

APPENDIX B – POTENTIAL MITIGATION MEASURES

This appendix identifies measures that may be implemented to mitigate temporary construction effects or permanent long-term effects. Final mitigation commitments will be listed in the final environmental document.

The following technical areas are included:

1. Air Quality
2. Archaeological Resources
3. Economics
4. Environmental Justice
5. Geology and Soils
6. Hazardous Materials
7. Historic Resources
8. Land Use and Shorelines
9. Noise
10. Parks and Recreation
11. Public Services and Utilities
12. Relocations
13. Social Resources
14. Transportation
15. Vibration
16. Visual Quality
17. Water Resources

1 Air Quality

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 could become airborne during demolition, material transport, grading, driving of vehicles and machinery on- and off-site, and through wind events. Washington State

Department of Transportation (WSDOT) will comply with the procedures outlined in the Memorandum of Agreement between WSDOT and the Puget Sound Clean Air Agency for controlling fugitive dust and will prepare a fugitive dust control plan.

Possible mitigation measures to minimize construction-related emissions of fugitive dust, carbon monoxide (CO), and nitrogen oxides (NO_x) are listed below¹:

¹ Associated General Contractors of Washington. 1997

- Use phased development to keep disturbed areas to a minimum.
- Use wind fences to reduce disturbance to soils.
- Restrict on-site traffic 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.
- Minimize odors by covering loads of hot asphalt.
- Spray exposed soil with water or other dust palliatives to reduce particulate emissions and the deposition of particulate matter.
- Cover all trucks transporting materials, wet materials in trucks, or provide adequate freeboard (space from the top of the material to the top of the truck) to reduce particulate emissions during transportation.
- Provide wheel washers to remove the particulate matter that vehicles would otherwise carry off-site to decrease deposits of particulate matter on area roadways.
- Remove particulate matter deposited on paved public roads to reduce mud and resultant windblown dust on area roadways.
- Route and schedule construction trucks to reduce delays to traffic during peak travel times to decrease secondary air quality effects caused by a reduction in traffic speeds while waiting for construction trucks.
- Route construction trucks away from residential and business areas to minimize annoyance from dust.
- Place quarry spall aprons where trucks enter public roads to reduce the amount of mud tracked out.
- Gravel or pave haul roads to reduce particulate emissions within the project limits.
- Require appropriate emission-control devices (e.g., diesel oxygen catalyst, diesel particulate filters, and particulate traps) on large pieces of diesel-fueled equipment to

reduce CO, NOx, and particulate emissions in vehicular exhaust.

- Use relatively new, well-maintained equipment to reduce CO and NOx emissions.
- Require the use of low or ultra-low sulfur fuels in construction equipment to allow for the use of effective particulate-emission control devices on diesel vehicles.
- Coordinate construction activities with other projects in the area to reduce the cumulative effects of overlapping construction projects.

Mitigation for Long-term Effects

Because mobile source air toxics emissions are not expected to increase and no exceedances of the National Ambient Air Quality Standards are anticipated, no significant adverse air quality effects are expected from the project. Therefore, no long-term mitigation measures would be necessary. Any transportation demand control measures that reduce traffic volumes and levels of congestion within the study area, such as improving transit connections into downtown, would reduce traffic-related air pollutant emissions.

2 Archaeological Resources

Construction Mitigation

There are no unavoidable adverse effects to archaeological properties currently known within the area of ground disturbance.

Because sub-surface exploration has been limited, eligible archaeological properties may yet be identified and damaged by construction. Potential adverse effects will be resolved in a Section 106 Memorandum of Agreement developed among WSDOT, the Federal Highway Administration (FHWA), the Washington State Department of Archaeology and Historic Preservation (DAHP), Advisory Council on Historic Preservation (ACHP), affected tribes, and the City of Seattle. The Memorandum of Agreement identifies responsible parties for complying with elements of the agreement, outlines mitigation measures and an archaeological monitoring plan that would be applied, and binds signatories to comply with the mitigation measures.

Mitigation for Long-term Effects

Operation of the project would not affect intact archaeological resources; therefore, no mitigation would be necessary.

3 Economics

Construction Mitigation

A program of public information and business assistance measures will be developed; these measures would include conducting public information campaigns to encourage patronage of businesses during construction.

Construction activities could interfere with access to some businesses and properties adjacent to the project on each side of the right-of-way. A primary goal of construction planning is to maintain adequate access to all businesses so they can continue to operate. Signage would be used to help customers to recognize that the businesses are open.

Mitigation for Long-term Effects

Operational effects would be very minor, and the project's design was developed to avoid or minimize the extent and number of businesses, jobs, and access that would be permanently affected; therefore, no mitigation would be necessary. Compensation for partial acquisitions and permanent utility easements would be provided at fair market value and would comply with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

4 Environmental Justice

Construction Mitigation

Construction effects to minority and low-income populations can be avoided, minimized, and mitigated. Discussions with service providers have identified potential solutions to many known and potential construction effects. The key to minimizing potential effects is ongoing community outreach and communication efforts before, during, and after construction. Continued outreach during the construction period will be important to ensure that the suggested measures are successful and to understand how they might be modified to be more effective.

