

Best Management Practices and Mitigation Measures

Appendix B Best Management Practices and Mitigation Measures

This appendix summarizes best management practices (BMPs) and mitigation measures that could be used to avoid or minimize undesirable effects of the project during construction or operation of the SR 519 Phase 2 project. WSDOT and FHWA will determine mitigation measures that (1) are incorporated into engineering design, (2) become contract requirements to be followed during construction, or (3) are implemented during operation of the completed project. Many of the procedures summarized below will be required by permits issued to WSDOT by federal, State of Washington, and local agencies. WSDOT will follow all permit requirements and will also put into effect additional measures as needed to avoid or minimize undesirable effects of project construction or operation.

Geology and Soils

Various procedures could be implemented to avoid or minimize adverse effects of the project related to geology and soils. Specific mitigation measures, discussed below, will be evaluated and selected during detailed engineering design and construction planning.

Construction Mitigation

Unwanted effects of most construction activities will be mitigated by implementing standard design and construction procedures. These mitigation measures range from applying best management practices for controlling erosion and sediment during construction to modifying design requirements to minimize effects of settlement.

Best management practices are innovative and improved environmental protection tools, practices, and methods that have been determined to be the most effective, practical means of avoiding or reducing environmental impacts. WSDOT's *Construction Manual*, M 41-01.03, provides detailed information on construction-related BMPs (WSDOT, 2007b).

A temporary erosion and sediment control (TESC) plan will be implemented for the duration of the construction. This plan describes and identifies what best management practices will be used to control erosion and sediment. A water quality monitoring plan will also be implemented. Erosion control best management practices include silt fences, catch basin inserts, straw bales, and plastic and sedimentation ponds. These measures will be identified in the TESC plan, which will be a part of the construction documents.

The amount of exposed earth for the project is less than a few acres at any one time, limiting the potential for sediment transport. BMPs would be used to prevent soil from being carried off the site.

Construction documents might also require that stockpiles of imported earthfill and aggregate are either covered or surrounded by silt fences; that the amount of earth exposed for construction is limited, particularly during wet winter months; that sedimentation in water pumped from construction excavations is filtered in Baker tanks or other suitable means before disposal; and that catch basin inserts are used.

Construction documents may require trucks hauling aggregate or earthfill to the site to cover their loads with tarps or limit the volume of earth to avoid spillage. If there is a potential that truck tires will carry sediment from the site to surface streets, site access points could be required to use wheel washes or rock surfacing to limit tracking of soil from the construction site.

Contaminated soils and groundwater are known to occur within the project vicinity. When encountered during excavations for foundations or for relocation of utilities, they will require special handling, containment, and disposal as referenced in the specifications of the design plans. If contaminated soils are temporarily stockpiled onsite, the piles will require special management to prevent the migration of contaminants from the stockpile. Possible management options include silt fences, containment berms, covering piles with plastic, and laying plastic on the ground before stockpiling. The project team has

performed hazardous material investigations of properties within the study area identified as likely to have higher levels of soil contamination. The Spill Prevention, Control, and Countermeasure (SPCC) Plan for the project will include procedures for management of excavation activities and materials within those areas.

Additional discussions of hazardous waste issues are provided in the *Hazardous Materials Discipline Report* prepared for this EA.

The potential for vertical and lateral movement of the ground during construction of new approach ramps will be quantified during the design phase of the project. If vertical or lateral movements of the earth from new fills are predicted to be excessive, they will be mitigated through the use of ground improvement methods. Utilities will be relocated or protected in locations where ground settlement cannot be mitigated.

Unfavorable soil and groundwater conditions (e.g., loose silts and sands below the groundwater table, old timber pilings, and other construction debris from the early 1900s) in areas where deep foundations will be constructed will be mitigated through the use of foundation drilling equipment specifically designed to provide borehole support during drilling and capable of removing debris. WSDOT will prepare contract documents to avoid or minimize these construction risks. If determined during design to be critical, full-depth casing will be required to maintain hole stability.

If WSDOT determines during design that the potential for vertical or horizontal ground movement next to excavations is excessive, the construction documents will require use of stiff retaining wall systems or lateral support using earth anchors or structural bracing. The location of the wall will be monitored during excavations using survey methods and geotechnical instrumentation to warn of developing movements.

