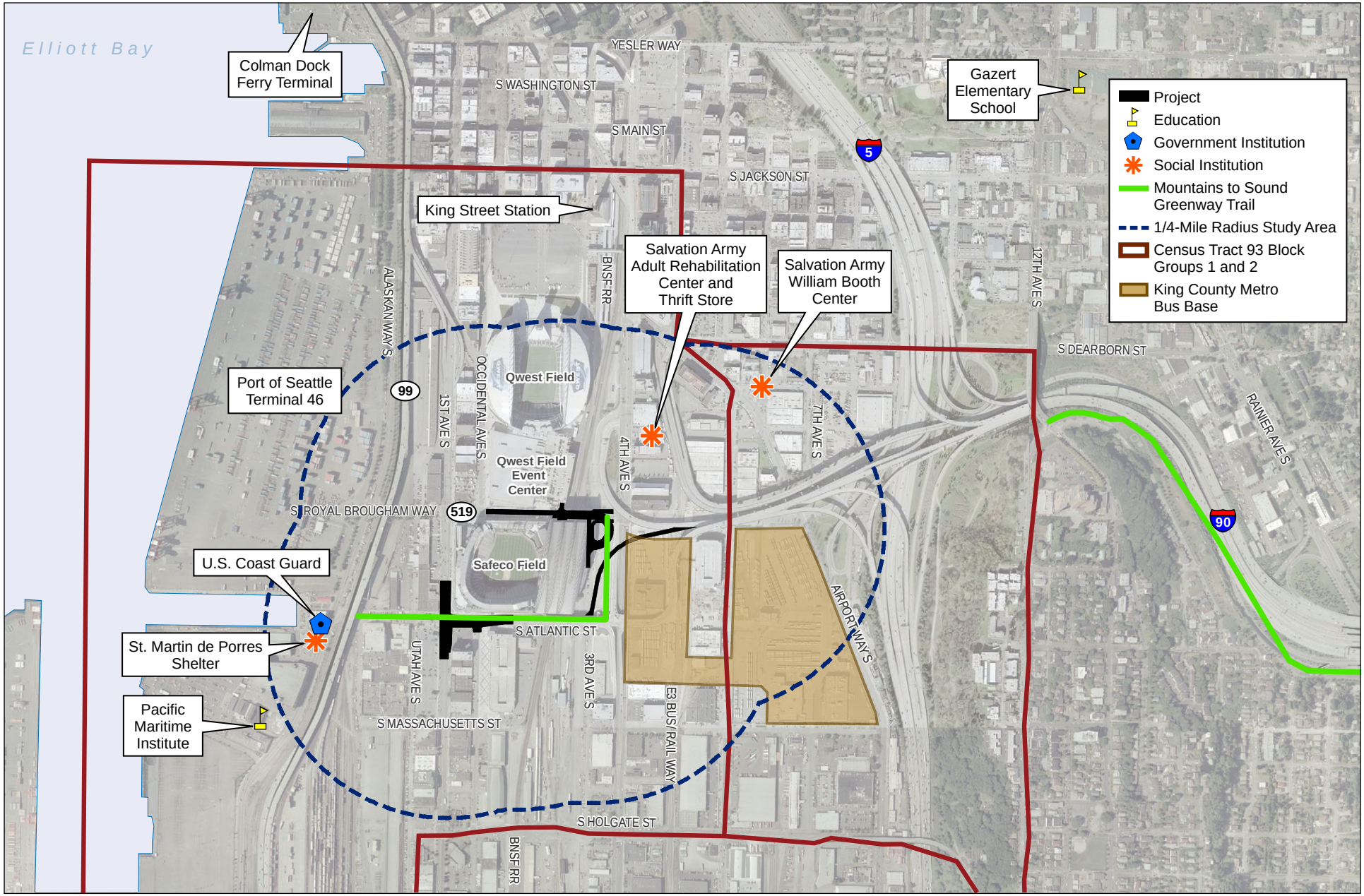
The South Royal Brougham Way railroad overpass will improve neighborhood connectivity and safety by providing bicycle lanes and a pedestrian walkway. The project will not displace any businesses or residents, and it will not have disproportionately high or adverse effects on minority and/or low-income people. The project will benefit the economy by reducing traffic congestion and improving freight transport and commuter travel times from the I-5/I-90 freeway system to the Seattle waterfront and other South Downtown (SODO) destinations. During construction, the project will provide short-term economic benefits through increased employment. Temporary lane closures and detours could affect sales at businesses in the immediate project vicinity. Construction-related delays will increase travel times for local freight deliveries and pickups.

Why does this report consider social and economic factors?

NEPA requires evaluation of the effects that proposed projects are likely to have on people, their communities, and their economic well-being. Social and economic effects are also considered in this EA to determine if the project would meet the provisions of Executive Order 12898, which is intended to protect minority and low-income populations, and Title VI of the Civil Rights Act, which provides legal protection against discrimination by race, color, national origins, or gender.

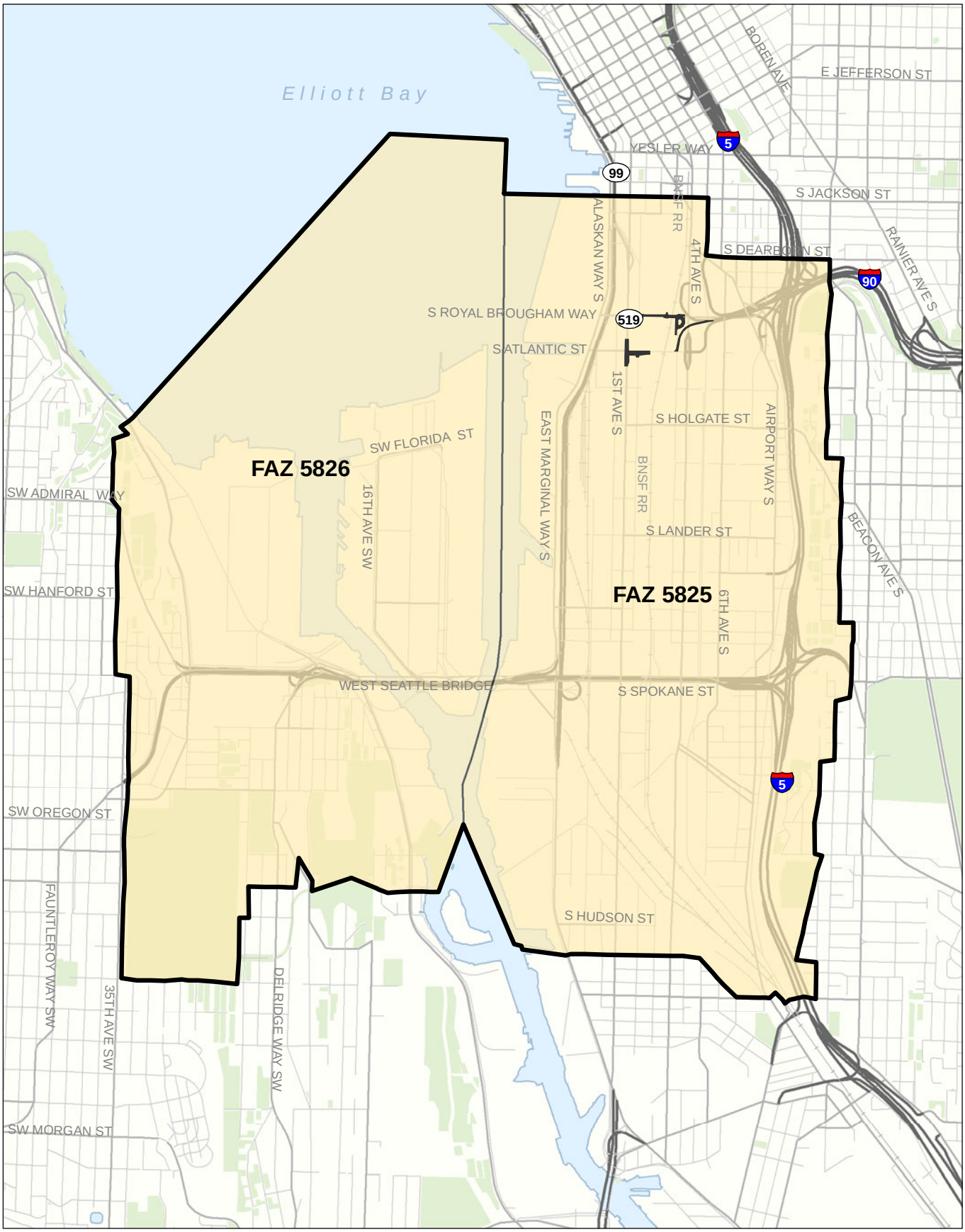
How was the information collected?

The project team collected social and economic data, reviewed planning documents and reports relevant to social and economic conditions in the study area, and conducted a site visit. The project team defined two separate study areas, one for social characteristics (Exhibit 5-24) and one for economic factors (Exhibit 5-25). The team defined the study area for



Source: City of Seattle (2007) and King County (2006)

Exhibit 5-24
Social Elements



Source: Puget Sound Regional Council (2006) and City of Seattle (2007)

PSRC Forecast Analysis Zone (FAZ)

Economic Study Area

Project

Park

N

0 0.5 Mile

Exhibit 5-25
Economic Study Area

social characteristics as a quarter-mile radius around the project limits, which was appropriate to determine minority and low-income residents and the social resources that could be affected by the project. Puget Sound Regional Council (PSRC) forecast analysis zones (FAZs), which are an aggregation of several census tracts (including population and employment forecasts), were used as the study area for economic factors.

What are the characteristics of the social study area?

The study area is a mixture of industrial and commercial land uses, including large-area land uses such as Safeco Field, Qwest Field, and the Port of Seattle terminals (Exhibit 5-24). There are large numbers of employees but few residents, and therefore few amenities that typically support a residential neighborhood.

The major transportation corridors (Interstates 5 and 90, State Routes 519 and 99, and the BNSF Railway) are essential links providing access and linkages to the Port of Seattle terminals, industrial facilities and warehouses in the Greater Duwamish Manufacturing and Industrial Center, the Washington State Ferries terminal at Colman Dock, the stadiums and event center, the central waterfront, and SODO businesses. Although they enable the movement of freight and people into and out of the study area, they also act as barriers to interaction among people who reside in or travel to the area. This barrier effect, along with the industrial character of the area, results in the neighborhood having relatively low community cohesion.

Based on U.S. Census data, the study area contains a smaller percentage of white population compared to Seattle and King County, and African-Americans account for 17 percent of the population in the study area—double the percentage for Seattle and over three times larger than that for King County. The project team also reviewed recent enrollment data from the Seattle School District because the most recent U.S. Census data are more than 7 years old and population characteristics may have changed. Based on school year 2004-2005 information, of the 757 students who attended schools with reference areas in the study area, approximately 95 percent were minority and approximately 75 percent participated in

What is a reference area?

Reference areas are the geographic area surrounding an elementary school used by Seattle Public Schools to identify the school which elementary school students would attend based on their home address.

free/reduced-price lunch programs, which indicates low-income households. Population characteristics of the study area, Seattle, and King County are summarized in Exhibit 5-26. The *Social and Economic Elements Technical Memorandum* supporting this EA provides more information on the population characteristics of the study area.

Exhibit 5-26. Population Characteristics in the Study Area

	Study Area	Seattle	King County
Population[a]	1,590	563,374	1,737,034
Median Age	43.6	35.4	35.7
People over 65 Years of Age	137 (8.6%)	67,807 (12.0%)	181,772 (10.5%)
Owner-Occupied Housing	37.5%	48.4%	59.8%
Renter-Occupied Housing	62.5%	51.6%	40.2%
Median Household Income	$53,854	$45,736	$53,157
Households at or below Poverty Level	69 (13.9%)	27,693 (10.7%)	55,739 (7.8%)
Individuals at or below Poverty Level	567 (37.2%)	64,068 (11.8%)	142,564 (8.4%)
Average Household Size	1.67	2.08	2.39
Households with No Vehicle	99 (18%)	42,180 (16.3%)	66,244 (9.3%)
Persons with Disability (population 5 years and over)	505 (34.2%)	90,999 (16.2%)	462,393 (26.6%)
Limited-English-Proficient Population	38 (2.2%)	108,433 (20.2%)	299,620 (18.4%)

Source: U.S. Bureau of the Census, 2005.
[a]Population data do not include the transient population that resides in the study area.

What social resources are located in the study area?

Only a few social resources are located in the study area, as is consistent with its industrial and commercial land use patterns and zoning (see Exhibit 5-24). There are no religious institutions, cemeteries, medical services facilities, or public schools located in the study area. Locations of social resources in the study area are illustrated on Exhibit 5-24 and include the following:

- Pacific Maritime Institute, a vocational school providing training programs geared toward the maritime industry
- St. Martin de Porres Shelter, a shelter for men over the age of 50

- The Salvation Army Adult Rehabilitation Center and Thrift Store, which includes a public thrift store, drop-off location for donated goods, clean and sober housing, and vocational training
- The William Booth Center, also operated by the Salvation Army, which offers clean and sober housing, job search assistance and counseling, and medical respite for homeless men
- The United States Coast Guard facility, a component of the U.S. Department of Homeland Security

Closest to the project site is the Salvation Army Adult Rehabilitation Center and Thrift Store, located on the east side of Fourth Avenue South directly opposite the end of the existing I-90 off-ramp. This facility consists of a warehouse, retail store, and residential housing for on-site workers.

Both Safeco Field, owned and operated by the Public Facilities District, and Qwest Field and Qwest Field Event Center, owned and operated by the Public Stadium Authority, are not public recreation facilities because they operate privately and a paid admission is required to attend most of the events.

What pedestrian, bicyclist, and transit facilities are in the study area?

A number of pedestrian, bicyclist, and transit facilities are located within the social study area, as shown on Exhibit 5-24.

Pedestrian and Bicyclist Facilities

Within the study area, sidewalks are adjacent to most city streets and only the northbound side of East Marginal Way South has a dedicated bicycle lane. A portion of the Mountains to Sound Greenway, a trail stretching over 100 miles from central Washington to the Seattle waterfront, is in the study area and follows the sidewalk on the north side of South Atlantic Street and a ramp way adjacent to Fourth Avenue South (see Exhibit 5-24). The parts of the Mountains to Sound Greenway within Seattle are designed as a bicycle transportation network and pedestrian pathway by the City of Seattle. Other non-motorized facilities in the study area include

the Waterfront Bicycle/Pedestrian facility and the multi-use trail adjacent to the E-3 Bus/Rail Way.

Transit

King County Metro Transit and Sound Transit provide bus service to the study area. Additional transit facilities in or near the study area include King Street Station (a multimodal transit hub), south access to the Downtown Seattle Transit Tunnel, the SODO Busway, HOV direct-access ramps to the I-90 center roadway, King County Metro Transit's Ryerson Base, the Sound Transit Sounder and Amtrak Cascade rail lines, and the Washington State Ferries terminal at Colman Dock, which is a key destination for westbound commuters through the study area. The Sound Transit Central Link light rail line and Stadium Station, east of the project, are currently under construction and are scheduled to start operating in 2009. For additional information regarding the pedestrian, bicyclist, and transit facilities in the study area, please refer to Section 5.9, Transportation.

Container Trucks at Pier 46
Photo Courtesy of Port of Seattle

What are the general economic characteristics in the study area?

The economy of the study area is influenced by activities in the SODO Business District and the Greater Duwamish Manufacturing and Industrial Center, the region's largest industrial and manufacturing district.

The industrial sector, which encompasses a wide range of manufacturing, maritime, and related industries, provides jobs that pay 21 percent higher than the city's average wage (City of Seattle, 2004). This sector has contributed to lowering the City's unemployment rate from a decade high of 6.7 percent in 2003 to 4.5 percent in 2006 (U.S Bureau of Labor Statistics, 2006).

The Seattle waterfront is a critical component of the state, regional, and national economy. Businesses directly involved in trade or providing supporting services to trade are located throughout the study area. EnterpriseSeattle reports that one in three jobs in the local economy is related to international trade (enterpriseSeattle, 2007). The Port of Seattle operates world-class container and cruise ship facilities and BNSF Railway

operates the Seattle International Gateway container-loading facility. Over 2 million containers cross the Port's facilities per year and nearly 20 million metric tons of imports and exports crossed the docks in 2005 (enterpriseSeattle, 2007).

The SODO district is also home to Starbucks Corporation, Costco's Seattle warehouse, UPS, Tully's Coffee Corporation, and Todd Shipyards. Safeco Field, Qwest Field, and Qwest Field Event Center, where thousands of people gather to enjoy sporting events, entertainment, trade shows, and conferences, are located in the heart of the study area.

PSRC estimates that the total number of jobs in the economic study area will increase by nearly one-third from 49,320 in 2000 to 63,949 in 2030. The sector with the largest share of total employees is wholesale trade, transportation services, communication, and utilities (WTCU).

The WTCU sector is dominated by activities at the Port of Seattle and other businesses that support international trade. This sector accounted for approximately 32.9 percent of all jobs in the study area in 2000, compared to 14.6 percent in King County and 12.6 percent in all of Seattle. By 2030, the WTCU sector is expected to account for approximately 29.4 percent of jobs in the study area. The projected decrease in the WTCU job share represents an anticipated shift in employment to the finance, insurance, real estate, and services sector.

All of the businesses and organizations in the study area rely on an efficient transportation network to move freight and people to and from the region. The transportation system, therefore, is crucial to the study area's economic sustainability.

How were the effects of the project on social and economic factors analyzed?

Methods used for the analysis of the social and economic effects of the project and of the No Build Alternative included a site visit; review of planning documents; review and analysis of data from various agencies; and review and analysis of related discipline reports and technical memorandums prepared for this project.

What would social and economic elements be like without the project?

Social Elements

Under the No Build Alternative, the unsafe conditions for pedestrians and bicyclists associated with traffic conflicts and congestion at the street-level crossing of the BNSF Railway tracks at South Royal Brougham Way would continue and could result in an increase in the number of accidents. The No Build Alternative would not result in any other negative effects on social elements.

Economic Elements

Under the No Build Alternative, continuing and growing traffic congestion would increase the travel time required to move freight to and from the Port of Seattle terminals and surrounding industrial and commercial district. For example, Terminal 46 is dependent on truck access, and its use could be affected by traffic congestion. The extent to which this congestion could adversely affect overall economic growth is uncertain. There is a point at which congestion can influence companies and workers to locate elsewhere. However, Seattle's recent and positive economic history suggests it is unlikely that regional levels of employment and income would change substantially on the basis of traffic congestion alone.

What direct effects will construction of the project have on social and economic factors?