The following potential mitigation measures are specific to St. Martin de Porres Shelter:

- Identify a safe pedestrian route(s) between Pioneer Square/downtown and St. Martin de Porres Shelter to allow movement of people to and from the shelter throughout construction. This includes providing a pedestrian crossing at Alaskan Way S. and S. Atlantic Street. Information about this route would be distributed

to social service providers, advertised, and signed to allow better access.

- Monitor noise levels during construction. Specifically, monitor the noise levels during the nighttime summer months when windows at the shelter need to be open for ventilation.

The following are general potential mitigation measures:

- Ensure continuous access to buildings, properties, and loading areas used by social service providers during construction to facilitate:
 - Emergency access at all times.
 - Client and employee access at all applicable hours.
 - Delivery access.
- Work in collaboration with public transportation (King County Metro Transit) to plan consistent bus schedules and facilitate traffic flow.
- Help provide and facilitate route planning support during construction for service providers and the public.
 - Early notification of route changes.
 - Posted in multiple languages in many locations.
- Notify the public early about construction activities (bus service, road closures, sidewalk closures, etc).
 - Translate materials into different languages.
 - Send notices directly to service provider staff.
- Secure construction sites to prevent entry and injuries, especially by homeless persons.
 - Light construction areas during the night.
 - Conduct security sweeps to look for people who may have found their way into the construction site.
- Train construction workers on how to interact with homeless persons they may encounter at construction sites.
- Facilitate alternative transit access during construction.
- Conduct outreach communication with representatives of area homeless shelters, special needs housing, transitional housing, and related social service organizations prior to the start of construction to develop specific mitigation measures for the needs of these special low-income populations, including those living on the streets.
- Maintain regular communication with minority-owned businesses that may be affected by construction-related traffic congestion.

- Consider distributing flyers to service providers and local businesses and placing flyers on windshields of cars parked in long-term parking concerning when vehicles need to be moved. List other long-term parking alternatives in the area.

Mitigation for Long-term Effects

Once construction is completed, most of the project effects are likely to be short-term as people and service providers adjust to the changes in the transportation infrastructure. It is important to keep in mind the sensitive aspects of minority and low-income populations, including economic disadvantages, physical and mental disabilities, and language and cultural barriers that may make transitions and changes more difficult to adapt to. Continued community outreach and communication after construction is completed will be a crucial part of minimizing adverse effects. The following list identifies infrastructure considerations as well as community outreach and communication activities that should occur prior to the opening of the new facilities to educate and prepare the public for changes in their community. These measures will help avoid, minimize, and mitigate adverse effects of the project.

- Work with service providers to facilitate changes in access to their facilities for their clients, employees, and deliveries. This includes providing a debriefing for service providers to disseminate information about transit and route changes and options for minority and low-income populations.
- Continue communications with social service providers and homeless people through interviews and briefings to learn more about people who may live out of vehicles and what other parking alternatives exist for that population.
- Use newsletters, websites, posters, newspaper inserts, television and radio public announcements, special neighborhood public meetings, and other similar methods of communication to announce to the general public the upcoming opening and use of the new roadway facilities. Publish these messages in non-English languages to accommodate the area's diverse population.
- Coordinate the opening of the facilities upon completion of construction with modes of public transportation—bus and light rail. Both public and private transportation providers would need to know how to change operations and communicate these changes to their users.
- Continue to coordinate with transit agencies to conduct special outreach activities to communicate new transit service and operations to members of the public who have

mobility limitations and the transit-dependent. Coordination efforts would be extended to social and employment services that work with these special populations, as well as low-income and homeless populations (including those living on the street and in vehicles).

- Install a substantial network of temporary signs, posters, or reader boards to guide vehicular or transit traffic in the first several weeks or months after the opening of the new roadway facilities. Consider using a special opening-event logo or theme so signs are easily recognizable.

5 Geology and Soils

Construction Mitigation

Mitigation measures for the construction effects are based on the site information and standard design and construction procedures. All effects can be mitigated, as discussed in this section.

Erosion and Sediment Transport

Construction Best Management Practices (BMPs) appropriate for the project, such as construction staging barrier berms, filter fabric fences, temporary sediment detention basins, and use of slope coverings to contain sediment on-site, will be effective in protecting water resources and reducing erosion from areas with cuts, fills, or excavations. Erosion control measures suitable to the site conditions will be included as part of the design. A temporary erosion and sediment control (TESC) plan will be prepared for approval in accordance with the WSDOT *Highway Runoff Manual*.

Excavations and Dewatering

Proper shoring or sloping of the excavation should be performed to mitigate potential sloughing of soils and lateral movement or settlement of nearby existing roadways, railways, structures, and utilities. The shoring system should consider the loads applied due to construction equipment working behind the top of the excavation and any other surcharge loads.

Dewatering of soils within and below excavations may be performed by using sumps or well points in small excavations and dewatering wells in deep excavations. The dewatering system should be designed so that the groundwater outside the excavation is not changed in areas where adjacent structures may be affected. Mitigation measures would include the use of groundwater recharge wells, dewatering in small sections, or

use of barriers (e.g., sheet piles, diaphragm walls) to isolate the groundwater table within the excavation.