In areas requiring ground improvement to mitigate potential effects of liquefaction or settlement, strict controls will be imposed on construction methods to contain spoils and excess

water caused by the ground improvement technique. These controls typically include use of earth dams to confine fluids, continuously re-circulating water, and limiting the amount of onsite stockpiling of spoils from excavations. Another alternative is to select ground improvement methods that will not produce spoils and excess water.

To mitigate the effect of ground vibrations during construction, construction documents will require that equipment be selected and operated to minimize the potential for vibration. For example, in constructing the drilled shaft bridge foundations, the use of special equipment to rotate the steel shaft casings in the ground will be considered in the vicinity of sensitive underground utilities. Similarly, methods of ground improvement that produce limited vibrations, such as deep cement soil mixing, will be identified in construction specifications if determined necessary after detailed engineering review.

The amount of construction debris and excess earth that must be disposed at landfills will be limited by reprocessing concrete into aggregate to the extent possible. Quantities of construction debris appear to be too small to support reprocessing of SR 519 material by itself, but when combined with other construction debris in the area (for example, Alaskan Way Viaduct debris) could provide sufficient quantities to support reprocessing. If feasible, reprocessed aggregate will be re-used in concrete or fills on the SR 519 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 proposed development or at other projects in the area requiring earthfill.

The likelihood of an earthquake during construction is very low, and nothing can be done to mitigate for its occurrence. However, WSDOT will apply contingency plans and mitigation strategies to revise construction schedules or rebuild damaged facilities in the event of an earthquake.

Operational Mitigation

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 of mitigating their potential effects will be developed, where determined appropriate. 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. At the bridge approach fill located between Third and Fourth avenues, either ground improvement or deep foundations will be used to reduce settlement.
- 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. If design studies determine the potential for excessive vibrations between the elevated structure and the sports facilities, isolation joints or similar systems will be used to minimize the potential for damage to the existing facilities.
- If groundwater flow in the study area is determined to be adversely affected by the installation of ground improvement methods, ground improvement construction methods that limit the effects to groundwater flow will be identified in construction documents. These alternate methods might involve use of stone columns rather than jet grouting or soil mixing procedures.
- New structures at risk from earthquake-induced liquefaction and ground settlement will be designed according to WSDOT seismic design standards for liquefaction and ground settlement. Where design studies identify substantial risk, deep foundations will be used to

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

transfer seismic loading to suitable bearing materials. If required, soils will be improved to reduce the risk of liquefaction and related seismic damage.

- For seismic hazards on existing structures due to induced loading from the proposed South Atlantic Street ramp structure, the proposed structure will be designed to be structurally isolated from the existing structures, or will be designed with sufficient stiffness to reduce 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.

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 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 would require one or more of the following actions:

- Spray exposed soil with water or other suppressant to reduce emissions of PM₁₀ and deposition of particulate matter.
- Use phased development to keep disturbed areas to a minimum.
- Use wind fencing to reduce disturbance to soils.
- 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.
- 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 PM₁₀, VOCs, NO_x, oxides of sulfur, and CO will be minimized as much as practicable. Since these emissions primarily result from construction equipment, machinery engines will be kept 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 SO₂ and PM emissions from these engines.

Operational Mitigation

The project will not require any mitigation during operation because no adverse effects are anticipated.

Water Resources

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 stormwater pollution prevention plan and 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.

Noise

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 mitigation measures including, but not necessarily limited to, the following:

- Developing a construction management plan (CMP) 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.
- 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

Based on FHWA noise abatement criteria, noise abatement measures must be considered when the predicted noise levels approach or exceed the criteria. This means noise abatement measures must be considered for any applicable outdoor location where peak-hour noise levels equal or exceed 66 dBA.

To mitigate roadway noise over the long term, installing a noise wall is usually the most practical and effective measure. However, noise walls are generally not considered to be compatible with commercial or industrial zoning. The multiple driveways associated with the two outdoor dining facilities would create gaps in any noise wall and reduce its effectiveness, and noise walls would restrict drivers' views. Because noise walls are not feasible in this case, WSDOT did not perform a reasonableness analysis for these sites. Appendix A of the *Noise Discipline Report* explains WSDOT's procedures for conducting feasibility and reasonableness analyses for noise wall mitigation.

Hazardous Materials

Recommended mitigation measures for identified effects of the project during construction and operation are summarized below.

Construction Mitigation

There are two options for mitigating the adverse effects of contaminated soil if encountered during construction.