Social Elements

Construction of the project is expected to be completed in approximately 3 years (2009 to 2012) and will be completed in three components (see Chapter 4) so that no single location will be under construction for the entire construction period. Typical construction effects include increases in noise and dust levels, negative visual quality effects, and changes to or disruption of access. These effects can negatively affect the local residents and businesses within the construction zone as well as other users of nearby social and recreational resources. Project effects are expected to be minimal since most of the social resources are located far enough away from the project to be unaffected. For those resources closer to the construction

zone, design and mitigation measures would be implemented to minimize any effects.

Construction activities will limit access along South Royal Brougham Way for pedestrians and bicyclists and could require the relocation of transit stops along First Avenue South. WSDOT will prepare a construction management plan with provisions to minimize effects on local roadways and will specify that sidewalks be maintained unless construction activities make this an unsafe option.

Construction will not result in any relocations of residents or businesses. No construction-related effects are anticipated on regional and community growth, social resources, recreational resources, or environmental justice populations. Refer to Section 5.10 for a discussion of construction effects on public services and utilities.

Economic Elements

Congestion and construction activities could affect sales at businesses in the project vicinity. However, because most of the businesses in the study area do not rely on impulse purchases, the effect is not expected to be substantial. Congestion could also increase travel times for freight into and out of the study area.

A potential benefit during construction is the short-term increase in employment and spending that will be necessary to support the construction program.

What direct effects will operation of the project have on social and economic factors?

The project will result in primarily beneficial long-term effects on social and economic elements.

Social Elements

The project will reduce congestion and improve safety by removing conflicts between rail traffic and vehicles, pedestrians, and bicyclists, thereby improving the quality of life and community cohesion for local residents. The closure of the left-hand turn lane from the Fourth Avenue South on-ramp to South Atlantic Street is not expected to result in any negative

effects because of the other connectors available in the study area. The Mountains to Sound Greenway will maintain its connections; however, a new crosswalk located where the proposed I-90 off-ramp connects to South Atlantic Street could cause minor delays to users. The Mountains to Sound Greenway is designated as a bicycle transportation network and pedestrian pathway by the City of Seattle.

Positive effects of the new South Royal Brougham railroad overpass for pedestrians and bicyclists will include unimpeded access and the removal of existing conflicts with the BNSF Railway. The overpass will be designed to comply with the Americans with Disabilities Act, will include bicycle lanes in both directions, will improve access to the stadiums, and will provide better connections to the surrounding transit options.

Economic Elements

The project will result in improved freight mobility, which could reduce operating costs for commercial freight haulers as travel times between the freeway system and the Seattle waterfront are reduced. The project will not have long-term economic effects on any local business or reduce property tax revenues for the City of Seattle.

Will the project result in any disproportionate adverse effects on environmental justice populations?

Environmental justice refers to the process of identifying and addressing, as appropriate, disproportionately high and adverse human health and/or environmental effects on minority and/or low-income populations.

The project team reviewed the discipline reports and technical memorandums prepared for this EA and concluded that the project will not result in any disproportionate adverse effects on minority and low-income populations. The project will benefit all populations by improving safety and providing unimpeded and ADA-compliant access across the BNSF Railway tracks. The unimpeded access will also improve transit connections, and this will be especially beneficial to people with low incomes, who tend to use public transit more than people in higher income groups. The results of the demographic analysis, the feedback on the project received from the public involvement program, and the discipline reports and technical memorandums prepared for this EA all indicate that no minority or low-income population will be disproportionately adversely affected by the project as

determined above. Therefore, the project has met the provisions of Executive Order 12898, as supported by Title VI of the Civil Rights Act.

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

The project includes a number of measures to avoid or minimize the negative effects of construction on the surrounding area. The following mitigation measures could be used:

- Develop agreements with interested parties that identify specific measures to ensure that social services and activities provided in the study area are protected during construction. These agreements will cover how measures are implemented and when work will occur. Such agreements could be developed with the following: City of Seattle, Sound Transit, King County Metro, Port of Seattle, BNSF Railway, Amtrak, Public Stadium Authority, Public Facilities District, and Baseball Club of Seattle.
- Continue the public involvement program, using the project website, e-mail communications, neighborhood meetings, fact sheets, or newsletters, as appropriate, to communicate information about the project and to allow residents and businesses to identify concerns regarding project construction. Fact sheets or newsletters will be prepared in appropriate languages, if needed.
- When temporary road closures are required, minimize the amount of time the road is closed and ensure that detour routes have proper signage.
- Require that construction equipment be new or be kept in good mechanical condition, and that engines be equipped with appropriate noise buffering devices to lower noise generation.
- If construction is required during stadium or event center functions, coordinate with those facilities and the Seattle

Police Department to develop the appropriate mitigation measures.

- If alternative routes or transit stops are required, clearly identify and mark them, provide additional signage indicating location, and ensure that they are accessible to people with disabilities.

Additional mitigation measures related to social and economic factors are identified in the Sections 5.2, 5.4, 5.9, 5.10, and 5.11.

Operational Mitigation

The project will result in beneficial effects on all populations, and therefore no mitigation measures are proposed for any of the social elements of the study area during operation. For economic factors, the following mitigation measure could be implemented: to avoid adverse access effects, work with business owners to reconfigure or provide alternative access, if required.

What indirect effects will the project have on social and economic elements?

During construction, no indirect effects are anticipated on social elements of the study area, including environmental justice populations. With respect to the economic elements, construction spending will result in indirect and induced employment and income in the regional economy and the local area.

The operation of the project will have no long-term adverse indirect effects. The addition of the new pedestrian overpass and the bicycle-only lanes could encourage non-motorized means of transportation because of improved connectivity and better access to transit options.

Will the project contribute to any cumulative effects on social and economic elements?

Construction activities from this and other projects, such as the Alaskan Way Viaduct and Seawall Replacement Project from South Holgate Street to South King Street, could increase congestion in the study area, reduce freight mobility, impede access to businesses, and require pedestrians and bicyclists to use other routes due to sidewalk closures or detours. Additional

noise, light, and glare associated with construction equipment and activities could also temporarily affect any residents, businesses, or users of the Mountains to Sound Greenway. However, with mitigation measures implemented and given the relatively short time period for construction as well as construction not occurring in any one location for the entire construction duration, cumulative effects are anticipated to be minimal.

Over the long term, the project will make a beneficial contribution to social elements, including environmental justice populations, and to economic factors due to improvements in freight mobility and connectivity and the increase in safety in the study area.

5.9 Transportation

The project will allow westbound freight to move faster and more directly; reduce conflicts and improve safety between rail and other modes of travel on South Royal Brougham Way; provide a more direct route for traffic from the I-5/I-90 freeway system to Seattle's central waterfront area and terminals; and improve access from I-5 and I-90 to Safeco Field and Qwest Field. It will reduce on-street parking by about 50 spaces and will remove several bus parking spaces in the Ryerson Bus Base. During construction, from 2009 to 2012, traffic congestion will increase locally.

What is the transportation study area?

The study area for the transportation analysis is bounded by the South Spokane Street Viaduct to the south, South Jackson Street to the north, the Seattle waterfront to the west, and the west end of the I-90 Mount Baker Tunnel to the east. The project team collected morning and afternoon peak-hour traffic volumes throughout the study area, including I-90 westbound, South Atlantic Street, South Royal Brougham Way, South Holgate Street, South Lander Street, First Avenue South, and Fourth Avenue South. Additionally, detailed origin-destination data were collected. Details about the traffic data and how they were collected are available in the *Transportation Discipline Report* prepared for this EA. Exhibit 5-27 shows the transportation study area boundary. In-depth traffic analysis results are reported in the *Transportation Discipline Report*. The intersections most affected by the project are within the blue box on Exhibit 5-27.

Regional traffic is traffic on longer-distance trips with destinations outside the study area.

Local traffic is traffic on shorter-distance trips with origins and/or destinations within the study area.

What are the transportation facilities and uses in the study area now?

The study area includes:

- Important regional transportation facilities, including rail lines serving freight and passengers and SR 519 serving freight trucks and linking the area and downtown Seattle to the Interstate System (I-5 and I-90)

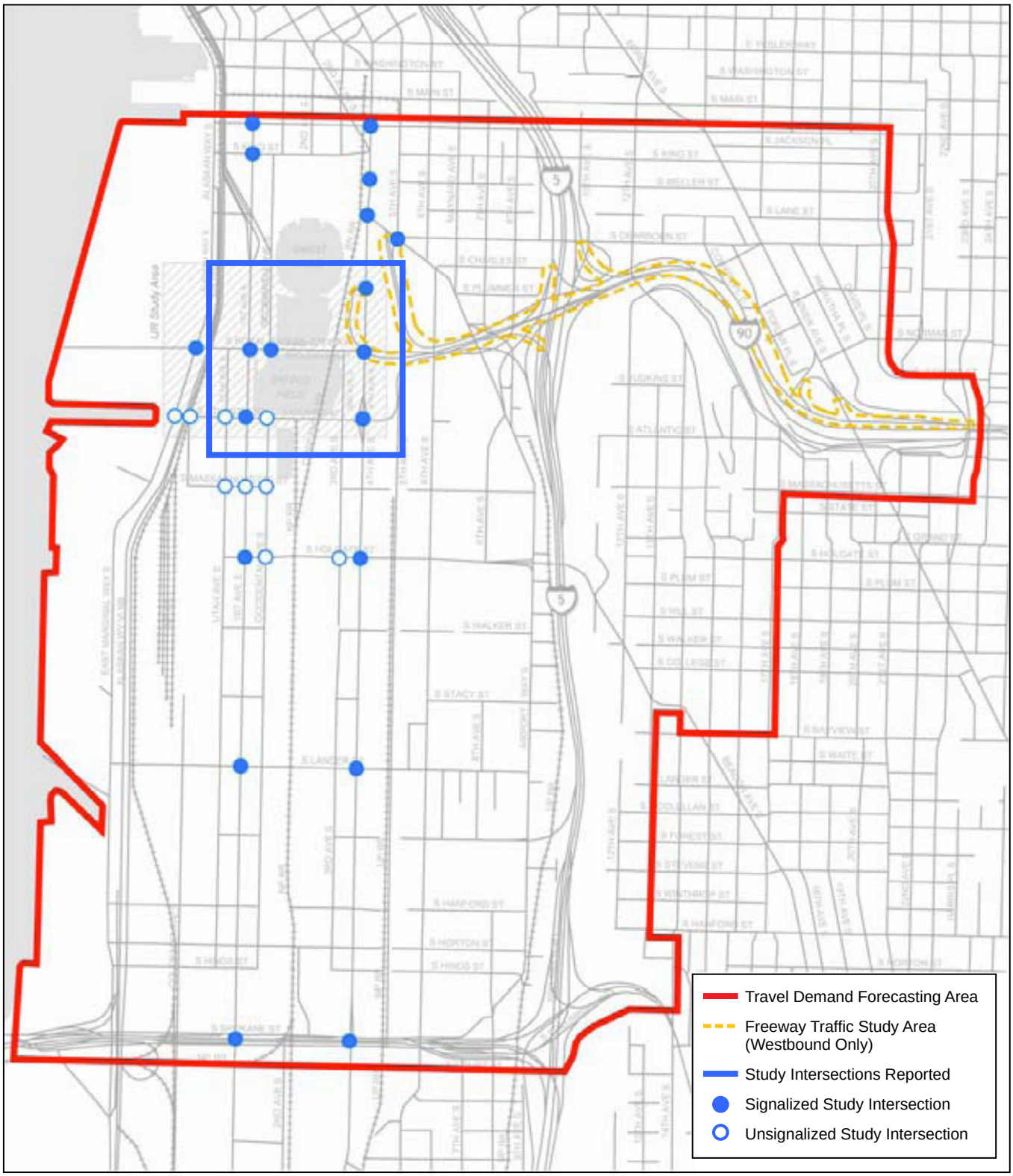


Exhibit 5-27
Transportation Study Area

- Key transit facilities, including the Ryerson Bus Base, south access to the Downtown Seattle Transit Tunnel, the SODO Busway, HOV direct-access ramps to the I-90 center roadway, and the new Central Link light rail Stadium Station opening in 2009
- Regional destinations, including the Port of Seattle cargo terminals, two major sports stadiums, and an event center

Changing land uses, including an increase in high density residential use, future access to light rail, future linkage to the Mountains to Sound Greenway, and increasing use of the stadiums and event center, are emphasizing the needs for regional and local pedestrian and bicycle facilities.

The mix of transportation uses in the study area creates conflicts between regional and local transportation users. Freight is just one component of travel using this area. As shown in Exhibit 5-28, over 40 percent of the regional peak-hour travel (coming from the interstate system) crosses the BNSF tracks destined toward the waterfront.

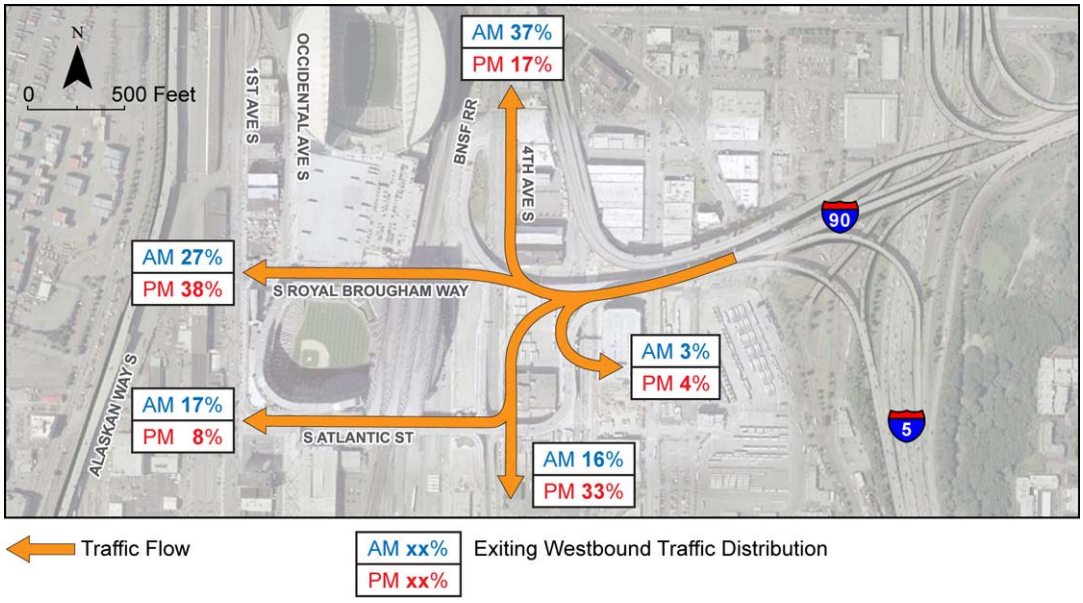


Exhibit 5-28. Portion of Regional Interstate Peak-Hour Traffic to Destinations in the Study Area

Conflicts occur between rail, pedestrians, bicycles, trucks, and autos. There are five crossings of the BNSF mainline between

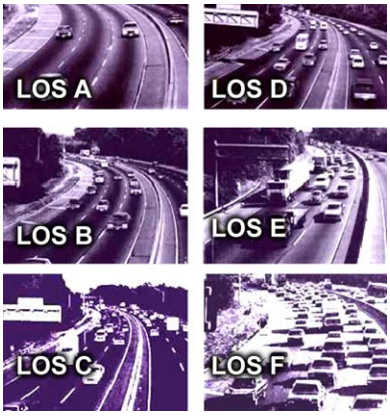
South King Street and South Spokane Street connecting the Port and interstate system (a distance of 1.8 miles), further constraining east-west travel. Regional and local travel routes are shown on Exhibit 4-2 in Chapter 4.

Freight hauled by trucks is a major component of traffic in the study area. Eastbound freight moves smoothly from the Port of Seattle terminals and other Seattle waterfront locations to the I-5/I-90 freeway system via the SR 519 Phase 1 elevated ramp on South Atlantic Street. In the westbound direction, however, freight movement is slowed by the circuitous route that trucks must take as they exit the freeway system via the existing off-ramp to Fourth Avenue South, especially during the morning and evening peaks in traffic volume.

Traffic peaks in the morning between 7 and 9 AM and in the afternoon between 4 and 6 PM, corresponding to commuter travel times. Peak directional travel during these times is generally inbound in the AM and outbound in the PM. Truck traffic does not peak during commute times; instead, truck traffic occurs throughout the day, often avoiding peak congestion.

South Atlantic Street captures a much higher portion of the eastbound traffic than South Royal Brougham Way (about 73 percent for South Atlantic Street and 27 percent for South Royal Brougham Way). In the westbound direction, South Royal Brougham Way currently attracts more traffic than South Atlantic Street (57 percent on South Royal Brougham Way and 43 percent on South Atlantic Street). About 30,000 vehicles travel on South Atlantic Street and South Royal Brougham Way on an average weekday. Traffic volumes in the westbound direction are higher during the morning peak than during the evening peak, whereas eastbound traffic patterns are similar at both peak times.

Level of service (LOS) is a term used to describe the quality of transportation facilities. LOS is graded A through F. Level of service A generally represents free-flow conditions, while level of service F represents very congested conditions. The pictures below from the Transportation Research Board *Highway Capacity Manual* represent LOS for freeway segments.



How does traffic operate in the study area?

A level of service (LOS) analysis was conducted at each study area intersection using Synchro 6.0 software. At intersections, LOS is measured in terms of average delay per vehicle. For freeway segments, LOS reflects density of vehicles.

Intersections in the Study Area

The analysis of existing intersection operations focused on

weekday morning and afternoon peak hours. The *Transportation Discipline Report* provides more detailed information, including AM and PM peak-hour turning movement volumes and LOS results at all studied intersections.

Exhibit 5-29 shows the current level of service for eight intersections in the study area. During weekday morning and afternoon peak hours, most intersections in the study area operate at LOS D or better. Only one intersection operates at LOS F—First Avenue South at South Atlantic Street operates at LOS F in the morning peak hour as a result of higher demand on the west approach coming from the Port. Some intersections operate at LOS E, the City threshold for intersection operations. This threshold is an indicator of the worst operational level of service allowed at intersections within the city.