The dewatering wells should be carefully constructed to the specified design of the well depth, length, screen, and filter pack. Proper maintenance of the pumping wells should be performed to ensure that they are working as designed. Monitoring of the groundwater table and settlement outside of the excavation should be performed to confirm that the dewatering system is working as designed. The effectiveness of these systems would greatly depend on the soil conditions at the dewatering location.

Stockpiles and Spoils Disposal

Construction BMPs discussed in the previous section would mitigate some of the construction effects related to spoils disposal. If excavated soils are to be used as fill in other areas, they should be noncontaminated, not contain debris or organics, and not be too wet. Spoils that are to be used as landscaping fill or structural fill may be stored in stockpiles at staging areas located along the project corridor. Stockpiles should not be placed directly over utilities or pavements that should not be damaged. Alternatively, stockpile heights could be limited so that excessive settlement or damage of underlying utilities or pavements does not occur. The stockpiles should be lined and covered with plastic to avoid erosion due to surface water and rain and could be surrounded by silt fences.

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 possible. If feasible, reprocessed aggregate will be reused in concrete or fills on the project or other projects in the Seattle area. Similarly, asphalt can also be reprocessed and mixed with soil for fills, and steel rebar can also be recycled. Uncontaminated soil from excavations will be used as fill either for the project or at other projects in the area requiring fill.

Fill Embankments

For fill embankments over soft soils, the short-term stability is usually the most critical. The short-term construction stability of the proposed fill embankments could be improved using staged construction, ground improvement, or geotextiles. These mitigation methods would improve the short-term stability of the fill embankments as the underlying cohesive soil consolidates and gains strength over time.

Foundations

Foundations that are being considered for this project include cast-in-place concrete piles, drilled shafts, and micropiles. Soldier piles or sheet piles may also be used for shoring systems.

Temporary and Permanent Retaining Walls

Numerous retaining wall types could be selected to retain soils around permanent and temporary excavations. For all of these wall types, proper construction procedures would mitigate potential settlement and ground movement adjacent to the wall. The depths of the walls should extend deep enough into suitable bearing soil to resist the pressures that would be exerted on the wall.

In areas where additional support is needed for a wall and the wall height cannot be reduced, the use of bracing systems such as internal bracing or tiebacks could be considered. Prior to installation of tiebacks, a careful survey of adjacent utilities and foundations should be performed. If utilities or foundations are present, tieback configurations can be altered or internal bracing or a cantilever wall system used in that area. Additional mitigation measures include minimizing unsupported wall heights, controlling ground losses, and timely installation of suitable bracing or tiebacks.

Ground Improvement

Ground improvement techniques specific to the particular construction zone would be selected by WSDOT, and should be performed by construction personnel with experience in the selected ground improvement technique. Types of techniques that could be used are jet grouting, deep soil mixing, and vibro-replacement. During any type of ground improvement installation, monitoring of adjacent utilities or structures should be performed. In areas requiring ground improvements, strict controls will be imposed on construction methods to contain spoils and excess water caused by ground improvement technique. These controls typically include using earth dams to confine fluids, continuously recirculating water, and limiting the amount of on-site stockpiling of spoils from excavations. Another alternative is to select ground improvement methods that do not produce spoils or excess water.

Removal of Existing Structures

If deep foundations are to be removed, vibration techniques should only be used in areas where adjacent structures or utili-

ties are not present. Non-vibratory techniques should be used in areas where adjacent utilities or structures cannot tolerate vibration or settlement. Alternatively, vibration monitoring could be performed to confirm that tolerances are not being exceeded.

Construction Vibrations

Several of the proposed construction methods could cause vibration, including pile driving, stone column installation, and other construction activities. These vibrations could cause ground settlement and damage to utilities and structures. Mitigation is described under Section 15 Vibration in this appendix.

Mitigation for Long-term Effects

The project will be designed to avoid or minimize major effects wherever possible. Where project effects cannot be avoided entirely, the project design will minimize effects to the extent possible. During preliminary design, WSDOT will conduct geotechnical investigations to understand subsurface conditions prior to final design. Mitigation measures for long-term fill settlement, traffic-induced vibrations, and seismic hazards will be identified following this investigation, and methods for mitigating their potential effects will be developed, where determined appropriate. Examples of these mitigation measures include the following:

- To avoid risks of long-term ground settlement, the proposed structures would be constructed on deep foundations that extend through the compressible soils to denser bearing material.
- New structures at risk from earthquake-induced liquefaction and ground settlement will be designed according to WSDOT seismic design standards.

6 Hazardous Materials

Construction Mitigation

Before construction starts, WSDOT will prepare a spill prevention, control, and countermeasures (SPCC) plan that sets forth procedures that would be followed and equipment and materials that would be used if contaminated media are encountered during construction.

Mitigation and hazardous materials handling and disposal options for the construction effects of the proposed action are summarized below.

Contamination is likely to be encountered during construction. The project may avoid some areas of contamination by not acquiring properties that have been identified as having known or potential contamination. However, contamination may not be avoidable in areas of the SR 99 right-of-way where earthwork is anticipated.