In Option 1 WSDOT would conduct additional environmental testing to verify the location, extent, and degree of contamination, if present. Such testing could include sampling

at the three sites of concern that fall within the project limits.

The three sites are:

- 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 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

The investigation would identify the location, extent, and degree of contamination so that a contaminated soil management plan could be prepared. A geophysical survey would be performed around the three sites of concern to locate unknown underground storage tanks (USTs).

In Option 2 WSDOT would prepare an SPCC Plan that would state the procedures to be followed in case contamination is encountered during construction.

If Option 1 is selected and an investigation confirms the presence of contaminated soil within an area of planned excavation, preparation of a contaminated soil management plan is recommended. Such a plan would identify procedures and assign responsibilities for managing contaminated soil that might be encountered during construction so that project delays could be minimized. The plan would address issues such as field screening methods, notification requirements, stockpiled soil management, and contaminated soil disposal.

The potential to encounter contaminated groundwater was identified in the evaluation of potential effects of construction activities. If dewatering is needed, WSDOT will develop an

approved dewatering plan that addresses the potential for encountering contaminated groundwater, including treatment and disposal of contaminated groundwater or applicable discharge permits.

Underground Storage Tanks and Associated Pipelines

Option 1 also provides for conducting a geophysical survey before construction to locate USTs and pipelines on each of the three properties. Removal of any discovered USTs and pipelines must comply with Ecology's Underground Storage Tank Statute and Regulations (Chapter 90-76 RCW, Chapter 173-360 WAC).

Hazardous Material Spills

WSDOT will prepare and follow a Temporary Erosion and Sediment Control (TESC) Plan to mitigate effects on soil, surface water, and groundwater by requiring the implementation of best management practices (BMPs) for runoff from the construction site. In addition, WSDOT will prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan to set forth procedures, equipment, and materials used in the event of a spill of contaminated soil, petroleum products, contaminated water, or other hazardous substances during construction.

Worker Safety and Public Health

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 be required for construction workers. In addition, public access to the project construction zone, contaminated environmental media, and/or hazardous substances will be restricted. Contaminated media, if any, moved offsite will be shipped in accordance with U.S. Department of Transportation and Washington Department of Ecology requirements to reduce the potential for releases.

Operational Mitigation

Operation of the project will result in improved traffic flow, which will reduce the likelihood of vehicle collisions and hazardous materials spills.

Land Use

During construction of the project, WSDOT will implement measures to ensure that traffic flow is maintained and negative effects on land uses minimized.

Construction Mitigation

Recommended mitigation measures to avoid or minimize adverse effects could include:

- Preparing and implementing a Transportation Management Plan (TMP), which will require signs to be posted showing detour routes during any required road and/or lane closures.
- Coordinating in advance with property owners and businesses within the study area including the City of Seattle, Port of Seattle, BNSF Railway, Safeco Field, Qwest Field and Event Center, King County Metro, as well as Washington State Ferries, and providing advance notice of construction activities, any required utility disruptions, and any required detours.
- Avoiding construction during scheduled events 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.

Cultural Resources

Construction Mitigation

Construction could result in direct physical damage to, or loss of, presently undetected archaeological sites. Sites discovered during construction, if determined to be NRHP eligible, will have to be documented and addressed through scientific data

recovery or other suitable measures determined in consultation with the SHPO and affected tribes.

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 mitigation will be necessary for project operation.

Social and Economic Elements

Construction Mitigation

The project will include a number of measures to avoid or minimize the negative effects of construction on the surrounding area. The following mitigation measures could be included. WSDOT will determine specific mitigation measures during detailed project design and construction planning and coordinate with the appropriate local jurisdictions.

Social Elements

Community Cohesion

WSDOT will continue to use the project website and fact sheets or newsletters to communicate and provide information about the project with residents and businesses and allow them to identify and address any concerns regarding the project. If any temporary road closures are required, WSDOT will minimize the amount of time the road is closed and ensure that detour routes have proper signage.

WSDOT will maintain equipment in good mechanical condition and to equip engines with mufflers to minimize exhaust emissions and noise.

Regional and Community Growth

The construction phase of the project will not affect regional and community growth, and therefore no mitigation measures are proposed.

Social Resources

Because no social resources would be negatively affected by construction, no mitigation is proposed.

Sports and Exhibition Facilities

WSDOT will temporarily stop construction during major scheduled sports events and major scheduled exhibitions at Safeco Field, Qwest Field, or Qwest Field Events Center, and no additional mitigation measures are proposed for these facilities. If circumstances require that construction activities occur during stadium events or Event Center activities, WSDOT will coordinate with those facilities and the Seattle Police Department.