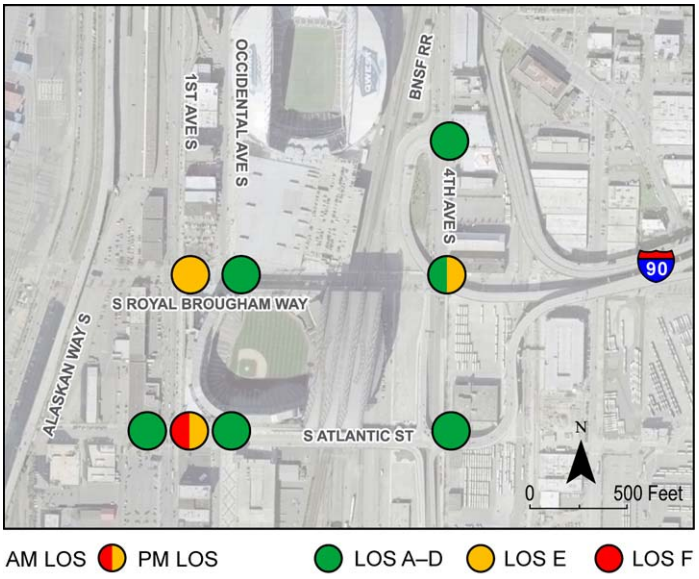
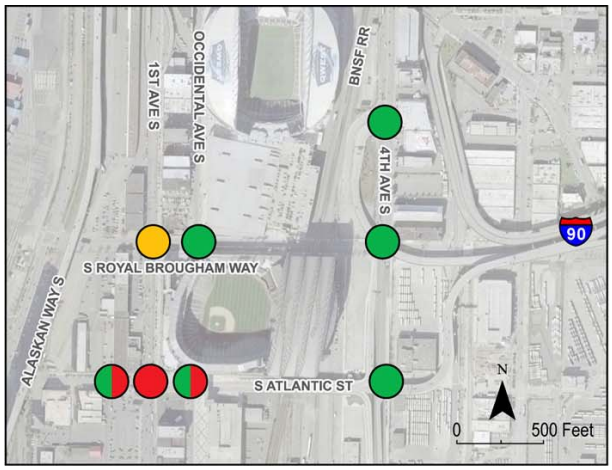


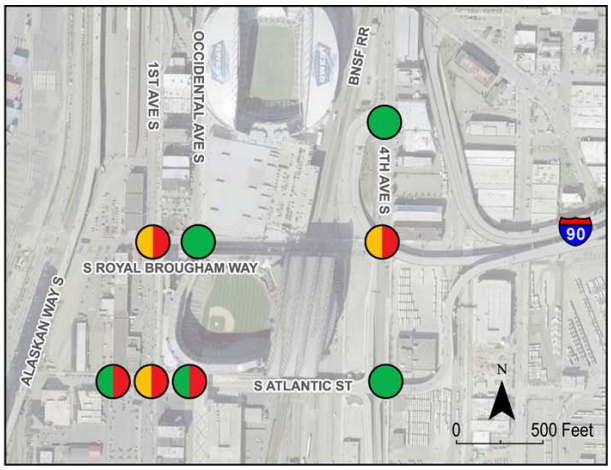
Exhibit 5-29. Existing Intersection LOS

By the design horizon of 2030, congestion will increase under the No Build Alternative. In the morning, the intersection of South Atlantic Street at First Avenue South will remain at LOS F in the morning; however, both adjacent intersections will worsen to LOS F as shown in Exhibit 5-30. In the PM peak hour, four intersections will operate at LOS F. South Atlantic Street at Utah Avenue, South First Street, and Occidental

Avenue South, and South Royal Brougham Way at Fourth Avenue South worsen to LOS F.



Existing (2007) and 2030 No Build AM Peak Hour LOS



Existing (2007) and 2030 No Build PM Peak Hour LOS

Exhibit 5-30. Existing and 2030 No Build AM and PM LOS

Queuing associated with train crossings also occurs frequently on South Royal Brougham Way.

Freeway Systems in the Study Area

The study area includes the system interchange of I-90 and I-5. The project team analyzed freeway operations for the westbound section of I-90 west of I-5 for average weekdays and conditions during home games at the stadiums or major exhibitions. Currently, on an average weekday this section operates well at LOS D or better. In the future, traffic on the I-90 off-ramp leading to the intersection at Fourth Avenue is expected to worsen to LOS F in the morning and afternoon

Traffic congestion occurs frequently in the study area, with traffic backing up as far as .25 mile on the I-90 off-ramps. Congestion on westbound I-90 is primarily due to the I-5 off-ramps backing up, late lane-changing maneuvers to get into the exit lanes, and vehicles weaving from the center roadway express lanes to exit onto northbound I-5. Congestion on I-90 westbound occurs primarily on the northbound I-5 off-ramp in the morning peak hours and on the southbound ramp in the

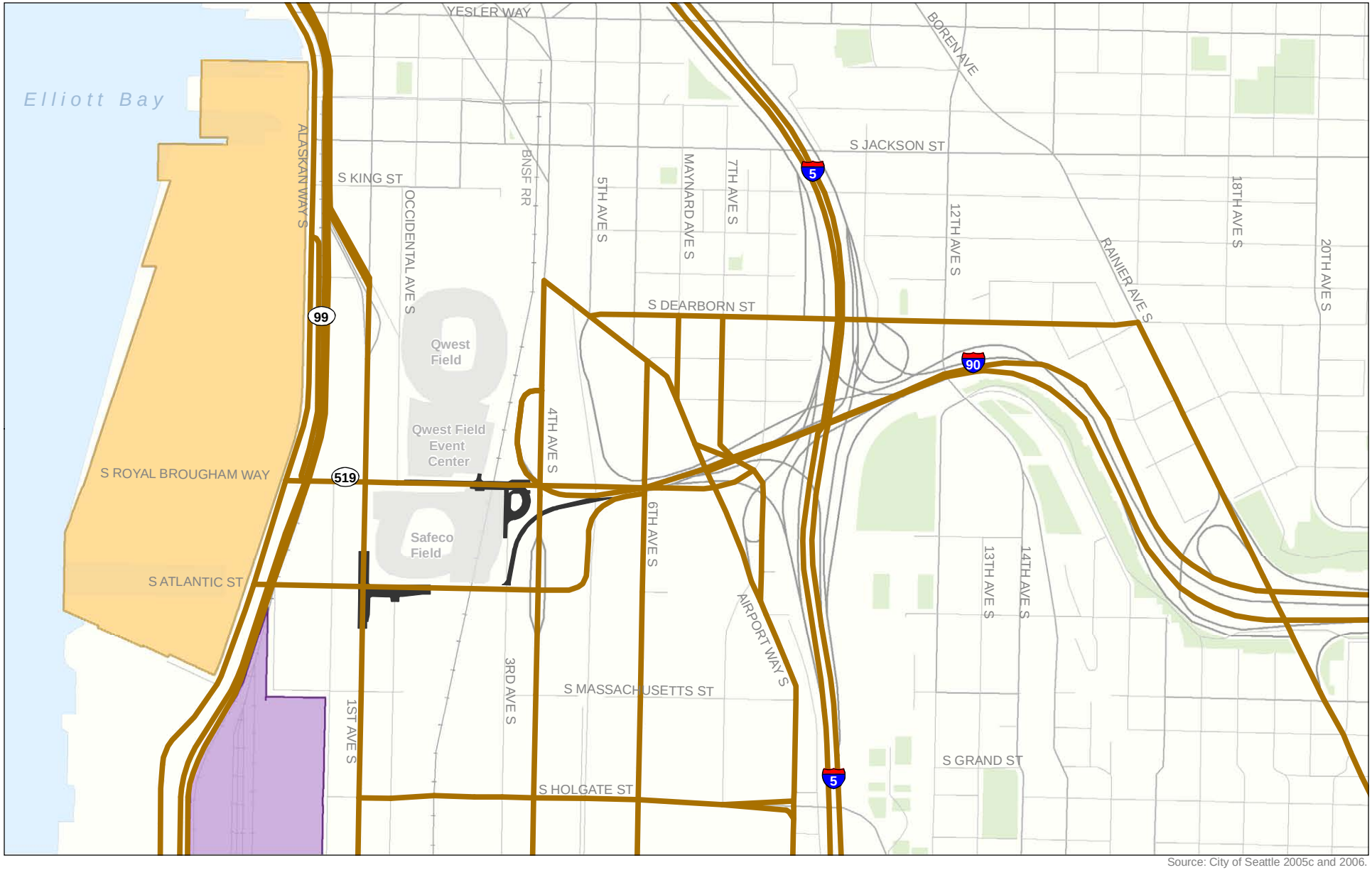
afternoon peak hours. Congestion causes delays to all vehicles in the study area, affecting the travel time for any vehicle destined to the waterfront.

Truck and Freight Routing

Existing major truck routes in the study area are shown on Exhibit 5-31. Truck traffic flow in the study area is similar to general traffic flow, which is shown on Exhibit 4-2.

Westbound traffic from the freeway exits at Fourth Avenue South and follows a circuitous route to South Atlantic Street to cross over the BNSF Railway tracks located just east of Safeco Field and Qwest Field. Signage currently designates South Royal Brougham Way as SR 519 and as the truck route to the waterfront. The street-level rail crossing on South Royal Brougham Way is an obstacle for truck movement, because it includes crossings throughout the day by BNSF Railway, Amtrak, and Sounder commuter trains.

In general, trucks represent between 5 and 10 percent of all vehicles moving through the study area over a 24-hour weekday. Most trucks travel to the waterfront along South Atlantic Street, First Avenue South, and Fourth Avenue South. These corridors provide access to I-5, I-90, and SR 99, and therefore serve more trucks throughout the day. In the east-west direction, South Royal Brougham Way and South Atlantic Street serve more than 2,000 trucks per day. In the westbound direction, the truck volumes are similar on both streets (about 500 daily trucks); in the eastbound direction, truck traffic predominantly uses South Atlantic Street, where the SR 519 Phase 1 approach provides direct access to I-90 and I-5. It is notable that as shown on Exhibit 5-32, truck traffic occurs throughout the mid-day, often avoiding peak congested periods. Future truck volumes in the study area were estimated separately for truck traffic generated by the Port of Seattle (POS) and by other destinations. For the POS truck traffic, the forecast was based on a memorandum prepared for the POS in 2005 (Heffron Transportation, 2005). The POS long-range forecast assumes that regional truck traffic generated by the Port of Seattle will grow at about 2 percent per year between 2015 and 2030.



Source: City of Seattle 2005c and 2006.

Exhibit 5-31
Major Truck Routes and Destinations in the Study Area

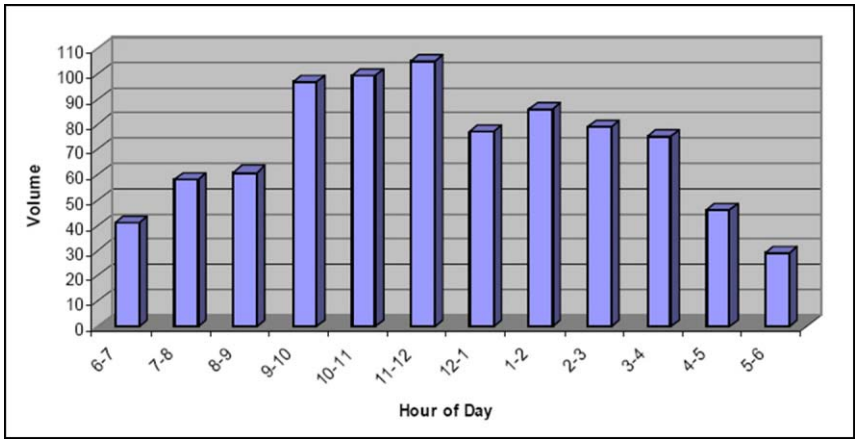


Exhibit 5-32. Profile of Truck Traffic on I-90 at 4th Avenue
Source: Transportation Discipline Report

Another recent study conducted for the Port of Seattle (Heffron Transportation, 2003) provided an estimate of the average daily truck trips generated by the Port container terminals. This study also provided a distribution of the POS truck trips in the study area, including freeway sections and surface streets. Truck traffic not generated by the Port of Seattle was assumed to grow at the same rate as the general traffic through the area.

Rail Closures and Crossings

The study area is home to a major railroad corridor used by several rail lines. In the study area, passenger and freight trains must travel at low speeds as they reach passenger boarding areas and loading zones. Passenger service through the area connects King Street Station with Tacoma and points south. Commuter rail service provided by Sound Transit was recently enhanced by adding an additional train in the peak direction, as well as a reverse commute train in the off-peak direction. Existing train volumes and speeds are listed in Exhibit 5-33.

Rail closures account for a substantial amount of the time that cars are stopped at intersections in the study area. Exhibit 5-34 shows the existing number and duration of closures at the South Royal Brougham Way crossing on a typical weekday and during the morning and afternoon peak hours.

Exhibit 5-33. Average Weekday Train Traffic Volume and Speed

Rail Service Provider	Number of Trains (daily)	Train Speed
Sound Transit Commuter Rail	5 Northbound AM 1 Northbound PM	20 mph
	1 Southbound AM 5 Southbound PM	20 mph
Amtrak	4 Northbound	20 mph
	5 Southbound	20 mph
BNSF	40 Northbound and Southbound	20 mph 10 mph tail track

Note: Additional Sound Transit Commuter Rail service is provided during events.

Exhibit 5-34. 2011 South Royal Brougham Way Crossing Closures in 2007

Daily	AM Peak (7–9 AM)	PM Peak (4-6 PM)
NA[a] 160 minutes total (11% of time)	21 times 33 minutes total (28% of time)	19 times 24 minutes (20% of time)

Source: The Transpo Group, 2007.

[a]Number of times daily is not available

Event Traffic

Within the project vicinity there are three large event facilities: Safeco Field, Qwest Field, and Qwest Field Event Center. The main types of events held in these facilities are sporting events, held in either Safeco Field or Qwest Field, and consumer trade shows at the Event Center.

Exhibit 5-35 lists the general audience sizes associated with events held at the three facilities. Major parking areas for all three facilities are the Safeco parking garage (south of Safeco Field), the Event Center parking garage (south of Qwest Field), the large surface lot north of Qwest Field, and Union Station Garage (northeast of Qwest Field across Fourth Avenue). In addition, there are several roadways with on-street parking available, including sections of First Avenue South, Third Avenue South, and Occidental Avenue South, although much of the on-street parking is blocked off during large events. King Street Station, northeast of Qwest Field, provides easy access to passenger trains, and there are numerous bus stops in

the immediate area to facilitate transit use to and from events. Sound Transit is currently building a light rail station (Stadium Station) just east of the study area.

Exhibit 5-35. Typical Event Attendees in Stadium Area

Event	Average Number of Attendees (approximate)
Safeco Field Mariners baseball	33,000
Qwest Field Seahawks football	58,000
Event Center trade shows - large	20,000 - 65,000
Event Center trade shows - small	5,000 - 20,000

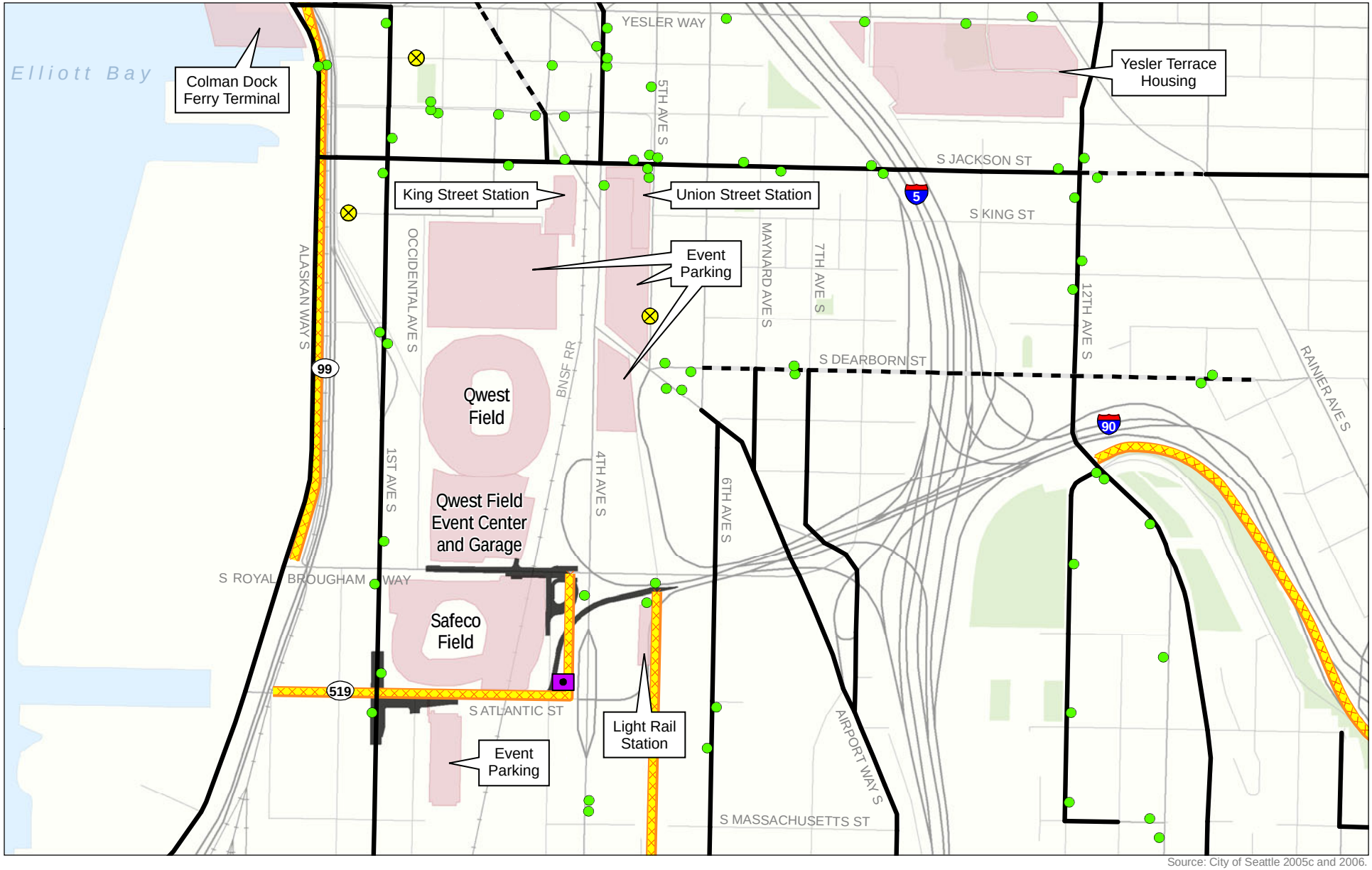
What are the pedestrian and bicycle facilities in the study area?

Within the study area there are three main pedestrian pathways:

- Along Alaskan Way South, from South Atlantic Street to South Royal Brougham Way
- Along South Atlantic Street from First Avenue South to Fourth Avenue South
- Along Fourth Avenue South from South Atlantic Street to South Royal Brougham Way

Bicycles are also permitted along these pathways. As noted in Section 5.8, within the study area, only the northbound side of East Marginal Way South has a dedicated bicycle lane. The Mountains to Sound Greenway also crosses the study area, extending eastward from the north side of South Atlantic Street at Alaskan Way South to Fourth Avenue South, then turning north to South Royal Brougham Way. There is a multi-use trail adjacent to the E-3 Bus/Rail Way along Fifth Avenue South, starting at South Royal Brougham Way and extending southward out of the study area. Exhibit 5-36 shows designated pedestrian and bicycle facilities in the study area.