Soil handling options include (1) using soils that do not exceed appropriate Washington State Model Toxics Control Act (MTCA) cleanup levels under roadways as fill [if the soils meet both state and regulatory requirements and geotechnical fill specifications], or (2) transporting the soils to a thermal treatment facility, landfill, or dangerous waste landfill or incinerator.

For structures that would be modified, it would be necessary to verify the presence of asbestos-containing building materials and lead-based paint. This would be accomplished as a pre-demolition building survey conducted by an Asbestos Hazard Emergency Response Act (AHERA)-certified building inspector. If asbestos-containing building materials or lead-based paint were identified, mitigation would consist of removing these materials in compliance with the Washington Industrial Safety and Health Act and Puget Sound Clean Air Agency standards prior to building demolition and disposing of them in an approved facility. Removal of any discovered underground storage tanks or pipelines will comply with the Washington State Department of Ecology's Underground Storage Tank Statute and Regulations (Chapter 90-76 RCW, Chapter 173-360 WAC).

Contamination would likely be encountered during earthwork in the fill and in the right-of-way. Petroleum- and creosote-contaminated soil, as well as creosote-treated timber, would likely be encountered. If petroleum contamination, asbestos-containing building materials, or lead-based paint are encountered, mitigation is expected to be reasonably predictable. Remediation of other potential contaminants that may be encountered, such as halogenated solvents and other solvents, metals, polychlorinated biphenyls (PCBs), creosote, formaldehyde, volatile and semivolatile organic compounds, and polycyclic aromatic hydrocarbons (PAHs), is not considered reasonably predictable.

The presence of hydrogen sulfide (H₂S) at the north end of the project area may require special procedures, including monitoring and mechanical ventilation of excavations. For any

dewatering activities that encounter H₂S dissolved in the groundwater, treatment would most likely be required prior to discharge.

Minimization of Effects

To minimize the amount of contamination that may be encountered, Phase II Environmental Site Assessments may be performed in areas where excavation or drilling is expected to determine the location and extent of contamination so as to avoid hot spots. For bridge foundations, driven piles should be used instead of drilled shafts, if possible, to reduce the potential for opening conduits for contaminant migration.

The slurry used in construction may become contaminated. To reduce the potential for contamination, the contaminated portion of the hole could be cased, to a maximum practicable depth of about 50 feet. If slurry were to become contaminated, the contaminated slurry (below appropriate MTCA cleanup level criteria) could be reused within the contaminated zone on the property, but may not be acceptable for use elsewhere on the project. The contaminated slurry could be handled separately, reducing the volume of contaminated slurry generated by constant reuse through this portion of the project. At the end of the contaminated area, the contaminated slurry should be disposed of appropriately to minimize cross-contamination along the diaphragm wall.

Drilled shafts are proposed, and the soil removed from the shafts could be contaminated. Alternate support structures that do not result in waste soil include driven piles or stone columns. Both methods displace soil laterally. However, they may have limited applications. Driven piles cannot be installed near buildings because vibration and installation of stone columns requires overhead clearance, which is limited along the project corridor. Large amounts of water could be displaced during installation of stone columns if a wet method is employed.

Depending on the contaminant concentrations and geotechnical qualities of any rail ballast that must be removed, it could be reused in the relocated railyard.

Specific construction methods may need to be employed to minimize the transport of hazardous materials or contaminated media during construction. In areas of known groundwater contamination, special drilling methods would be employed to reduce the potential for vertical migration of contaminants during drilled shaft installation. Each saturated zone should

be cased to prevent the groundwater from entering the borehole and flowing down the open shaft.

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

Volatile organic compounds, including compounds from creosote-treated timbers and gasoline, and contaminated soil could become airborne during construction. Engineering controls such as fans and blowers could be employed to dissipate volatile contaminants. More elaborate engineering controls, such as wetting of soil or filtration of air, may also be necessary.

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

Stormwater control and treatment would be maintained or improved as discussed under Section 16 Water Resources of this appendix.

Hazardous Materials Handling and Disposal Options

Mitigation measures that would be required as part of the construction planning include development of a stormwater pollution prevention plan; TESC plan; SPCC plan; hazardous materials management plan that addresses handling and disposal of known and unanticipated contamination; fugitive dust control plan; and water quality monitoring plan.

Development and implementation of these plans would be required by WSDOT Standard Specifications and required regulatory permits, including the National Pollutant Discharge Elimination System (NPDES) stormwater permit.

Although most contaminated sites in the construction area have been identified, the possibility of encountering unknown contamination cannot be discounted. The WSDOT *Environmental Procedures Manual* (Section 620.08)² provides guidelines for addressing discoveries of unanticipated contamination. Workers should also be apprised of the possibility of encountering unknown contamination. If unknown contamination is encountered, WSDOT would have a trained haz-

²WSDOT. 2007

ardous material consultant assess the site. A site health and safety plan would be prepared that describes monitoring requirements and the use of personal protective equipment for workers that come in contact with contaminated media.

Mitigation for Long-term Effects

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

7 Historic Resources

Construction Mitigation

Since the project is not anticipated to have a substantial effect on the Pioneer Square National Register historic district or local preservation district, general business mitigation measures are not needed. A vibration and settlement management and monitoring plan will be developed to determine if historic buildings are at risk and protect them from damage due to vibration or subsidence. Presently, the only historic property that would be affected during construction is the Bemis Building, so mitigation is focused on these effects.