In addition to the pedestrian pathways, bicycle lanes, and trails discussed above, sidewalks are present throughout the study area.



Source: City of Seattle 2005c and 2006.

Bus Stop
Mid Block Pedestrian Crossing
Pedestrian Staircase
Bike Lane
Bike Route
Trail
Pedestrian Generator
Project

N
0
1,000 Feet

Exhibit 5-36
Existing Pedestrian and Bicycle Facilities

The main north-south corridors of First Avenue South and Fourth Avenue South have sidewalks on both sides of the street, with the exception of a segment on the west side of Fourth Avenue South near the I-90 off-ramp. The sidewalks along First Avenue South have planting strips along the sides nearest the curbs, with trees and shrubs creating a buffer between pedestrians and the roadway. South of South Royal Brougham Way, the sidewalks are wider and in parts separated from vehicle traffic, mainly near South Atlantic Street. In addition, there is a pedestrian staircase leading from the west side of Fourth Avenue South up to the South Atlantic Street overpass.

The most common destinations for pedestrians and bicyclists in the immediate area are the event facilities near South Royal Brougham Way and First Avenue South (Safeco Field, Qwest Field, and Qwest Field Event Center) and transit stops dispersed along major roadways, mainly First Avenue South and Fourth Avenue South. Other facilities in the vicinity which pedestrians and bicyclists often travel to or from are:

- The Washington State Ferries terminal at Colman Dock
- King Street Station along Fourth Avenue South
- Seattle bus tunnel entrances and exits, the closest one being near Fourth Avenue South and South Jackson Street

After it opens in 2009, the Central Link light rail Stadium Station near South Royal Brougham Way and Fifth Avenue South will become an important pedestrian facility and destination.

What transit service is provided in the study area?

Four agencies provide public transportation services in the study area: King County Metro Transit, Sound Transit, Amtrak, and Washington State Ferries. King County Metro Transit (Metro) provides most of the local (and local express) transit service in Seattle and the surrounding area. Sound Transit Regional Express provides express bus service and Sound Transit Sounder provides commuter rail service. Sound Transit is constructing the Central Link light rail line, which

will open in 2009 and provide service between downtown Seattle and Sea-Tac Airport, with the Stadium and SODO stations serving the SODO area. Amtrak Cascades provides passenger rail service from King Street Station to cities north and south of Seattle, and the Washington State Ferries downtown Seattle terminal is northwest of the project at Colman Dock, with vehicle and passenger service to and from Bremerton and Bainbridge Island and passenger-only service to and from Vashon Island.

Most transit lines operating in the study area use the north-south corridors of First Avenue South and Fourth Avenue South. Only one bus route (Metro Route 132) uses South Atlantic Street, and there are no bus routes on South Royal Brougham Way.

Transit facilities located within the study area consist of the bus stops, the E-3 Bus/Rail Way, King Street Station, and Metro's bus bases. The E-3 Bus/Rail Way and downtown Seattle transit tunnel provide Metro and Sound Transit exclusive rights-of-way for their bus operations.

The Metro boardings and alightings at bus stops within the general study area in 2006 were approximately 4,300 daily passengers in the AM peak period and approximately 5,000 passengers in the PM peak period. Transit services traveling through the area, including Sound Transit Regional Express buses, King County Metro buses, and Sounder commuter rail trains, carry many passengers through the area. Sound Transit express buses had about 9.7 million passengers in 2006, and the Sounder ridership for 2006 was about 1.7 million for the whole Sounder system. Total Amtrak Cascades ridership for 2006 was approximately 630,000, with about 418,000 of those riders coming from or going to Seattle via King Street Station. Ferry ridership in 2006 was just over 9 million passengers at the Colman Dock terminal.

During sporting events, most stadium attendees come by car. The Sound Transit Sounder commuter rail service provides special trips for some sporting events. Usually, the regular bus routes into or out of downtown Seattle via First Avenue South,

Fourth Avenue South, the Metro Bus/ Rail Way, Sixth Avenue South, or South Jackson Street serve the area during game periods and drop people within walking distance of both fields. The north-south corridors of the E-3 busway, Fourth Avenue, and First Avenue carry nearly 9 million passengers per year on 49 routes. Delays to buses or rail impact the commutes of all of these patrons. Both Qwest Field and Safeco Field prepare annual Transportation Management Plans (TMPs) to deal with the traffic issues during events. The parties have entered into agreements to coordinate game schedules and avoid dual major events taking place at the same time of day. Transit is a major component emphasized by the Qwest and Safeco TMPs.

The SODO area is also home to the Ryerson, Central, and Atlantic bus bases, which generate 1,500 coach trips per day.

What truck facilities are provided in the study area?

The study area contains a large amount of industrial lands, including Port of Seattle properties and container terminals, railroad intermodal yards, and other businesses that rely on the movement of trucks and freight. The freeway and arterials within the study area provide an important connection for freight transportation and are heavily used by trucks.

The railroad grade separation project completed in 2004 at South Atlantic Street (SR 519 Phase 1) provides an efficient two-way corridor between First Avenue South and Fourth Avenue South. The Phase 1 project also provides an improved eastbound on-ramp connection to I-90. However, trucks traveling westbound do not directly benefit from the Phase 1 improvements because there is currently no efficient connection from the freeway to the South Atlantic Street overpass.

The City of Seattle and WSDOT have defined street systems within the study area as major truck routes (see Exhibit 5-32). These designated truck routes provide access between the industrial lands within the study area and the state highway system, while also facilitating travel between the industrial lands and the Port terminals.

The Washington State Freight and Goods Transportation System (FGTS) is a classification system adopted by WSDOT and used to

The FGTS classifies roadways using five freight tonnage classifications, T-1 through T-5, as follows:

- T-1: more than 10 million tons per year
- T-2: 4 million to 10 million tons per year
- T-3: 300,000 to 4 million tons per year
- T-4: 100,000 to 300,000 tons per year
- T-5: at least 20,000 tons in 60 days

classify state highways, county roads, and city streets according to the average annual gross truck tonnage they carry. The system identifies as Washington's Strategic Freight Corridors those state routes that carry 4 million or more gross tons of freight annually (T-1 and T-2 classes). The estimated annual tonnage on SR 519 was 9.94 million tons, which is very close to the T-1 classification.

Are there any safety issues in the study area?

The street-level rail crossing on South Royal Brougham Way, which creates conflicts between trains and vehicle traffic, bicyclists, and pedestrians, is an important safety issue. However, data discussed in this section show that larger numbers of collisions and injuries actually occur at nearby street intersections and on the I-90 off-ramp to Fourth Avenue South. Pedestrian safety during events at Safeco Field and Qwest Field is also an important concern, particularly as pedestrian traffic is expected to increase when the new light rail Stadium Station opens in 2009. By distributing traffic more efficiently, reducing congestion, and eliminating the street-level rail crossing, the SR 519 Phase 2 project will reduce the risk, and most likely the occurrence, of collisions and injuries in the study area.

The project team reviewed recent vehicle collision data for the study area. The City of Seattle provided collision data for the surface streets and WSDOT provided collision data for the freeway mainline and ramps for the most recent 3 years of available data, between January 2004 and December 2006. The review of collision data covered intersections, street segments, freeway sections, and freeway ramps.

The City of Seattle defines a high accident intersection as a signalized intersection with more than 10 collisions per year on average, or an unsignalized intersection with 5 collisions per year on average. Within the study area, two intersections were found to be high accident intersections based on the 3-year period. The intersection of First Avenue South and South Spokane Street had more than 15 collisions per year on average, and the intersection of Fourth Avenue South and

South Royal Brougham Way had 10 collisions per year on average.

Surface Streets

The project team identified safety hazards under existing conditions at the following intersections:

- South Royal Brougham Way between First Avenue South and Fourth Avenue South
- South Atlantic Street between First Avenue South and Fourth Avenue South
- South Lander Street between First Avenue South and Fourth Avenue South
- First Avenue South/South Spokane Street intersection
- Fourth Avenue South/South Royal Brougham Way intersection.

The analysis of various east-west street segments within the study area indicated the sections of South Royal Brougham Way, South Atlantic Street, and South Lander Street between First Avenue South and Fourth Avenue South all had collision rates higher than the average. South Royal Brougham Way had the highest collision rates of the four studied segments. This is likely the result of high traffic volumes, closely spaced intersections, and rail crossings. No fatal collisions occurred on the surface street roadway segments included in this analysis between 2004 and 2006.

Freeways and Ramps

WSDOT collision data show that urban interstate highway facilities in the northwest region of the state have, on average, 1.5 collisions per million vehicle miles. Data collected between 2004 and 2006 show that there are several sections along I-90 westbound within the study area that have collision rates higher than the average. From the end of the Mount Baker Tunnel to the off-ramp at northbound Rainier Avenue, and from the northbound I-5 on ramp to the end of I-90 at Fourth Avenue South, annual rates are less than 5 collisions per million vehicle miles.

The I-90 segment between the Rainier Avenue southbound off-ramp and the I-5 northbound off-ramp had the highest number of collisions within the last 3 years, 53 collisions. Almost 40 percent of these collisions (20) resulted in injuries. Exceeding the speed limit was stated as the most frequent contributing factor. Off-ramps from westbound I-90 to I-5 have average annual collisions of 8 for the northbound I-5 exit and 5 for the southbound I-5 exit. The southbound I-5 off-ramp has a collision rate of over 3 collisions per million vehicles, which is higher than the average. The predominant collision type on this ramp is rear-end collision, likely resulting from congestion conditions on southbound I-5 and on the ramp, which backs up on weekdays during the afternoon rush hours.

Is on-street parking provided in the study area?

Both on-street and off-street parking are available in the study area. The different types of parking available are as follows:

- Off-street – parking which is provided in a lot
- On-street – parking provided on the side of the roadway
- Pay parking – spaces paid for by users
- Unrestricted parking – spaces which the public does not have to pay for and which have no time limits
- Free hourly parking – spaces which the public does not have to pay for, but which have time limits (30 minutes, 1 hour, or 2 hours)

Many of the roadways in the area do not allow on-street parking, particularly Fourth Avenue South, South Royal Brougham Way, and the portion of South Atlantic Street on the Phase 1 overpass, named Edgar Martinez Drive. Where on-street parking is allowed, the two dominant types are unrestricted parking and free hourly parking. Surface lots and parking garages provide off-street parking. The demand for event parking greatly exceeds the available parking in the stadium garages and on nearby streets.

What were the methods used to evaluate the project's effects on traffic and transportation?

WSDOT evaluated transportation effects within the study area by assessing the following:

- Potential construction effects on street, freeway, bicycle/pedestrian, transit, and rail operations
- Existing and future traffic operations of the local freeway segments and surface streets
- Safety (accident history)
- Event traffic and parking management
- Truck routes
- Rail operations and crossings
- Pedestrian and bicycle circulation
- Transit operations, services, and facilities
- Parking supply and access

Traffic conditions were analyzed for the morning and afternoon peak hours on a typical day. A special assessment of traffic during events was also considered given the number of events in the area. The project team also considered the project's relationship to the Washington State Ferries terminal at Colman Dock.

Three horizon years were considered in this analysis: 2007 (existing conditions), which provides a point of reference to compare with future scenarios; 2011, which is the proposed year of opening; and 2030, the design year. An assessment of traffic during construction was included. Finally, the analysis also considered daily traffic volumes to capture off-peak conditions. To assess operations on the surface street system, measures to evaluate the effect on transportation include travel time, level of service in terms of delay (at intersections) and density (for freeway segments), and backups.

The project team developed forecasts of travel demand using the most recent version (April 2007) of the City of Seattle travel demand model. The City model provides a land use and transportation network structure consistent with the Puget

Sound Regional Council travel demand model. The *Transportation Discipline Report* provides greater detail on the specific land use and transportation network assumptions used to create travel demand, as well as methods used to analyze traffic operations. The resulting land use projections for 2030 (population and employment) are consistent with current regional projections by PSRC and the City of Seattle Comprehensive Plan.

What would traffic and transportation be like without the project?

The project team analyzed current traffic conditions using traffic data generated by operational analysis tools. The data were verified based on observations in the field. These tools were then used to forecast conditions without the project in 2011 and 2030. Section 5.9 describes peak-hour traffic volumes in the study area under current (2007) conditions.

The 2007 daily distribution of traffic volumes for I-90 is typically higher during the PM peak hour than the AM. The First Avenue South and Fourth Avenue South arterial corridors also carry high traffic volumes during the AM and PM peak hour. Based on travel demand forecasts, average daily traffic volumes headed for the waterfront are expected to increase sharply by 2030 as shown in Exhibit 5-37.

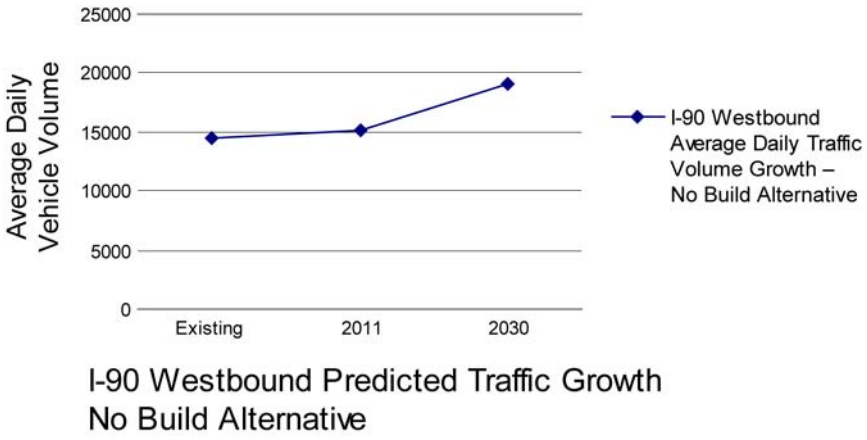


Exhibit 5-37. I-90 Westbound Predicted Traffic Growth Under No Build Alternative

As traffic increases in the study area and conflicts between trains and other modes increase, operations are expected to worsen. Most of the intersections within the study area currently operate at or better than the City's operational threshold of LOS D during the peak hour (Exhibit 5-38). This threshold is an indicator of the worst level of service allowed at intersections within the city.

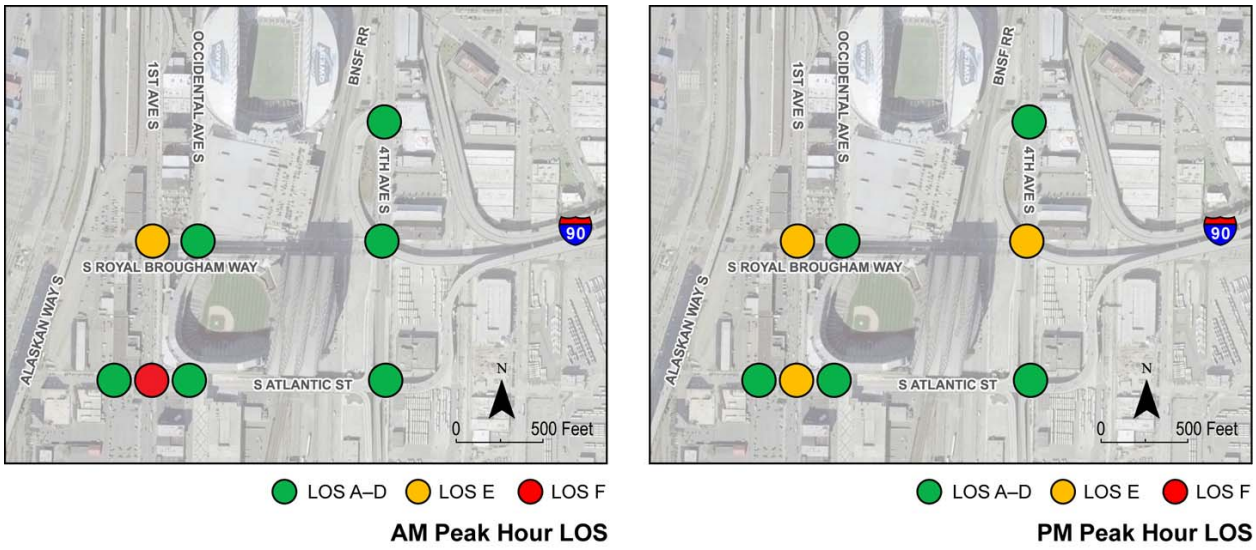


Exhibit 5-38. Existing AM and PM Peak Hour LOS

The exception to this general compliance is the intersection of First Avenue South at South Atlantic Street. By the year of opening, the intersections of First Avenue South at South Royal Brougham Way and South Atlantic Street at Occidental Avenue South worsen to LOS F in one of the peak hours analyzed due to removal of a left-turn pocket.

By the design year of 2030, the intersections of South Atlantic at Utah Avenue, First Avenue, and Occidental Avenue and the intersection of Fourth Avenue at Royal Brougham Way operate at LOS F during one or both peak periods due to limited green time for cars turning left off of South Atlantic Street. Exhibit 5-39 summarizes level of service in the area for the year of opening (2011) and design year (2030) with and without the project.

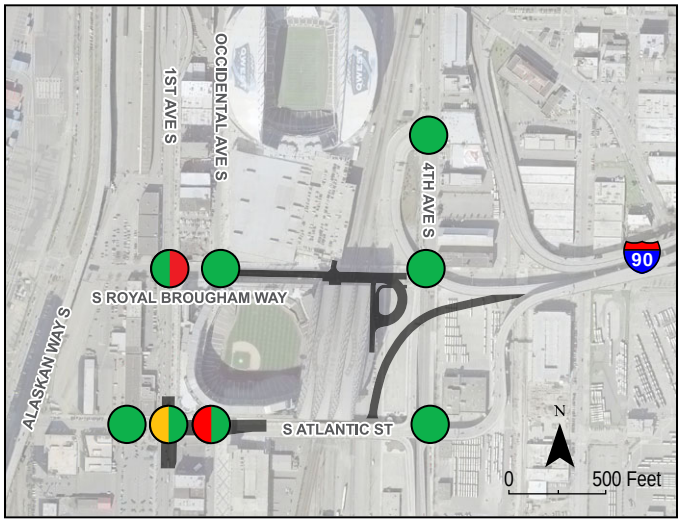
Because of the current configuration of the westbound terminus of I-90, trucks and commuter traffic follow circuitous routes to reach their waterfront destinations.

Without the project, the circuitous routing and poor levels of service at intersections would continue to prevent waterfront-bound vehicles from efficiently reaching their destinations. As a point of comparison, travel times were estimated for the design year for the east-west and north-south corridors in the study area. As shown on Exhibit 5-39, a westbound trip from the interstate to the Port may take as much as 15 minutes in morning traffic.

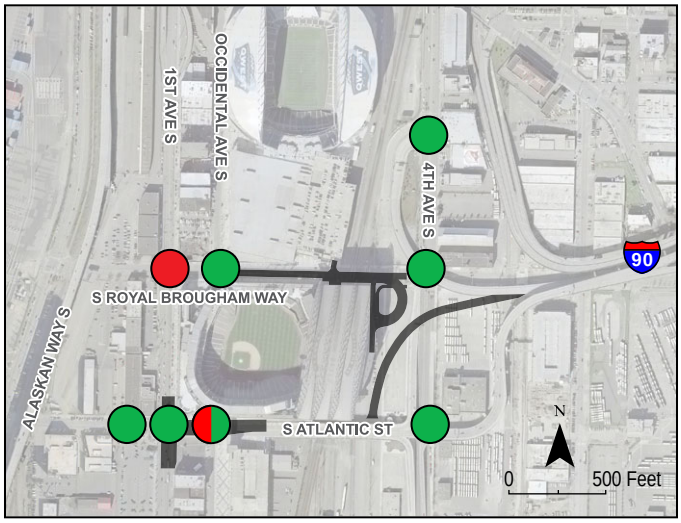
Physical and economic growth in the SODO neighborhood and Port of Seattle by 2030 would be impaired by increased delays and travel times. Without the project, key freight routes and delivery schedules would be negatively affected by conflicts with other modes and increased delay and travel times from the freeway system to the Port of Seattle terminals (Exhibit 5-40).

What direct effects will construction of the project have on transportation?

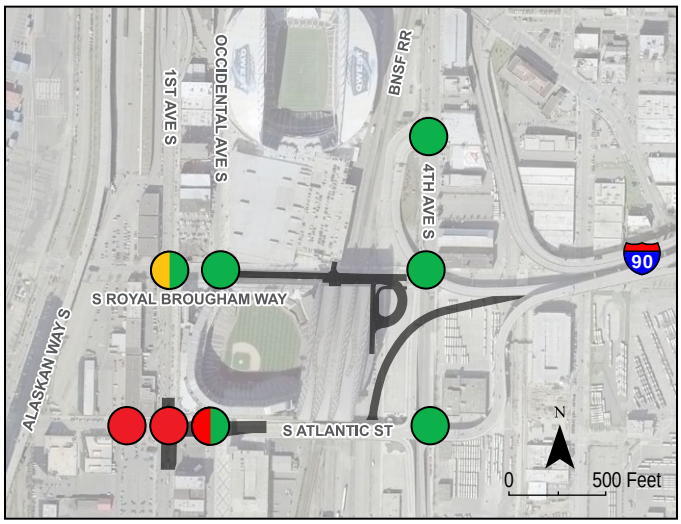
Construction activities will have short-term effects on traffic, transit, parking, bicycles, and pedestrians in the study area due to temporary detours and partial or full road closures. Motorists traveling between the freeway system and the Seattle waterfront will encounter reduced lanes and increased travel times, but the construction goal is to keep streets open to traffic during the day. Temporary street closures will be confined to night or other off-peak hours. The phased construction approach described in Chapter 4 will help to limit lane closures to one part of the construction zone at a time. Construction and waste materials will be hauled to and from locations distant from the project site. Exhibit 5-41 shows an example of the haul routes and circulation for each of the construction sites.



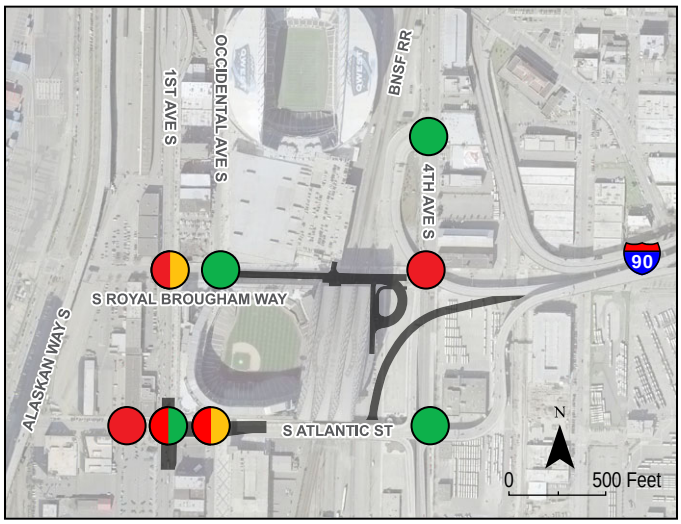
2011 No Build and Project
AM Peak Hour LOS



2011 No Build and Project
PM Peak Hour LOS



2030 No Build and Project
AM Peak Hour LOS



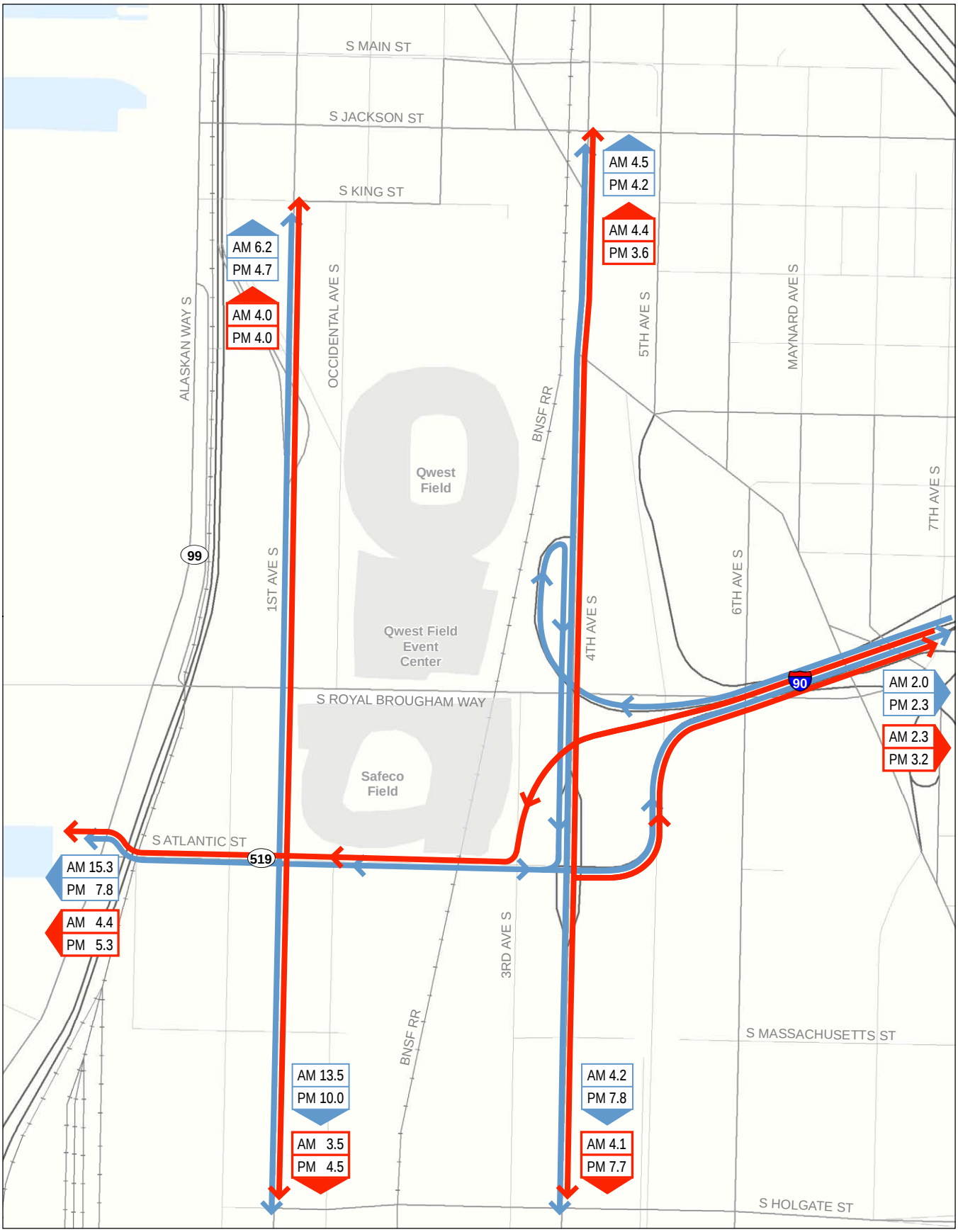
2030 No Build and Project
PM Peak Hour LOS

No Build LOS / Project LOS

LOS A–D LOS E LOS F

Project

Exhibit 5-39
2011 and 2030 AM and PM Peak Hour LOS with and without Project



Source: City of Seattle (2007) and King County (2006)

Exhibit 5-40
SR 519 2030 Travel Times

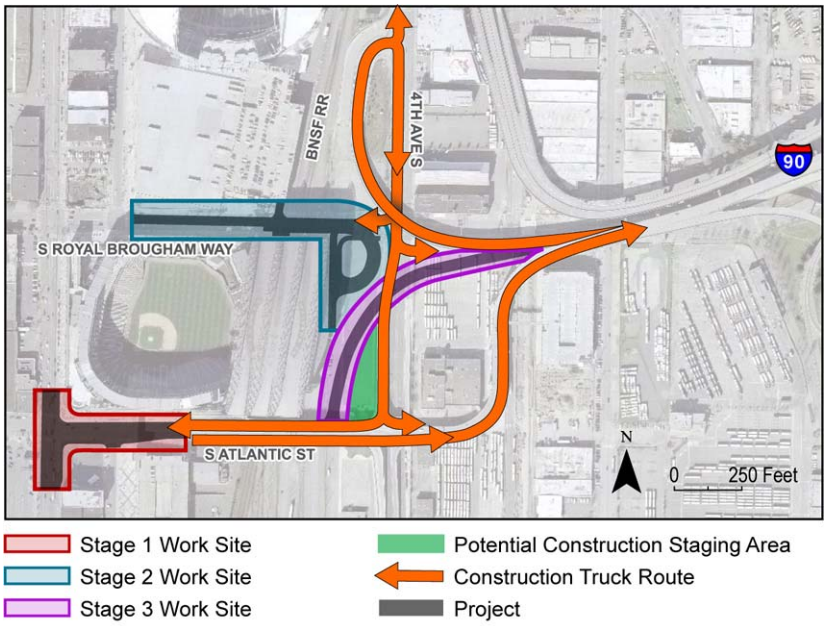


Exhibit 5-41. Construction Sites and Haul Routes For SR 519 Intermodal Access Project – Phase 2

Dedicated bicycle lanes are not available along the proposed haul routes. Along South Atlantic Street and Fourth Avenue South, bicyclists typically use the wide sidewalks with pedestrians, and this pattern will continue during construction. Bicycle and pedestrian interaction with construction vehicles, therefore, will be limited to intersection crossings near the construction site. Sidewalks along the north side of South Atlantic Street will be closed and a protected walkway provided.

The King County Metro Transit employee parking garage is located just south of South Royal Brougham Way between the E-3 Bus/Rail Way and Sixth Avenue South. Access to this parking garage is from Sixth Avenue South and will not be directly affected by the construction work. WSDOT will coordinate with Metro daily to help ensure safe and efficient transit operations to continue throughout construction.

Construction of the project will conflict with rail operations in two main ways: during construction of the new I-90 off-ramp to South Atlantic Street, and during installation of steel girders

for the South Royal Brougham Way elevated structure. WSDOT has coordinated closely with the rail operators to plan both of these activities. The portion of the new I-90 off-ramp that will cross above the Sound Transit Central Link light rail tracks will be completed before the Central Link testing program and regular service begin in 2009, thereby avoiding any effect on the new light rail line. At South Royal Brougham Way, cranes will be used to lift and position steel girders for the new railway overpass. WSDOT will continue to coordinate closely with BNSF Railway, Amtrak, Sound Transit, and King County Metro to avoid or minimize effects of the girder installations on mainline or commuter rail services.

Construction of the project could occur during other projects, compounding traffic effects on the study area. These effects are discussed below in cumulative effects.

What direct effects will operation of the project have on transportation?

Freeway Operations

The project will improve westbound travel patterns on I-90 and SR 519 through and west of the I-90/I-5 freeway system interchange. The project offers a secondary access into the area for trips destined west of the BNSF tracks, substantially reducing the volume of trips at the Fourth Avenue ramp terminus. This reduction and splitting of traffic volumes between the new and old westbound off-ramps will also reduce the off-ramp traffic backups into the higher speed segments of SR 519 and I-90. Regular queuing of vehicles onto the freeway from ramp termini increases the potential for rear-end accidents. Because the project will result in fewer vehicles using the I-90 off-ramp to Fourth Avenue South by 2011 and 2030, lengths of traffic backups on this ramp will be reduced by nearly half as shown in Exhibit 5-42. East of the system interchange, operations will generally be the same with or without the project. A detailed discussion of backups is provided in the *Transportation Discipline Report* prepared for this EA.

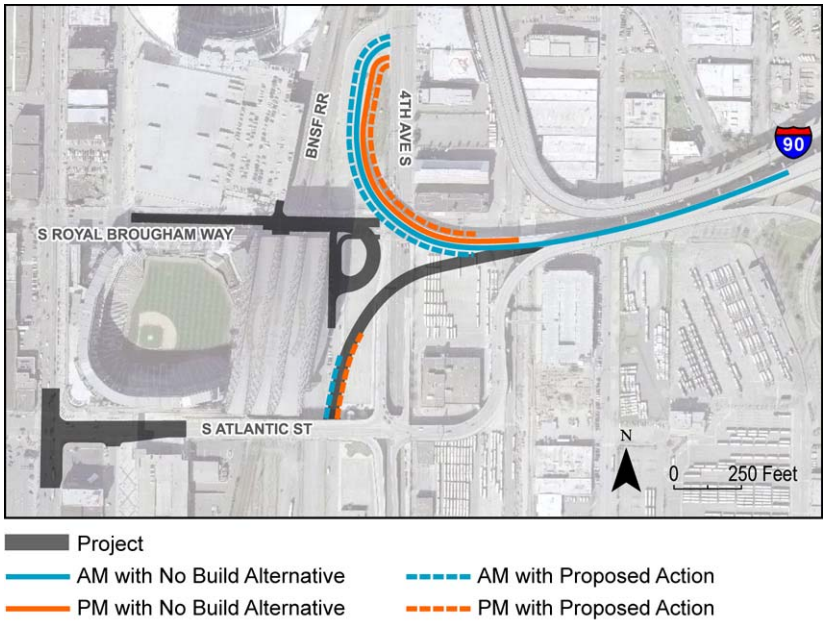


Exhibit 5-42. Westbound Backup Lengths

Surface Street Operations

With the project there will be a more direct link across the BNSF tracks, and conflicts will be reduced because regional traffic will flow directly to and from the Atlantic Street corridor. Therefore, street intersection operations will improve. During the year of opening (2011), the level of service at the I-90 off-ramp to Fourth Avenue South will improve during the AM and PM peak hours (see Exhibit 5-39). In 2011 and 2030, most of the intersections in the study area will have improved LOS at all times as a result of the project. LOS for the AM peak at two intersections, First Avenue South and South Royal Brougham Way, will degrade from LOS E to LOS F due to removal of a left-turn pocket by 2011. One intersection in the broader study area, South Massachusetts Street at First Avenue South, is expected to operate poorly as a two-way stop-controlled intersection in all cases. This intersection will operate slightly worse with the project due to the emphasis on north-south traffic. The PM LOS will improve at these and all other intersections in the study area.

Because intersection operations will improve as a result of the project, travel times along the east-west corridors will also improve. Travel times from the interstate system to the Port

that would take over 15 minutes in the No Build Alternative will take under 5 minutes. The efficiency afforded for east-west travel also results in improved north-south travel times. Most notably, the southbound travel times that would be as much as 13 minutes without the project will also be under 5 minutes with the project as shown in Exhibit 5-40.

In 2011, the new intersection between the proposed I-90 off-ramp and South Atlantic Street and the intersection at the existing I-90 off-ramp to Fourth Avenue South will operate at LOS D or better during both peak hours. This is the minimum acceptable level of service for the SODO neighborhood, as determined by the City of Seattle.

Safety

An important safety component of the project is the overpass of South Royal Brougham Way above the BNSF and Amtrak mainline and Sound Transit Sounder commuter rail tracks. As explained in Chapter 4, the elevated structure on South Royal Brougham Way will extend from Occidental Avenue South to Third Avenue South. The provision of an arterial overpass at this intersection will increase safety by allowing motorists, bicyclists, and pedestrians to cross the tracks independently of moving rail traffic. The loop connector will also improve safety along South Royal Brougham Way by separating vehicle traffic and pedestrians, allowing large volumes of pedestrians to move swiftly and safely to and from events. The project also reduces the volume of southbound traffic through the intersection of Fourth Avenue South and South Royal Brougham Way. Southbound right-turning traffic during the AM and PM peak hours from Fourth Avenue South to westbound South Royal Brougham Way could be reduced by approximately 85 percent because of the direct connector between the I-90 freeway and South Atlantic Street. The southbound through movement during both peaks could also be reduced by approximately 14 percent. As part of the project this intersection can also function with fewer lanes on the west approach (eastbound) and the south approach (northbound). Exhibit 5-43 shows the lane configuration and southbound volume reduction at Fourth Avenue South and South Royal Brougham Way.

This intersection currently has a high number of accidents. Fewer vehicles through this intersection may reduce the potential for accidents. Fewer southbound right-turning vehicles could also reduce the potential for conflict with pedestrians.

Event Traffic and Parking Management

Before and after events in the stadium district, traffic is very congested. Long queues form on the I-90 off-ramp to Fourth Avenue South extending back onto the freeway system itself. Additional traffic control is implemented in the area, including closing South Royal Brougham Way to minimize conflicts with large pedestrian surges. After events, South Atlantic Street is also closed to allow traffic to exit the garages. With the project, South Royal Brougham Way will be closed before and after events except for vehicles entering the Qwest Field Event Center garage, and South Atlantic Street will be closed after events.