Mitigation could include the following potential measures:

- Communicate regularly with affected residents and businesses in the Bemis Building (through building management) about construction issues.
- Maintain adequate access to the property, including the loading dock, so that businesses can continue to operate.
- At the Bemis Building, make improvements to alternative (south side) loading docks so that they can be used while the west side loading docks are blocked. Any changes will be in compliance with the Secretary of the Interior's Standards.
- Develop a noise management and monitoring plan with measures such as maximum noise limits; certain hours for noisier construction activities; and use of BMPs, including the use of quieter equipment and techniques (see Section 9 Noise in this appendix). Any nighttime work would be completed in compliance with the City of Seattle

Noise Ordinance, and noise variances would be obtained prior to any nighttime construction.

- Develop a vibration and settlement management and monitoring plan to determine if historic buildings are at risk and protect them from damage due to vibration or subsidence.

Mitigation for Long-term Effects

The development of mitigation measures will be coordinated between WSDOT, FHWA, DAHP, ACHP, affected tribes, and the City of Seattle. A Memorandum of Agreement is being developed among these parties to ensure that any adverse effects to historic resources, as defined by Section 106, are avoided, minimized, or mitigated.

One of the mitigation measures being implemented for the demolition of the viaduct is documenting the structure to Historic American Engineering Record (HAER) Level 2 standards. The HAER report, which will be filed with the Library of Congress, will include a narrative history and context statement for the viaduct, copies of the original plans, and historic and current photos. Photos taken for HAER could be displayed at public venues around Seattle.

8 Land Use and Shorelines

Construction Mitigation

Mitigation measures for potential land use effects during construction activities would include providing advance notice to property owners in the project area regarding construction activities, utility disruptions, and detours. Construction will be coordinated in advance with the City of Seattle, Port of Seattle, BNSF Railway, Safeco Field, Qwest Field, Qwest Field Event Center, and King County Metro Transit. Local access to adjacent residences and businesses would be maintained during construction. Construction traffic, dust, and noise would be mitigated to the extent possible as described in Section 9 Noise, Section 14 Transportation, and Section 1 Air Quality of this appendix.

Mitigation for Long-term Effects

Land use effects would generally be beneficial, and no mitigation would be necessary.

9 Noise

Construction Mitigation

Project construction may require nighttime construction activities or exceed daytime noise level limits; therefore, noise variances may be required from the City of Seattle. If noise variances are required, construction noise mitigation methods would be developed in coordination with the City and specified in the noise variances. The temporary noise variances will comply with all requirements of the Seattle Municipal Code, including maximum permissible sound levels (SMC 25.08.410). WSDOT performance standards require construction noise levels to be kept below local, state, and federal thresholds. To reduce construction noise at nearby receptors, mitigation measures such as the following could be incorporated into construction plans, specifications, and variance requirements:

- Designating specific construction activities as high-impact noise generating. Those activities are then assigned noise level limits that cannot be exceeded during specific time periods.
- Crush and recycle concrete off-site, away from noise-sensitive uses, to decrease construction noise effects. If recycled on-site, an operations plan would be required to define the locations and hours of operations.
- Construct temporary noise barriers or curtains around stationary equipment and long-term work areas that must be located close to residences. This would decrease noise levels at nearby sensitive receptors and could reduce equipment noise by 5 to 10 dBA.
- Limit the noisiest construction activities to between 8 a.m. and 5 p.m. on weekdays and between 9 a.m. and 5 p.m. on weekends and holidays to reduce construction noise levels during sensitive nighttime hours. The City of Seattle noise ordinance places restrictions on the use of noise impact equipment. Noise variances would be required from the City of Seattle for construction between 5 p.m. and 8 a.m. on weekdays and between 5 p.m. and 9 a.m. on weekends and holidays. WSDOT will follow the conditions issued with the temporary noise variance.
- Sequence construction to avoid the simultaneous use of multiple noisy machines and to avoid the loudest tasks (such as pile driving) during stadium or event center events and at night.
- Equip construction equipment engines with adequate mufflers, intake silencers, and engine enclosures; this could reduce their noise by 5 to 10 dBA.

- Use the quietest equipment available; this could reduce noise by 5 to 10 dBA.
- Use manually adjustable or automatic ambient sound-level sensing backup alarms approved by the Occupational Safety and Health Administration. These alarms are 10 to 20 dBA quieter than standard alarms, which could reduce disturbances to nearby residents from backup alarms during quieter periods.
- Turn off construction equipment during prolonged periods of non-use; this could eliminate noise from construction equipment during those periods.
- Maintain all equipment and train equipment operators; this could reduce noise levels and increase operational efficiency. Out-of-specification mufflers can increase equipment noise by 10 to 20 dBA.
- Minimize idling of power equipment.
- Where possible, locate stationary equipment away from noise-sensitive receiving properties.
- Notify nearby residents prior to periods of intense nighttime construction.
- Provide a 24-hour noise complaint line.
- Use utility-provided electric power rather than diesel-powered electric generators, whenever practical.