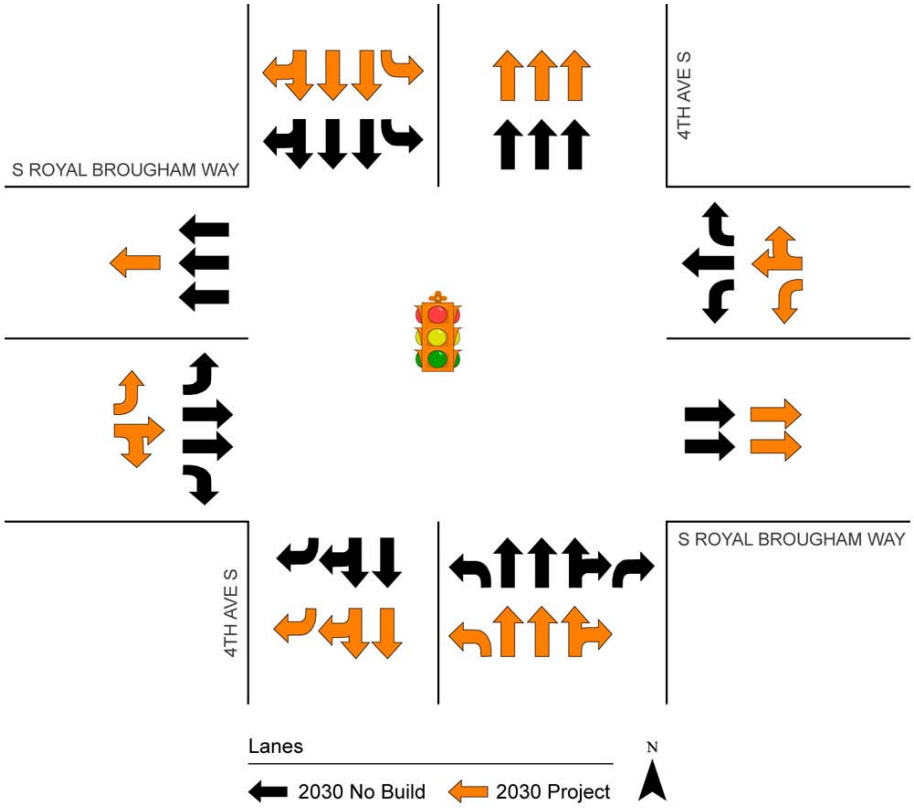


Exhibit 5-43. Fourth Avenue and Royal Brougham Way Intersection Reduction

Most notably for trucks coming from northbound I-5, there would be no access across the BNSF mainline to the Port of Seattle during events unless trucks only were permitted onto South Atlantic Street, depending on the level of the event. For some large events, trucks would be forced onto Fourth Avenue. From southbound I-5 and I-90, trucks could use the Fourth Avenue ramps to get to the Duwamish industrial area and the Port of Seattle.

Truck Routes

The project will provide a direct connection for the primary westbound truck route from the freeway system to the Seattle waterfront via the new South Atlantic Street connector. The eastbound truck route from the waterfront to I-90, constructed as Phase 1 of the SR 519 improvements, will not be modified by the project. The proposed I-90 off-ramp to South Atlantic Street will be designed to accommodate the largest interstate semi-trailer trucks so that oversized cargo can be transported safely and efficiently. The project will not require any restrictions regarding the transportation of hazardous materials.

Rail Operations and Crossings

The project team expects that there will be a major increase in passenger rail operations in the study area by the time the project is completed, with about 20 Sound Transit Sounder commuter trains crossing South Royal Brougham Way during weekday mornings by 2011. Amtrak passenger rail service through the study area is also anticipated to increase by 2011. Rail traffic along the BNSF mainline is anticipated to increase. Historically, railroad gate closures at South Royal Brougham Way for passenger and freight traffic occurred for 2.5 hours per day in 1992. This time had grown to 3.5 hours by 1996 and is anticipated to be 5 hours by 2010 (WSDOT, 2001). With the anticipated growth in rail traffic, the project will greatly improve mobility within the study area by removing the existing conflict between rail operations and vehicle, bicycle, and pedestrian traffic.

Pedestrian and Bicycle Circulation

The project will construct a pedestrian ramp adjacent to, but physically separate from, the vehicular loop ramp on South

Royal Brougham Way. A staircase and an ADA-compliant means such as an elevator will allow pedestrians to enter or leave the elevated portion of the structure at all times.

The loop ramp roadway will incorporate a 5-foot-wide bicycle lane on each side.

The project will not alter the intersection of South Royal Brougham Way and First Avenue South. Pedestrians and bicyclists would continue to use the intersection as at present.

While there are many safety enhancements afforded by the project for pedestrians, there are locations where safety at pedestrian crossings is a potential issue. These locations are the north side of South Atlantic Street at the I-90 off-ramp terminus, the western end of the proposed elevated structure along South Royal Brougham Way, and the intersection of First Avenue South and South Atlantic Street.

Transit Operations, Services, and Facilities

A major new transit project, Sound Transit's Central Link light rail system, will start operating in 2009 and will provide light rail service between downtown Seattle and Sea-Tac Airport. The Central Link system will include the Stadium Station, which is now under construction immediately east of the proposed SR 519 Phase 2 improvements.

King County Metro Transit is currently developing a four-point initiative, Transit Now, which will include new buses and upgraded passenger waiting areas, add technology to synchronize traffic signals, and operate real-time bus arrival signs. The program will implement more frequent and faster service, called RapidRide, on five major corridors. The goal of Transit Now is to accommodate 18 million to 21 million more annual rides within 10 years. When completed, these planned improvements will create a multi-modal transit hub in the study area where local and regional, wheeled and tracked transit modes and bus lines meet to provide greatly improved transit services supported by a strong and reliable transportation infrastructure. Most of the intersections on the bus routes involved will show improvements in bus service operating time or, at least, no difference between the No Build Alternative and

the project. In general, for transit patrons on the First and Fourth Avenue corridors, the project may result in slightly improved travel times.

The new I-90 off-ramp will permanently displace a few bus parking spaces within the Ryerson Bus Base. The number will depend on the final location of the support columns. The design will be closely coordinated with Metro to minimize the number of spaces and effects on internal circulation.

Parking Supply and Access

The project will permanently reduce available on-street parking in the study area by an estimated 50 vehicle spaces. The locations affected will be on First Avenue South near South Atlantic Street and along Third Avenue South from South Royal Brougham Way to just north of South Atlantic Street. The reduction of on-street parking will likely result in increased use of off-street public parking, and possibly parking in adjacent neighborhoods.

Access to the Safeco Field garage will be similar with the project and under the No Build Alternative. The project will create an additional access point on the second level of the Qwest Field Event Center garage from the new elevated structure on South Royal Brougham Way. Preliminary design analysis indicates that there may be issues related to sight distances for traffic exiting the garage onto the new elevated structure. However, traffic in either direction on the elevated structure will be traveling at low speeds and will have good visibility of vehicles exiting the parking garage. For the drivers exiting the garage, the bike lanes along South Royal Brougham Way will provide additional visibility of the traffic.

The project will not permanently affect the supply of off-street parking.

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

WSDOT is considering a range of strategies and measures to mitigate adverse effects of project construction on traffic and

transportation conditions in the study area. Construction management strategies could include:

- Preparation of a construction management plan with provisions for traffic management. The plan would reflect other infrastructure and development projects to minimize adverse effects on all transportation modes during SR 519 Phase 2 construction.
- Provisions of the construction management plan that are geared specifically to the stadiums and coordinated with the City of Seattle to minimize effects on local roadways
- Close coordination with local land owners to minimize local access effects
- Public outreach to provide construction information through media outlets including internet alerts and web pages, and through variable message signs

WSDOT will meet with interested parties, including representatives from the City of Seattle and the Seattle Police Department, Safeco Field, Qwest Field, and the Port of Seattle, to plan and coordinate the management of event traffic and parking at the stadiums and event center during construction of the project. It was assumed that future sports events will be scheduled in a manner similar to the present, with the majority of baseball games during weekday evenings and most of the football games on Sundays. WSDOT will temporarily stop or alter construction activity during sports events at the stadiums and coordinate closely with Qwest Field Event Center to minimize traffic congestion during major exhibitions.

The construction schedule for the project will be closely coordinated with other construction activities that could affect the area at the same time, including the South Holgate Street to South King Street Viaduct Replacement Project. WSDOT will coordinate with the City of Seattle, King County Metro Transit, the Port of Seattle, the stadium and event center operators, Washington State Ferries, and other potentially affected entities to keep unwanted construction effects to a minimum and

ensure as much traffic mobility as feasible during construction of the project.

Operational Mitigation

Street Intersections

Traffic modeling conducted for this analysis suggests that by 2030, almost all intersections in the study area will perform better or at least at the same LOS in the project as compared with the No Build Alternative. The exception is the intersection of First Avenue South and South Massachusetts Street, which is likely to show slightly higher delays on the low-volume westbound approach with the project than under the No Build Alternative to accommodate high north-south volumes. Currently there is no signal at this intersection. Two improvement options are available: signalization of the intersection or restricting turns onto First Avenue South from minor streets. The projected increase in traffic volumes on South Massachusetts Street indicates that signal criteria will be met at this intersection when the project is built and operating. Restricting the side-street approaches to allow only right-turns onto First Avenue South would also improve traffic flow at the intersection with South Massachusetts Street.

Parking

Off-street public parking is already limited in the study area and demand is expected to increase in future years, with or without the project. It could be mitigated by general transportation demand management techniques to encourage the use of alternative transportation modes such as providing special-event bus service and staging space. A new light rail station in the area could reduce the demand for parking as people can access the area without using their vehicles.

The number of bus parking spaces permanently lost on the Ryerson Base as a result of the project will depend on the location of the support columns. The detailed design process will be closely coordinated with King County Metro Transit to minimize adverse effects of project construction and operation on Ryerson Base bus parking spaces and internal circulation.

Transportation demand management is a broad range of strategies that reduce or shift use of the roadway, thereby increasing the efficiency and life of the overall transportation system. TDM programs influence travel behavior by using strategies that accommodate more person-trips in fewer vehicles, shift the location or time of day at which trips are made, or reduce the need for vehicle trips.

Pedestrians and Bicycles

The locations where safety at pedestrian crossings might be an issue are the intersection of the proposed new I-90 off-ramp with the north side of South Atlantic Street, the western end of the proposed elevated structure along South Royal Brougham Way, and the intersection of First Avenue South and South Atlantic Street. Mitigation measures to increase safety at these locations could include:

- Restricting right turns when the signal is red to ensure pedestrians have a clear path to cross the intersection
- Countdown pedestrian signals that inform pedestrians of the amount of time they have to cross a street safely
- Signage to inform pedestrians of what to do during each phase of a countdown pedestrian signal
- Signage to alert drivers exiting the freeway system that a pedestrian crossing is ahead

Event Traffic

The operational effects of the project on event traffic could be mitigated in several ways. Potential mitigation strategies during operation were also discussed at the previously noted workshop with stakeholders. Before events, the elevated structure on South Royal Brougham Way could be kept open to traffic in both directions to accommodate motorists not wanting to access the Qwest Field parking garage. Variable message signs exist at various locations on the interstate system in the Puget Sound area alerting drivers of constraints and events in the system. Additional variable message signs along I-5 could be used to alert drivers that access into the stadium area is restricted during events and advising them of alternative routes. This would be particularly useful for drivers destined to the ferry.

After events, mitigation measures could include allowing only right turns for traffic exiting the Qwest Field parking garage. Also, traffic from I-5 using the new freeway off-ramp could be specifically routed onto northbound or southbound Fourth

Avenue South using variable message signs (as in pre-event conditions).

To maintain emergency vehicle access, a lane will be kept open on the surface street of South Royal Brougham Way, a measure which would prevent buses from lining up there. Instead, buses could be directed to line up on the elevated ramp between the Occidental Avenue South intersection and the entrance to the Qwest Field parking garage. Buses could then travel east or west, depending on which direction they were facing when parked.

What indirect effects will the project have on transportation?

The project will have no indirect effects on transportation.

Will the project contribute to any cumulative effects on transportation?

Both the No Build and project alternatives were analyzed using a consistent set of land use and transportation assumptions. The projected 2030 land use is based on the existing City of Seattle Comprehensive Plan and therefore does not include any of the zoning changes currently being considered as part of the Livable South Downtown planning process.

The 2030 traffic forecasts for the No Build Alternative and the project also assumed a consistent set of transportation capital and service improvements. Projects that were identified in local or regional plans and that had a likely source of funding were incorporated in the forecasts and analysis. The major planned transportation projects included in the 2030 forecasts are shown in Exhibit 5-44.

In November 2007, the City of Seattle released the *Draft EIS for Livable South Downtown Planning* (City of Seattle, 2007a), a SEPA programmatic EIS which evaluates options for a comprehensive neighborhood plan for the SODO area.

Exhibit 5-44. Planned Transportation Projects Assumed to be Complete by 2030

Project	Description
Alaskan Way Viaduct and Seawall Replacement Program	Replacement of the Alaskan Way Viaduct including First Avenue South frontage roads. An initial set of Moving Forward projects includes transit enhancements, column safety, utility relocations, replacing the south end between Holgate Street and South King Street, and improvements to the Battery Street Tunnel and Lenora Street to Battery Street.
I-90 HOV Lanes	Installation of high-occupancy-vehicle lanes in each direction along I-90 between Rainier Avenue South and Bellevue Way.
South Lander Street	Grade separation of South Lander Street between First Avenue South and Fourth Avenue South.
South Holgate Street	Closure of street-level crossing between Occidental Avenue and Third Avenue South.
Spokane Street Viaduct Improvements	Construction of a new ramp at Fourth Avenue South and addition of HOV lanes between I-5 and First Avenue South.
Sound Transit Phase I	Completion of Sounder commuter rail, express bus, and Link light rail between Sea-Tac Airport and the University of Washington.
East Link LRT Connection	Extension of light rail to Bellevue/Redmond across I-90.
Colman Dock Ferry Terminal	Expansion of Colman Dock and remote holding area.

Source: *Transportation Discipline Report.*

The study examines growth and planning issues specific to Pioneer Square, the Chinatown/ International District (including the Little Saigon area east of I-5), and the northernmost edges of the Greater Duwamish Manufacturing and Industrial Center. Preliminary recommendations were released by the City's Department of Planning and Development in March 2006. Land use and zoning changes considered as part of this process will require conducting an environmental review prior to legislative decision-making. If implemented, this plan could contribute to changes in travel patterns in the SR 519 area, including increased noncommercial vehicle, bicycle, and pedestrian activity. However, most of the traffic moving through the study area does not have an origin or destination within the study area (except during events), and that will not change under any of the potential land use scenarios.

5.10 Public Services and Utilities

Project operation will not affect utilities. The South Royal Brougham Way railroad overpass will allow public service vehicles to proceed freely and independently of rail traffic. During construction, WSDOT will maintain unimpeded passage for emergency service vehicles at all times.

South Royal Brougham Way north of Safeco Field

What are public services and utilities, and what is the study area for them?

Public services and utilities include fire protection, emergency medical service, police protection, solid waste and recycling collection, and an array of publicly and privately owned utilities (electricity, natural gas, telecommunications, water, wastewater, and stormwater). Using a 1,000-foot-wide radius around the project limits, the project team identified any public service or utility facilities and/or service boundaries that might be affected by the project by reviewing the City of Seattle Comprehensive Plan (2002), relevant websites, and GIS maps to identify public services and utility providers.

What emergency service providers are located in or serve the study area?

Fire and Emergency Medical Service

The Seattle Fire Department responds to all fire and emergency medical service calls in Seattle. Three fire stations (Exhibit 5-45) are located close to the project and respond to calls from the study area. Medic One is the Level 1 trauma facility for Seattle and provides advanced life support activities.

Exhibit 5-45. Fire Stations and Emergency Medical Serving the Study Area

Station #	Address	Equipment
10 (Department Headquarters)	301 Second Avenue South[a]	Engine company, ladder company, aid unit, and the primary Hazmat Unit
14	3224 Fourth Avenue	Ladder company, aid unit, and rescue unit
5	925 Alaskan Way	Engine company, fireboat
Medic One (Headquarters)	325 Ninth Avenue	Two Medic One units

[a]New station currently under construction approximately two blocks east of existing station at the intersection of Fourth Avenue South and South Washington Street.
Source: Seattle Fire Department, 2007.

Police

The Seattle Police Department (SPD) provides law enforcement and responds to 911 emergency calls in Seattle. SPD provides enhanced police service, including traffic control, during special events in the stadium area. In addition to the SPD, other law enforcement agencies either provide police protection or travel through the study area. The Washington State Patrol patrols and responds to calls along SR 99, SR 519, I-90, and I-5, and the BNSF Railway Police Solutions Team is responsible for the BNSF Railway. The King County Sheriff's Office and Port of Seattle Police use the arterials in the study area.

What other service providers and utilities are located in or serve the study area?

Several other public services and utilities serve the study area. Exhibit 5-46 lists the primary providers and services. Major utilities in the study area include a 96-inch combined stormwater and sewer line and a 72-inch stormwater line beneath and parallel to South Royal Brougham Way.

Exhibit 5-46. Service and Utility Providers in the Study Area

Company/Agency	Service Provided
Seattle City Light	Electricity
Puget Sound Energy	Natural gas
Seattle Public Utilities	Water
	Wastewater
	Stormwater
	Solid Waste/Recycling[a]
King County Natural Resources	Wastewater Treatment
Qwest Communications	Telephone and internet
Comcast	Cable TV, internet, and telephone
Millennium Digital Media	Cable TV, internet, and telephone

[a]SPU contracts to two private firms for collection - Waste Management, Inc., and Rabanco (a subsidiary of Allied Waste Services).

Source: Seattle Comprehensive Plan.

There are a number of other utility lines located in the study area both aboveground and underground, including electrical transmission lines, gas lines, water lines, and communication lines. Refer to the *Public Services and Utilities Technical*

Memorandum for complete information on all the public service and utility providers.

What were the methods used to evaluate the project's effect on public services and utilities?

The project team identified the public services and utilities that have designated service areas within the study area or that provide services or respond to calls within the study area. The project team then determined the effects of the project and the No Build Alternative by reviewing the existing conditions and the proposed project design to identify any areas of potential effects.

What would public services and utilities be like without the project?

The No Build Alternative would not improve the east-west movement of traffic or provide a new crossing over the BNSF Railway tracks; therefore, the response times of fire, emergency medical, police services, and other public service vehicles would either remain at their current levels or potentially increase (refer to the *Transportation Discipline Report* for more complete information). Because there would be no changes to existing utilities in the study area, no effects would occur.

What direct effects will construction of the project have on public services and utilities?

During construction of the project, response and travel times of fire, emergency medical, and police vehicles through the study area will increase due to construction-related traffic slowdowns. However, access will be maintained for emergency vehicles at all times. During daytime hours, South Royal Brougham Way may be kept open, but reduced to one lane of traffic in each direction. Construction of the railroad overpass could require about 18 to 21 months between 2010 and 2012. In coordination with the City of Seattle, WSDOT will prepare a construction management plan containing traffic management provisions to minimize effects of SR 519 Phase 2 construction on local roadways.

The project might require the temporary and/or permanent relocation of utilities. Relocations will be determined during the detailed design phase of the project.

What direct effects will operation of the project have on public services and utilities?

The project will improve the east-west movement of traffic through the study area by adding a more direct connection between I-5/I-90 and the central Seattle waterfront via South Atlantic Street, and it will remove conflicts between vehicles, pedestrians, and rail traffic at South Royal Brougham Way. The addition of an overpass above the BNSF Railway tracks at South Royal Brougham Way will allow uninterrupted crossing by public service vehicles, which will reduce response and travel times. Vehicle movements in the immediate project vicinity will be slower during event conditions.

The project will not result in any negative effects on utilities. Construction will avoid the large subsurface utilities that are present in the study area, and foundations for the new overpass at South Royal Brougham Way will be located to avoid placing any additional pressure on them from the weight of the structure. Section 5.3 describes the beneficial stormwater treatment that will be part of the project.

What measures are proposed to mitigate the effects of the project?

Mitigation measures to avoid or minimize adverse effects on public services and utilities during construction could include:

- Providing the fire department, police department, and other public service providers, including Seattle Public Utilities, with advance notice of construction schedules to allow for coordination and to minimize the effects of road closures.
- Scheduling construction during off-peak travel hours to minimize traffic congestion during peak travel hours, to the extent possible. For nighttime construction, a temporary noise variance from the City of Seattle might be required.
- Field-verifying the exact locations and depths of underground utilities prior to construction.

- Coordinating with the utility providers, including Seattle Public Utilities, to consider the location of utilities during detailed design. This measure will avoid or minimize conflicts related to disruptions of service, protection of existing utilities, and restrictions on access and maintenance-and-repair functions.
- Notifying area businesses and residents of utility interruptions, if any are required, by providing a schedule of construction activities in those areas, and coordinating any anticipated interruption of City services with Seattle Public Utilities.
- Preparing a subsurface utility engineering plan consisting of key elements such as existing locations, potential temporary locations (if required), and potential new locations for utilities (if required).

For a complete list of possible mitigation measures refer to the *Public Services and Utilities Technical Memorandum* prepared for this EA. Appendix B also provides further detail.

No mitigation will be required during operation of the project. WSDOT and the City of Seattle are in consultation to determine how street-level access to emergency response vehicles will be provided on South Royal Brougham Way at the crossing of the BNSF Railway tracks.

What indirect effects will the project have on public services and utilities?

The project will directly improve traffic flow, but it is not expected to have indirect effects on public services and utilities. It will not induce growth in the study area, Seattle, or King County that would increase the demand on or for public services and utilities.

Will the project contribute to any cumulative effects on public services and utilities?

The project could result in construction-related cumulative effects due to multiple projects occurring in the area at the same time. Construction-related congestion could increase travel and response times, and the projects could have

cumulative effects on utilities if they require multiple relocations or temporary bypasses. However, WSDOT will coordinate with the affected service providers and utility agencies during design and construction to minimize disruptions.

Over the long term, the project will make a beneficial contribution to public services, helping to reduce the long-term cumulative effect of continuing development on public services by incrementally improving traffic flow and thus emergency response times.

5.11 Visual Quality

The new I-90 off-ramp to South Atlantic Street and the South Royal Brougham Way railroad overpass will change views along Fourth Avenue South, South Atlantic Street, and particularly South Royal Brougham Way. WSDOT will design the project to be consistent with the industrial/sports-stadium/entertainment character of the neighborhood. Because these changes will be compatible with the surrounding visual environment, the resulting decrease in visual quality will be small. Construction activity will have a temporary negative effect on visual quality.

What are the existing visual components of the study area?

The study area was defined through review of aerial maps; several site visits; community input; and review of existing plans, policies, and maps. It includes roads and adjacent lands around the study area that have views of project components or will be seen from the proposed project.

View from north of Safeco Field along First Avenue South

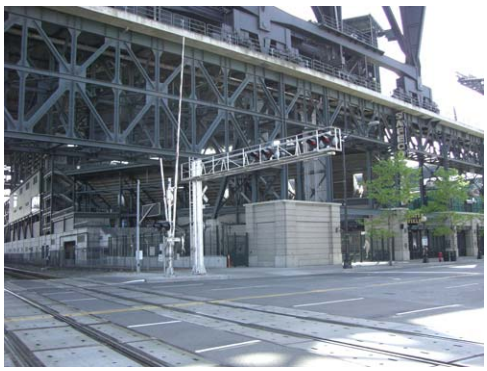
The project would be seen by various viewer groups who would have varying sensitivity to changes to the visual environment. Viewer groups and their viewing sensitivity would include drivers and passengers passing through the area to somewhere else (low sensitivity), pedestrians and bicyclists (high sensitivity), stadium and event center patrons (medium sensitivity), tourists and visitors (medium to high sensitivity), industrial and non-retail business employees and customers (low sensitivity), retail (including food/beverage) business employees and customers (medium sensitivity), and area residents (high sensitivity).

Safeco Field and parking structure for Qwest Field Event Center

The study area was organized into four corridors for the *Visual Quality Discipline Report* that was prepared to support the EA, which can be referred to for maps and descriptions of the corridors. The corridors and areas near them are all contained within the foreground distance zone (within 0.25 mile of the viewer) or middleground distance zone (between 0.25 and

5 miles of the viewer) of project components. Even within these viewing distances, the presence of existing public infrastructure, such as major arterials, bridges, ramps, stadiums, and railways, screens or blocks some views. The same public infrastructure that heavily influences views within the study area also influences its character.

Although the study area is visually complex, its character can best be described as a mixture of several different types, most notably industrial and sports stadium/exhibition center. The project is located in the northern portion of the SODO district in Seattle, within the Greater Duwamish Manufacturing and Industrial Center. This area has been traditionally characterized by its industrial environment and character. In recent years parts of the study area have undergone a transformation resulting from several forces, including the construction of the two professional sports stadiums and an exhibition facility. These large-scale structures have created a sports-stadium/exhibition center or entertainment district within the SODO area. Other areas away from the stadiums and exhibition facilities are also experiencing development and revitalization pressures, but generally retain an industrial character. The degree to which new structures reflect the industrial heritage of the areas varies. Some of the new structures, such as Safeco Field and the South Atlantic Street overpass, reflect and integrate the historic neighborhood industrial character into their design and adjacent streetscapes. Other new structures, such as Qwest Field and the Quest Field Event Center, use newer architectural materials and forms, but may use some design elements such as light fixtures and railings to tie into the historic context of the surrounding area.



Example of Safeco Field iron work (near BNSF track and South Royal Brougham Way)

What government regulations apply to the views and visual characteristics within the study area?

Federal (particularly NEPA) regulations ensure that the effects of transportation projects on visual resources and aesthetics are adequately considered when evaluating proposed projects. Washington State laws and regulations also address visual quality and aesthetics, including the State Environmental Policy Act, the Transportation Commission and Transportation

Department State Environmental Policy Act Rules, the Highway Beautification Act, and the Open Space Land Preservation Act.

Federal and state agencies provide guidance on how to fit projects into their environments from a visual and aesthetic perspective. Both FHWA and WSDOT provide policy and standards guidance relative to aesthetics and visual quality. These are included in sources such as the FHWA Visual Impact Assessment for Highway Projects (FHWA, 1990), FHWA Technical Advisory T6640.8A , the WSDOT *Environmental Procedures Manual* (WSDOT, 2007a), the WSDOT *Roadside Classification Plan* (WSDOT, 1996), and the WSDOT *Roadside Manual* (WSDOT, 2003).

It should be noted that although city comprehensive plans do not have jurisdiction over state highway projects or highway design, the City of Seattle Comprehensive Plan and Municipal Code (including the Stadium Transition Overlay District) contain visual resource oriented polices and goals. The policies and goals relevant to the study area include:

Streetscape elements near intersection of First Avenue South and South Atlantic Street

- Protecting public views of important features such as Mount Rainier and historic landmarks such as Smith Tower along view corridors, which include First and Fourth Avenues South and Royal Brougham Way
- Encouraging pedestrian friendly projects
- Retaining the character of areas with special character

The City of Seattle Design Commission provides review and input to projects relative to City design policies. More information on pertinent government regulations related to visual issues is provided in the *Visual Quality Discipline Report* prepared for this EA.

What methods were used to evaluate visual quality?

The project team performed the visual quality analysis according to the visual assessment system developed by FHWA described in *Visual Impact Assessment for Highway Projects* (FHWA, 1990). The first step in the system is to rate the

existing attributes of the study area to establish current visual quality. The three attributes that are examined and rated are vividness, intactness, and unity (see sidebar). The existing visual quality of the study area was determined by visiting the project vicinity multiple times. During the site visits, the project team documented existing conditions (such as potential viewers and their sensitivity to change, visual features, and viewsheds), and took photographs from six representative viewpoints that represent how the project will be seen from different parts of the study area. After the site visits, they reviewed additional background materials such as maps, aerial photographs, and City of Seattle planning and policy documents. All of these actions helped the study team develop visual quality ratings for the study area to serve as a baseline for evaluating the visual effects of the project.

Vividness: Describes how the elements of landform, water, vegetation, and human development combine to form a memorable composition. Vividness is ranked on a scale of 1 to 7, with a rating of 7 indicating a high degree of vividness.

Intactness: Measures the visual integrity of the natural and built landscape and its freedom from encroaching elements that are visually inconsistent with the viewed landscape. Well-kept urban and rural landscapes can have a high degree of intactness. Encroachment is ranked on a scale of 1 to 7, with a rating of 7 indicating no encroachment and 1 indicating a high degree of encroachment.

Unity: Measures the compositional harmony of the landscape or the degree of visual coherence when considered as a whole. High unity frequently reflects an intact natural landscape or in a human altered landscape, the careful design of individual components and their relationship in the landscape. Unity is rated on a scale of 1 to 7, with 7 representing a landscape with a coherent, harmonious (desirable) visual pattern.

The second step in the FHWA assessment system is to quantitatively assess how the project will change existing visual quality ratings. This was done by examining changes to the three attributes of vividness, intactness, and unity. The analysis was conducted by comparing the existing ratings of the six representative viewpoints with what the ratings will be of the same views with the project in place. The locations of the viewpoints are shown on Exhibit 5-47. The project team developed with-project ratings by comparing existing photographs with computer renderings (visual simulations) of what the viewed landscape will look like after the project is built. Details of project components shown in the simulations (Exhibits 5-48 through 5-53, presented later in this section) are conceptual only and do not necessarily reflect the final design. For each viewpoint, a qualitative description was made of how the most sensitive viewers at each viewpoint will be affected by the project.

What would visual quality be like without the project?

The visual quality of most of the study area would generally remain the same with the No Build Alternative, although future large-scale projects could affect visual character and quality.

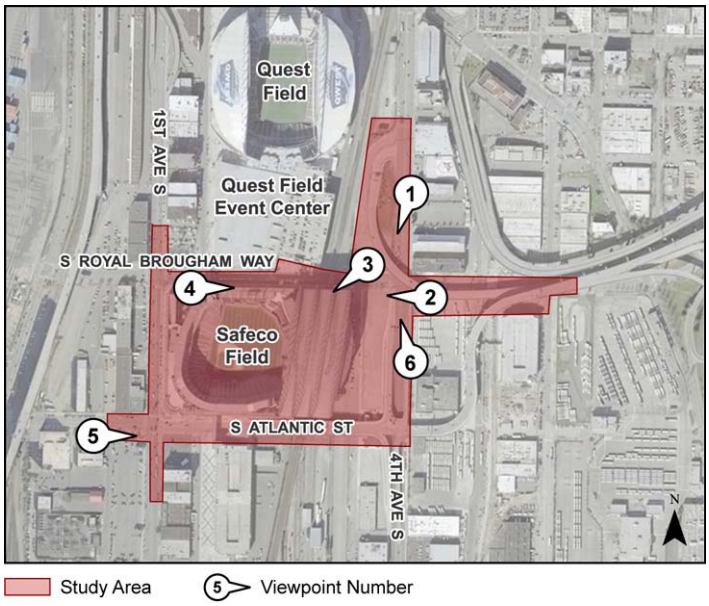


Exhibit 5-47. Viewpoints

One part of the study area where visual quality would be expected to decline under the No Build Alternative would be the area along South Royal Brougham Way. Increased traffic volumes and traffic conflicts among passenger vehicles, freight trucks, trains, bicyclists, and pedestrians would cause the visual environment to deteriorate and would have a negative influence on the public perception of that location.

What direct effects will construction of the project have on visual quality?

Construction could temporarily affect visual quality within the project footprint and the surrounding area. Typical construction effects that temporarily affect visual quality include dust, the presence and movement of equipment and materials, removal of existing vegetation, exposure of soils, glare and lights associated with construction, storage of construction materials, and general visual changes to the viewed landscape during the duration of construction.

What direct effects will operation of the project have on visual quality?

The improvements associated with the project will generally be compatible with the existing visual character of the study area and will have minor effects on visual quality. Although the

project will permanently change the visual environment for SR 519 users and viewers, it will be consistent with the existing mixed industrial and sports-stadium/exhibition-center character of the study area. Changes to existing visual quality ratings (which range from average to low) will not be substantial (the ratings are presented in the *Visual Quality Discipline Report* prepared for this EA). The direct effects of the project on the visual environment will include the following changes:

- Views along the portion of South Royal Brougham Way near Safeco Field and the Qwest Field Event Center as a result of building the South Royal Brougham Way railroad overpass
- Views of the additional bridge structure and adjacent pedestrian walkway over the BNSF Railway tracks that will connect Third Avenue South and South Royal Brougham Way
- Views of walls/fences at the BNSF Railway tracks in the South Royal Brougham Way right-of-way
- Views of approach fill (walls) that will be visible underneath the overpass near Third and Fourth Avenues South and Occidental Avenue South
- Views of the new I-90 off-ramp connecting the existing I-90 westbound ramp to South Atlantic Street
- Localized minor impediments to views of visual resources such as Mount Rainier and the Seattle downtown skyline from parts of Fourth Avenue South between the existing I-90 to Fourth Avenue South off-ramp and the South Atlantic Street to I-90 on-ramp
- Minor changes due to lighting, glare, and shading

Many of the views described above were included in the simulations that were developed for the six representative viewpoints (Exhibits 5-48 through 5-53) located throughout the study area. The effects of the completed project on views from the portion of South Royal Brougham Way west of the railroad

overpass are shown in Exhibit 5-51. The simulation from Viewpoint 4 illustrates how the west end of the overpass could appear from this location along the sidewalk next to Safeco Field.

Views of the project from locations along South Royal Brougham Way east of the overpass are depicted in Exhibits 5-49 and 5-50. Exhibit 5-49 provides a simulation from Viewpoint 2 looking along South Royal Brougham Way (near Fourth Avenue South). From this location, the overpass structure, loop ramp, and pedestrian plaza will likely be seen a block away to the west. Exhibit 5-50 is a simulation of a view from Third Avenue South (Viewpoint 3) looking west along South Royal Brougham Way. It provides a view of what the area under the overpass and east of the railroad tracks could look like from Third Avenue South.

Views of the project from two locations along Fourth Avenue South looking in different directions are depicted in Exhibits 5-48 and 5-53. Exhibit 5-48 provides an indication of what the north side of the railroad overpass could look like when viewed from Viewpoint 1 and areas near it. Exhibit 5-53 illustrates what the south side of the overpass could look like from Viewpoint 6 and nearby areas when looking north along Fourth Avenue South. Views of the southwest side (Viewpoint 5) of the study area are illustrated in Exhibit 5-52. The simulation depicts how the project could appear from areas near the intersection of South Atlantic Street and First Avenue South.

It should be noted that the simulations that were developed to depict views of proposed project components such as guardrails and columns are conceptual in nature. They were created to provide general graphic overviews of how the proposed project would fit into the landscape in which it would be built. Final design will occur after further refinement of the project.

Viewpoint 1: Existing View Looking South from Fourth Avenue South

Viewpoint 1: View of Project Looking South from Fourth Avenue South

Viewpoint Location

Exhibit 5-48
Viewpoint 1
Existing and With Project Illustrations

Viewpoint 2: Existing View Looking West from Fourth Avenue South and South Royal Brougham Way

Viewpoint 2: View of Project Looking West from Fourth Avenue South and South Royal Brougham Way

Viewpoint Location

Exhibit 5-49
Viewpoint 2
Existing and With Project Illustrations

Viewpoint 3: Existing View Looking West from South Royal Brougham Way and Third Avenue South

Viewpoint 3: View of Project Looking West from South Royal Brougham Way and Third Avenue South

Viewpoint Location

Exhibit 5-50
Viewpoint 3
Existing and With Project Illustrations

Viewpoint 4: Existing View Looking East from South Royal Brougham Way

Viewpoint 4: View of Project Looking East from South Royal Brougham Way

Viewpoint Location

Exhibit 5-51
Viewpoint 4
Existing and With Project Illustrations

Viewpoint 5: Existing View Looking East from South Atlantic Street and Utah Avenue South

Viewpoint 5: View of Project Looking East from South Atlantic Street and Utah Avenue South

Viewpoint Location

Exhibit 5-52
Viewpoint 5
Existing and With Project Illustrations

Viewpoint 6: Existing View Looking North from Fourth Avenue South

Viewpoint 6: View of Project Looking North from Fourth Avenue South

Viewpoint Location

Exhibit 5-53
Viewpoint 6
Existing and With Project Illustrations

What measures are proposed to mitigate the effects of the project?

Construction Mitigation

Temporary negative effects on visual character and quality related to construction activities, such as dust, night lighting, glare from equipment, and the presence of equipment and materials, are not expected to require mitigation measures beyond the BMPs to be implemented by WSDOT.

Operational Mitigation

The project team identified a number of potential mitigation measures that are described in Appendix B and in the *Visual Quality Discipline Report* prepared for this EA. The measures could help the project fit in with its visual environment, minimize negative effects on visual quality, and in some cases, improve existing visual quality. WSDOT incorporates context-sensitive design principles and considerations into the design of its projects. Considerations for this project will include incorporating architectural or urban design themes or elements from the study area (particularly from the stadiums) as well as existing streetscape components (such as street trees, paving patterns, and signs) into the project components to visually link them to their neighborhoods and the overall study area environment.