Mitigation for Long-term Effects

Traffic noise levels already approach or exceed noise abatement criteria in the study area as a result of general traffic on the urban arterial grid independent of traffic noise generated from the Alaskan Way Viaduct. Future traffic levels are not predicted to change substantially in this area as a result of the project. Mitigation of traffic noise levels is not feasible in this area because the majority of the traffic noise is generated by arterial traffic on the city street grid.

10 Parks and Recreation

Construction Mitigation

To mitigate for proximity effects of noise during construction, the specific effects on specific facilities and uses must be evaluated further in cooperation with the particular facility operator. Options may include the following measures:

- The perception that the construction area is difficult to access and inconvenient could be addressed by a public information program regarding provisions for access. The information could address access to park and recreation facilities as well as businesses. Letting the public know that

they will still be able to access these resources will reduce the extent to which people avoid the area.

- Provide clear pedestrian, bicycle, and vehicular routes around or across construction sites. These would need to be designed to be safe, pleasant, and to integrate with opportunities to view the construction site as an additional area of interest. These physical facilities would be combined with public information, including sidewalk wayfinding information that would clearly indicate present and future opportunities for access.
- Provide a continuous pedestrian corridor east of the construction area along First Avenue S. for continuous north-south movement when the Waterfront Bicycle/Pedestrian Facility is displaced with possible improvements on east-west corridors to the north and south to allow diverted trips to return to E. Marginal Way S. or Alaskan Way S.
- The visual interest of the construction site may be enhanced by viewpoints and information that may attract people to the construction site who also may use park and recreation facilities in the area as part of the visit.

Mitigation for Long-term Effects

No permanent effects would occur to existing facilities; therefore, no mitigation would be necessary.

11 Public Services and Utilities

Construction Mitigation

Proposed mitigation measures are based on National Environmental Policy Act (NEPA) principles, WSDOT and City of Seattle policies, mitigation proposed for similar projects in comparable urban environments, and coordination with affected agencies. These measures will need to be refined, and additional or more specific mitigation measures will be developed as the planning and design process continues.

Public Services

WSDOT will continue coordinating with City of Seattle and Port of Seattle police and fire departments, regional transportation agencies, and other appropriate agencies during preliminary and final design of the project to plan for reliable emergency access. This would include alternate plans and routes to avoid delays in response times and ensure that general emergency management services are not compromised. Early notice about detours or lane restrictions will be provided to emergency and non-emergency public service providers.

Additional coordination could occur with the police and fire departments. For example, WSDOT will notify and work with Seattle Fire Department regarding any water line relocations that could affect water supply for fire suppression and establish alternate supply lines prior to any breaks in service. Fire watches, or stationing fire trucks in the vicinity, could be required if the water supply and power must be turned off. WSDOT will also coordinate with local police departments to ensure adequate staffing during construction for traffic and pedestrian movement control and other necessary policing efforts.

Intelligent traffic signal controls could be used at signalized intersections as a partial mitigation measure for response time effects for fire and emergency medical services, particularly during construction. This would include E. Marginal Way S. and Alaskan Way S., as well as adjacent streets that can be reasonably expected to see increases in volume as a result of construction traffic diverted from surface streets.

A public service contact plan that identifies up to two contacts for each service provider to allow for redundancy in notification would be needed. The two primary contacts would then be responsible for coordinating with appropriate staff within the organization to discuss project-related information.

School Bus Routes

The Seattle School District has rerouting plans in place for times when the viaduct is closed. It is anticipated that the School District will implement rerouting plans to address school bus travel through the corridor during those limited times when the viaduct would be closed due to construction.

Solid Waste Collection and Disposal Effects

Construction waste and debris could be disposed of at a number of disposal facilities in the Puget Sound region. A portion of the debris, including clean wood waste, metals, gypsum, and other materials, could be recycled at facilities such as Seattle's recycling and disposal stations. Sufficient capacity exists at area transfer stations and regional landfills to accommodate the construction waste and debris generated from construction activities. The disposal of construction waste and debris is unresolved at this time. Waste processing haulers and facilities should be informed that additional loads would occur during construction. Additional haul trucks, operators, or train cars may be required.

Disaster Preparedness

WSDOT will continue coordinating with City of Seattle, Seattle Office of Emergency Management, and the Port of Seattle during construction so that these agencies would be informed of scheduled project activities and locations.

Utilities

Before final design and construction, the exact locations and depths of underground utilities will be field verified (by potholing where appropriate), and condition checks will be conducted as necessary.

During final design, WSDOT will develop construction methods and BMPs in consultation with the utility providers to provide site-specific spacing and protection measures. These measures would minimize issues such as lack of access, damage to facilities, settlement, vibration, groundwater dewatering, and hazardous materials and provide erosion and sediment control. WSDOT would perform installation according to agency regulations, utility provider requirements, and proper BMPs.

WSDOT would prepare a consolidated utility relocation plan for both short-term and long-term relocations, consisting of key elements that include existing, temporary, and new locations for utilities, sequence and coordinated schedules for utility work, and a detailed description of service disruptions. This plan would need to be reviewed and approved by the affected utility providers prior to the start of construction to reduce effects.