In addition, following some of the existing design features of I-90 and the SR 519 Phase 1 structures will help to ensure the project's visual consistency with its surroundings. Many of the potential measures discussed in the *Visual Quality Discipline Report* are general in nature. However, those selected will guide the design of the project past its current 10 percent complete phase. The design phase of the project will involve consultation with the City of Seattle and other stakeholders. More detailed examination and selection of mitigation measures will be conducted during the design phase as outlined in *Roadside Funding Matrix for WSDOT Capital Projects* (WSDOT, 2005b)

During the design phase, design standards will be developed for project elements such as signs, lighting, columns, walls, barriers, fencing, railings, plantings, and paving. The standards

will be developed with input from appropriate parties to ensure that the project fits in with its neighborhood.

What indirect effects will the project have on visual quality?

The three main components of the project will be consistent with the existing visual and landscape character of the portions of the study area where they will be built. The indirect effects of the project on the generally below-average existing visual quality will not be substantial.

Will the project contribute to any cumulative effects on visual quality?

The project will not contribute substantially to a cumulative change in the visual environment of the study area in the reasonably foreseeable future. The addition of transportation-related structures will be consistent with the visual character of the existing environment. Reasonably foreseeable future actions, including changes to the south end of the Alaskan Way Viaduct, will be too distant from the project site to interact substantially with the proposed SR 519 improvements in ways that will cumulatively affect the visual quality of the study area.

The project's effects on visual quality will be mitigated through measures such as those discussed previously and in Appendix B. The project will be consistent with design features already incorporated into Phase 1 of the SR 519 Intermodal Access Project and visually compatible with the stadium buildings and highway structures already present in the study area, minimizing the cumulative effect of the project on the visual environment.

5.12 Threatened and Endangered Species

The project will not affect any threatened or endangered species or critical habitat listed, or eligible for listing, under the Endangered Species Act.

WSDOT has determined that the project will have no effect on any species or designated critical habitat listed or proposed for listing under the Endangered Species Act (ESA). The project team obtained information from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service (NOAA Fisheries) to determine the presence or absence of listed and proposed threatened or endangered species and of designated and proposed critical habitat in the study area. The team also conducted an onsite field review of the study area on April 16, 2007, to determine the status and availability of suitable habitat for listed species in the action area as well as any potential effects of the project on such habitat or on individual plants or animals.

The species considered in the analysis were limited to those listed or proposed under the ESA that have suitable habitat in, or in the vicinity of, the study area: bald eagle, coastal-Puget Sound bull trout, Puget Sound Chinook salmon, Puget Sound steelhead, leatherback sea turtle, southern resident killer whale, humpback whale, and Steller sea lion.

Because of the project's location and distance from suitable habitats for these species, there will be no physical contact with, or construction-related disturbance to, the habitats or plants or animals listed under the ESA. By providing onsite stormwater treatment, the project will reduce pollutant loads from the project site below current levels and produce a net benefit to water quality. For these reasons, the project will have no effect on listed species or their designated critical habitats.

5.13 Cumulative Effects

The project will not contribute to any significant adverse cumulative effect. By reducing vehicle idling times, the project will help to limit the growth of cumulative air quality and noise effects between now and 2030.

What are cumulative effects, and why are they important?

Cumulative effects are important because they help us to understand the project in terms of a bigger picture—how the project might interact with effects persisting from past actions, with present-day activities, and with other projects that are planned but have not been built yet. In this way, cumulative effects can reveal broader and sometimes unintended consequences that might not be apparent when we look at the project by itself (CEQ, 1997).

What are cumulative effects?

Cumulative effects are impacts on the environment that result "from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Defined by FHWA and Council on Environmental Quality (CEQ) regulations (40 CFR 1508.7)." (WSDOT, 2006)

How did the project team identify expected cumulative effects?

The project team identified expected cumulative effects of the project and No Build Alternative by following a process recommended by the President's Council on Environmental Quality (CEQ, 1997) and as identified in Chapter 412 of the WSDOT *Environmental Procedures Manual* (WSDOT, 2007a). First, the team considered how past and present actions have already affected the study area. Next, they added the expected direct and indirect effects of the project or No Build Alternative on the particular resource being analyzed. Finally, the project team considered the probable effects of other reasonably foreseeable future actions (RFFAs) that are planned but not yet built. The team combined the past and present actions, direct and indirect effects, and RFFAs to produce a comprehensive view of how resources might be affected under the project or the No Build Alternative in the future.

Sections 5.1 through 5.12 identify and discuss the small contributions which the project and, in some cases, the No Build Alternative could make to cumulative effects on specific resource components.

Past and Present Actions

The SR 519 study area is located within the SODO neighborhood, which is part of the larger Greater Duwamish Manufacturing and Industrial Center (City of Seattle, 2006b). The area has been a regional shipping, manufacturing, and commercial center of the Pacific Northwest since the late nineteenth century, and remains so. *Toward a Sustainable Seattle*, the City's comprehensive plan as amended through 2005 (City of Seattle, 2005a), and the *Greater Duwamish Manufacturing and Industrial Center Plan* (Greater Duwamish Planning Committee, 1999) consistently emphasize industrial activities as the preferred and dominant land use within the area. Their policies prioritize manufacturing, warehousing, marine uses, transportation, utility, construction, and similar uses.

SR 519 is the essential transportation route for moving freight between the Seattle waterfront and I-5 and I-90. The Port of Seattle terminals have expanded over the years and the increase in freight entering and leaving the terminals has increased the amount of freight traffic in the study area. Consequently, a major purpose of the project is to ensure that freight moves efficiently through the study area in the future.

At the same time, the establishment of Safeco Field, Qwest Field, and Qwest Field Event Center in the recent past has introduced regional magnets for major public gatherings and support a growing commercial base in the study area. Especially during home games and major exhibitions, event-related traffic, pedestrians, railway operations, and commuter traffic can combine during the evening peak hours and cumulatively produce highly congested conditions (City of Seattle, 2006a). Transportation conflicts and the proliferation of non-industrial developments in industrial areas are two of the critical issues identified in the *Seattle's Industrial Lands: Background Report* (City of Seattle, 2007b).

Completion of Phase 1 of the SR 519 Intermodal Access Project in 2004 improved mobility in the study area for east-west traffic and provided an elevated crossing over the BNSF Railway tracks at South Atlantic Street. The Port of Seattle

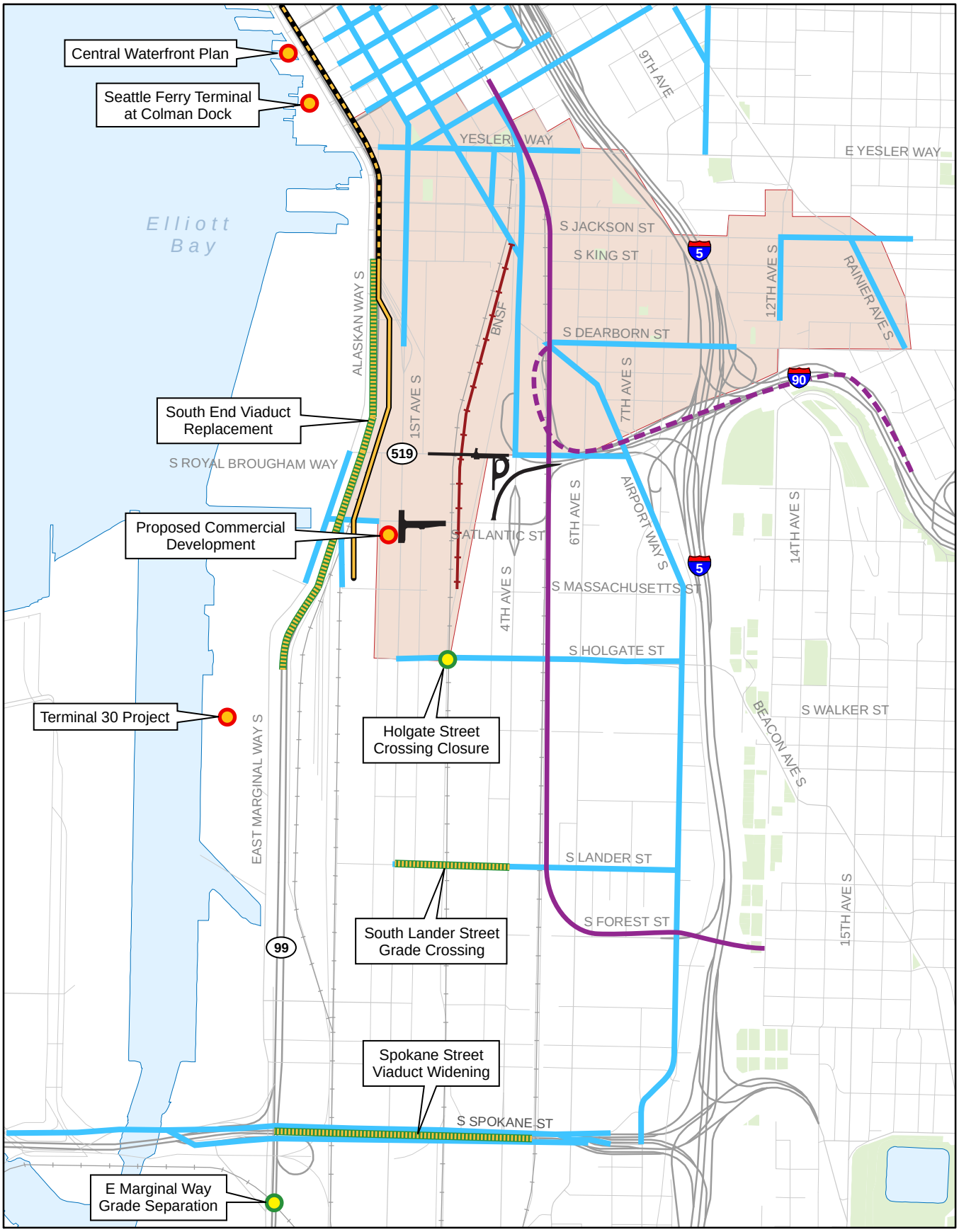
terminals, Qwest Field, Qwest Field Event Center, and Safeco Field generate or attract substantial volumes of traffic, and the stadiums and event center bring many pedestrians into the study area during sporting and other events.

Reasonably Foreseeable Future Actions

Exhibit 5-54 shows approximate locations of some of the larger reasonably foreseeable future actions (RFFAs) that could add to or interact with the project to contribute to cumulative effects on the environment. Exhibit 5-55 summarizes information about these projects. They include, but are not limited to:

- The South Holgate Street to South King Street Viaduct Replacement Project and the two-phase Electrical Line Relocation Project, both of which are Moving Forward projects within the Alaskan Way Viaduct and Seawall Replacement Program
- The South Spokane Street Viaduct project
- Completion of BNSF Railway track improvements
- Sound Transit light rail projects
- Closure of the South Holgate Street rail crossing
- Conversion of the Port of Seattle's Terminal 30 to a container terminal
- The East Marginal Way Grade Separation Project
- The City of Seattle's Central Waterfront Plan
- The City of Seattle's Bridging the Gap paving projects
- Washington State Ferries Terminal Improvements at Colman Dock

Urban development is increasing in portions of the SODO area immediately north of the study area. In November 2007, the City of Seattle released the *Draft EIS for Livable South Downtown Planning* (City of Seattle, 2007a), a SEPA programmatic EIS which evaluates options for a comprehensive neighborhood plan for the SODO area.



Project
Livable South Downtown Study Area (Approx.)
BNSF Railway Completion
Electrical Line Relocation Phase 1 and Phase 2
Sound Transit Central Link
Proposed Sound Transit East Link
Bridging the Gap Paving Project
Road Project
Development Project

Source: City of Seattle (2007) and King County (2006)

N

0 1,000 Feet

Exhibit 5-54
Reasonably Foreseeable Future Actions

Exhibit 5-55. Reasonably Foreseeable Future Actions in or Near the Study Area

Project[a]	Location	Purpose	Proponent	Expected Construction Time Frame[b]
South Holgate Street to South King Street Viaduct Replacement Project	SR 99 from South Holgate Street to South King Street	Build new SR 99 between South Holgate Street and South King Street. Includes South Atlantic Street and South Royal Brougham Way grade separation, detour routes, and temporary connections.	Washington State Department of Transportation	2009-2012
Electrical Line Relocation	Phase 1: South Massachusetts Street to South King Street Phase 2: South King Street to Union Street	Remove network distribution lines and transmission lines that are located under the existing Viaduct before it is demolished.	Washington State Department of Transportation	Phase 1: Construction scheduled for 2008-2009. Phase 2: To be determined.
Completion of BNSF Railway Improvements	King Street Station to South Royal Brougham Way	Reduce rail transportation conflicts along the BNSF right-of-way; increase safety at the BNSF crossing of South Royal Brougham Way.	BNSF Railway	Improvements at South Royal Brougham Way have been completed; with additional improvements along the BNSF right-of-way currently in progress.
Central Link Light Rail	Downtown Seattle to Sea-Tac Airport	Provide light rail service between downtown Seattle and Sea-Tac Airport.	Sound Transit	2008-2009
East Link Light Rail	Downtown Seattle to Redmond	Provide light rail service between downtown Seattle, Mercer Island, Bellevue, and Redmond.	Sound Transit	Construction not scheduled. Environmental impact statement scheduled for release in fall 2009.
Proposed Commercial Development	South side of South Atlantic Street between First Avenue South and Utah Avenue South	Provide office and retail uses.	Gull Industries	2010-2012
Livable South Downtown Planning Study	The study examines growth and planning issues specific to Pioneer Square, the Chinatown/ International District (including the Little Saigon area east of I-5), and the northernmost edges of the Greater Duwamish Manufacturing and Industrial Center.	Stimulate housing and related development consistent with the Mayor's Center City Seattle strategy.	City of Seattle, Department of Planning and Development	Environmental impact statement and legislative proposals in 2008
Closure of South Holgate Street at BNSF Railway Crossing	South Holgate Street at the BNSF Railway crossing	Eliminate conflicts between rail and vehicle traffic.	City of Seattle, Department of Transportation	Construction not scheduled

Exhibit 5-55. Reasonably Foreseeable Future Actions in or Near the Study Area

Project[a]	Location	Purpose	Proponent	Expected Construction Time Frame[b]
South Lander Street Grade Separation	South Lander Street between First Avenue South and Fourth Avenue South	Improve safety and traffic flow by constructing a roadway bridge for vehicles, bicycles, and pedestrians over the BNSF Railway tracks.	City of Seattle, Department of Transportation	2009-2011
South Spokane Street Viaduct Widening	South Spokane Street from Sixth Avenue South to West Seattle Bridge	Improve traffic safety and upgrade the structural and seismic performance of the viaduct that connects I-5 to the West Seattle High Level Bridge. Construct a new eastbound loop ramp to Fourth Avenue South, to the south of South Spokane Street.	City of Seattle, Department of Transportation	Seismic retrofit, median barrier installation, and street-level utility relocations have been completed. Viaduct widening and ramp construction is scheduled to start in 2008 and will be constructed in phases as funds become available, so exact construction range not known.
Bridging the Gap Paving Projects	Seattle arterial streets	As part of a larger program, the paving projects will resurface, restore, or replace approximately 300 lane-miles of arterial streets; rehabilitate or replace 3-5 bridges and seismically retrofit 5 additional bridges; repair or restore approximately 144 blocks of existing sidewalks; build approximately 117 blocks of new sidewalks; rehabilitate approximately 50 stairways; and restripe about 5,000 crosswalks.	City of Seattle, Department of Transportation	2006-2013
Central Waterfront Plan	South Atlantic Street to West Thomas Street along the shoreline edge of the Center City	Following replacement of the existing Alaskan Way Viaduct, construct new parks and open spaces, shoreline and habitat improvements, improved linkages to the downtown core, and transit connections, and implement land use and regulatory changes.	City of Seattle	Presently in planning process. Construction will begin with the removal of the viaduct and will be ongoing for several years.

Exhibit 5-55. Reasonably Foreseeable Future Actions in or Near the Study Area

Project[a]	Location	Purpose	Proponent	Expected Construction Time Frame[b]
Terminal 30 Conversion	East Marginal Way South between approximately South Holgate Street and South Lander Street	Terminal 30 had been used for cruise operations but will be converted back to its original use as a container terminal. This and the adjacent Terminal 25 will provide 70 acres for container use.	Port of Seattle	2007-2009
East Marginal Way Grade Separation Project	East Marginal Way South just south of South Spokane Street	Provide a north- and southbound grade separation on Duwamish Avenue South, relocating East Marginal Way through this corridor to improve access among Port of Seattle terminals, rail yards, and industrial warehouses.	Port of Seattle	2006-2008
Washington State Ferries Terminal Improvements at Colman Dock	Pier 54 at Seattle Waterfront on Alaskan Way South	Upgrade structures and facilities and increase capacity.	Washington State Department of Transportation	Construction not scheduled. For 2008-2009, focus will be on system-wide planning and coordination with nearby projects, including the proposed SR 519 Phase 2.

[a]Only major planned projects are listed. Many other projects that could be implemented in the reasonably foreseeable future are not shown.

[b]Dates are approximate.

Sources: General information from the WSDOT, City of Seattle, Port of Seattle, and Sound Transit websites.

The study examines growth and planning issues specific to Pioneer Square, the Chinatown/International District (including the Little Saigon area east of I-5), and the northernmost edges of the Greater Duwamish Manufacturing and Industrial Center. Preliminary recommendations were released by the City's Department of Planning and Development in March 2006. Land use and zoning changes considered as part of this process will require conducting an environmental review prior to legislative decision-making.

The project most likely to interact with the project in the near future is the South Holgate Street to South King Street Viaduct Replacement Project. That project, a Moving Forward project within the Alaskan Way Viaduct and Seawall Replacement Program, is scheduled for construction from 2009 to 2012, the same time frame as the project, and it will be located immediately west of the proposed SR 519 improvements.

Will the project make a substantial contribution to any adverse cumulative effects?

Operation of the SR 519 Phase 2 project will not make a substantial contribution to any adverse cumulative effect in the reasonably foreseeable future. From a beneficial standpoint, however, project operation will improve westbound traffic flow from the I-5/I-90 freeway system to the Port of Seattle terminals, other Seattle waterfront destinations, and the stadium area, helping to relieve the cumulative traffic congestion that presently characterizes the study area. In the cases of air quality, water quality, and noise, project operation will again make small but positive contributions to reducing unwanted cumulative effects in the study area by 2030, the project design year.

During construction, from 2009 until 2012, the project could interact with nearby construction of the South Holgate Street to South King Street Viaduct Replacement Project, which is scheduled for the same time frame. This could produce short-term, local, construction-related cumulative effects relating to traffic, soil erosion, air quality, sediment in stormwater runoff, and construction noise. The project's contribution to these

cumulative effects will be minimized through BMPs and other conservation measures built into the project, and by further mitigation measures as needed. These measures are discussed in the preceding individual sections on construction effects, and in Appendix B. The individual analyses presented previously in this chapter provide further information on expected cumulative effects.