City of Seattle standards and guidelines would be used to determine which underground utilities would need to be relocated on a case-by-case basis. Existing piping, conduits, buried cable, and buried utilities that encroach on areas required for construction would be removed and relocated within the existing right-of-way wherever possible.

WSDOT will prepare a coordinated utility communication plan to coordinate services to customers and minimize or avoid temporary disconnections each time a utility line is relocated. The limits on shutdowns would be documented in the plan as specified by the utility provider to minimize long-term effects. Utility providers will need to notify customers in advance of planned service disruptions.

Other measures could include:

- Provision of backup on-site electrical generation as applicable to provide temporary electric service to customers as determined by Seattle City Light on a case-by-case basis.
- Development of a notification and response plan for unplanned utility outages, including a customer service plan and contact information for utility customers to be used during construction.

Mitigation for Long-term Effects

Measures to avoid or reduce operational effects of the project include designing the project to avoid or minimize effects, preparing a consolidated utility relocation plan, and ensuring that adequate access to utility facilities for maintenance and repair will be maintained in the built condition.

12 Relocations

Construction Mitigation

Construction of the project would not result in any relocations, only partial property acquisitions, utility easements, and construction easements. WSDOT staff will work with affected property owners to assess their needs and minimize the amount of disruption that could result from temporary construction easements.

Construction traffic, dust, and noise would be mitigated to the extent possible as described in Section 9 Noise, Section 14 Transportation, and Section 1 Air Quality of this appendix.

Mitigation for Long-term Effects

Compensation for parcel acquisitions would comply with the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. None of the parcels that would be affected by the project are residential properties.

13 Social Resources

Construction Mitigation

This section provides a list of recommended potential construction mitigation measures to avoid, reduce, or minimize potential adverse effects on social resources resulting from construction of the project.

- Prior to the start of construction and periodically during construction, hold neighborhood public meetings to advise the public of planned construction activities, road

closures, traffic detours, changes in pedestrian walkways, etc.

- Periodically publish a project newsletter to alert members of the public of planned construction activities, road closures, traffic detours, changes in public transit routes, etc. Newsletters will be published in appropriate languages to effectively communicate with project area residents. Newsletters will be distributed at area community centers, schools, libraries, fire stations, city hall, social service agencies, King County Metro kiosks, and other similar locations so they may be seen by the general public. Newsletters would also be posted on the project website.
- Mark pedestrian pathways around the construction area to ensure public safety and to facilitate public wayfinding. Signs should be prepared in appropriate languages, and/or use symbols to communicate with persons with limited English proficiency or low literacy.

A community telephone line has been established so that members of the public can directly report problems related to construction activities, and in turn, the project team can address problems promptly.

Mitigation for Long-term Effects

Mitigation measures would include community outreach and communication as described in Section 4 Environmental Justice.

14 Transportation

Construction Mitigation

WSDOT will prepare a traffic management plan in consultation and coordination with King County Metro Transit, the Seattle Department of Transportation, the Seattle Police Department, the Seattle Fire Department, the Port of Seattle, and the stadium and event center facilities to be implemented throughout construction. The plan will include procedures for the following:

- Agency coordination.
- Communication with stakeholders and the public.
- Flexible and responsive management of traffic before, during, and after stadium area events and during peak traffic hours.
- Redirecting traffic.
- Notification of construction detours, hours of lane closures, and nighttime construction.

WSDOT plans to develop and deliver enhancements and improvements to help keep traffic moving during the construction of this project and other projects proposed as part of the Alaskan Way Viaduct and Seawall Replacement Program. Up to \$125 million has been set aside for funding these enhancements and improvements. These projects and strategies include additional transit service hours and capital equipment (i.e., buses), transit speed and reliability improvements, traveler information systems, improving arterial and street traffic operations, and supporting transportation demand management efforts and other projects.

The project team has begun work on identifying candidate projects and programs that could be eligible for funding. Projects planned for implementation are discussed below. In addition, WSDOT, the City of Seattle, and King County are considering establishing an oversight committee called the Downtown Transportation Operations Committee. This committee would be tasked with monitoring and coordinating construction activities in the greater downtown Seattle area. This committee would lead the coordination efforts to ensure that transportation operations for all modes (general purpose traffic, transit, and freight) are as effective as possible during downtown construction activities. This committee could provide for real-time communications and information linkages to better manage the multimodal transportation system.

Proposed projects to keep traffic moving during construction include:

- SR 519 Intermodal Access Project Phase 2
- Spokane Street Viaduct Widening Project
- Elliott Avenue W./15TH Avenue W. Corridor Improvements
- West Seattle Corridor Improvements
- SODO/Integrated Corridor Management Improvements
- I-5 Travel Time Signs
- Secure Use of New Buses and Transit Service Hours
- Bus Travel Time Monitoring System
- I-5 Active Traffic Management
- Ballard and SODO Arterial Travel Time System
- Denny Way Corridor Improvements
- South End Transportation Demand Management
- Downtown Transportation Demand Management

Appendix F Transportation Discipline Report

Additional information on mitigation is contained in *Appendix F, Transportation Discipline Report*.

- In-Construction Adaptation Project

Transit Priority Routes and Strategies

A number of potential transit enhancements are being considered for SR 99 and First Avenue S. during the construction period. Some of the considerations would require a policy decision or agreement from the City of Seattle, WSDOT, and King County. The projects include:

- Implementing a directional queue bypass lane for both northbound and southbound SR 99 ramps.
- Converting the Seneca and Columbia Street ramps to transit and high-occupancy vehicles (HOV) only during peak periods.
- Implementing a transit-only off-ramp to First Avenue S. near S. Royal Brougham Way.
- Implementing transit-only lanes on First Avenue S.
- Converting the Spokane Street Viaduct eastbound ramp to First Avenue S. from general purpose to transit and HOV only.

Other Potential Projects

In addition to the SR 99/Viaduct Project Initial Transit Enhancements and Other Improvements and the transit-related projects, more localized mitigation measures will be developed as project construction details are refined. Some localized mitigation measures during construction might include:

- Temporary widening of the proposed Alaskan Way S. from S. Atlantic Street to S. King Street, to accommodate three lanes of traffic during Stages 2 through 4. There would be two southbound lanes and one northbound lane.
- Construction of temporary signals.
- Providing flaggers at certain intersections to facilitate traffic movements.

WSDOT will consult and coordinate with the City of Seattle in all safety-related decisions affecting City streets and sidewalks to ensure that they meet City standards. Mitigation measures to increase safety at these locations could include such measures as:

- Right-turn restrictions 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.

All signage will follow FHWA's *Manual on Uniform Traffic Control Devices*.

Mitigation for Long-term Effects

No mitigation measures for transportation would be necessary during the long-term operation of the project.

15 Vibration

Construction Mitigation

Impact pile driving would be the most significant source of vibration for this project. Potential measures to reduce vibration from impact pile driving that can be used, when appropriate for specific site conditions, are as follows:

- **Jetting** – The use of a mixture of air and water pumped through a high pressure nozzle to erode soil adjacent to the pile to facilitate placement of the pile.
- **Pre-drilling** – Pre-drilling a hole for a pile can be used to place the pile at or near its design depth, eliminating most or all impact driving.
- **Cast-in-place or auger piles** – Eliminates impact driving and limits vibration to the lower levels generated by drilling.
- **Pile cushioning** – A resilient material placed between the driving hammer and the pile.
- **Alternative non-impact drivers** – Several types of proprietary pile-driving systems have been designed specifically to reduce the impact-induced vibration by using torque and down-pressure or hydraulic static loading. These methods would be expected to significantly reduce adverse vibration effects from pile placement.
- **Use of vibratory pile drivers** instead of impact drivers.

Vibration from other construction activities can be reduced by either restricting their operation to predetermined distances from historic structures or other sensitive receivers, or using alternative equipment or construction methods. An example would be the use of saws or rotary rock cutting heads instead of a hoe ram to cut bridge decks or concrete slabs.

WSDOT would require vibration monitoring at the nearest historic structure or sensitive receiver to the construction activities. The monitored data will be compared to the project's vibration criteria to ensure that ground vibration levels do not exceed the damage risk criteria for historic and non-historic buildings.

Mitigation for Long-term Effects

Annoyance effects from vibration are not expected to occur inside buildings from operation of the project, so no mitigation would be necessary.

16 Visual Quality

Construction Mitigation

Construction mitigation generally is of limited effectiveness in addressing the general disruption of the visual environment during construction. A number of features can help restore the visual character of the near or middle ground and add visual interest during construction.

The most effective construction mitigation for visual clutter is to restore the construction corridor where construction has been completed in intermediate stages rather than waiting until completion of the entire project. After completion of each section, complete reconstruction to the final configuration would allow that portion of the corridor to return to a stable landscape while other portions are still disrupted.

Local visual interest can be added to construction sites to compensate for the reduction in overall visual intactness by incorporating viewing areas with information to make the construction activity a point of visual interest. Detours for vehicles and pedestrians can include common graphic themes of wayfinding displays.

Mitigation for Long-term Effects

The design phase of the project will involve more detailed examination and selection of mitigation measures as outlined in the Roadside Funding Matrix for WSDOT Capital Projects. 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 the City of Seattle and other stakeholders to help ensure that the proposed project fits in visually as well as functionally with its neighborhood.

17 Water Resources

Construction Mitigation

Construction-related effects would be minimized or prevented through proper selection, maintenance, and management of BMPs, and implementation of the TESC and SPCC plans that would be developed for the project. WSDOT will inspect

BMPs at least once a week to ensure that they are functioning properly. BMPs will also minimize the possibility of contaminants reaching the stormwater conveyance systems.

Because there would be no surface water discharge of temporary construction dewatering, and treatment would be provided as needed prior to discharge to the combined sewer system or reinjection into the groundwater, no water quality effects are expected from construction dewatering in the project area from the Build Alternative. Therefore, no mitigation is necessary.

Mitigation for Long-term Effects

Although the final BMPs have not been designed, the types of treatment BMPs being considered for the project area includes wet vaults or StormFilters with ZPG™ media. Other BMPs that achieve basic treatment include bioinfiltration swales, sand filters, filter strips, wetponds, bioretention/rain gardens, and other types of facilities. Because the project would result in a net benefit to the environment, improving both water quality and nearshore sediments as compared to existing conditions, no mitigation is necessary.