Pedestrian, Bicyclist, and Transit Resources

If alternative routes are required for pedestrians and bicyclists WSDOT will clearly identify and mark them.

If temporary transit stops are required, WSDOT will clearly mark the stops and provide additional signage indicating location.

If there are any alternative routes and/or temporary transit stops, WSDOT will ensure that stops are accessible for those with disabilities.

WSDOT will prepare a Traffic Management Plan to minimize effects on local roadways. The TMP will specify that sidewalks be maintained on city streets unless construction activities make this an unsafe situation. If sidewalks are closed during construction, WSDOT will develop alternative routing to ensure that safe and convenient access is maintained.

In addition to the general TMP, specific measures will be identified and agreed upon between WSDOT and other agencies to ensure that services and activities provided in the study area are protected during construction. These agreements will specify measures to minimize adverse effects. Such

agreements will be developed at a minimum with the following agencies: City of Seattle, Sound Transit, King County Metro, Port of Seattle, BNSF, Amtrak, Public Stadium Authority, Public Facilities District, and Baseball Club of Seattle.

Environmental Justice

The project will not result in any disproportionately high and adverse effects during construction on minority and/or low-income populations during construction. Therefore, no specific mitigation measures are required for these populations. The mitigation measures described in this section are applicable to all populations.

Economic Elements

Owners of property to be acquired for right-of-way will be compensated for the fair market value of property acquired, in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended.

If alternative access to businesses is required, WSDOT will coordinate with business owners to reconfigure or provide alternate access during construction.

If construction is required during events at the stadiums, WSDOT will coordinate with the facilities' managers to minimize construction-related conflicts with events in the stadiums and the event center.

If traffic revisions are needed, WSDOT will post signs to alert travelers of the changes.

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 during operation. For the economic elements the following mitigation measure could be implemented: to avoid adverse access effects, work with business owners to reconfigure or provide alternate access, if required.

Transportation

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 that includes a traffic management component. The plan would address other infrastructure and development projects and establish procedures to minimize adverse effects on all transportation modes during construction.
- Revisions to the traffic management plan for the stadiums in coordination 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 met 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. Two projects that may require close coordination are the South End Alaskan Way Viaduct Replacement Project and the I-90 R8A relocation of HOV

lanes to outside the center roadway. WSDOT will coordinate with these projects and 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 suggests that by 2030, almost all intersections in the study area will perform better or at least at the same level of service (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 under the project. 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. The authority to implement improvements at this intersection is held by the City of Seattle.

Parking

The increase in demand for off-street public parking, which is already limited in the study area, could be mitigated by general transportation demand management techniques to encourage the use of alternative transportation modes. 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

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.

minimize adverse effects of project construction and operation on Ryerson Base bus parking spaces and internal circulation.

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 discussed at a workshop with project 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 to alert 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 that could 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.

Public Services and Utilities

During construction of the project, WSDOT will coordinate closely with public service and utility providers to ensure that traffic flow is maintained and services are uninterrupted.

Construction Mitigation

Recommended mitigation measures to avoid or minimize adverse effects could include:

- Preparing and implementing a Transportation Management Plan. Items in the TMP could include the installation of signal preemption through construction zones and posting signs to show detour routes if temporary road closures are required.
- Providing the fire department, police departments, 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 on response and travel times.
- If any waterline relocations or shutdowns are required that could affect water supply for fire suppression, notifying and coordinating with the fire department and Seattle Public Utilities, and establishing alternate supply lines prior to any break in service.
- If water supply and power must be turned off, establishing fire watches or stationing a fire truck in the vicinity, as required.

- Notifying and coordinating with the Seattle Police Department to ensure adequate staffing during construction for traffic control and pedestrian movement.
- Scheduling construction during off-peak travel hours to minimize traffic congestion during peak travel hours.
- Avoiding construction during events at Safeco Field, Qwest Field, or the Qwest Field Event Center and coordinating with members of these facilities, as well as the Seattle Police Department, prior to construction to minimize any construction-related effects.
- Before construction starts, coordinating with the BNSF Railway regarding limits on construction activities overhead of the railroad right-of-way from October to December every year; BNSF does not allow construction activities in their right-of-way during this timeframe.
- 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. The objective will be to avoid or minimize conflicts, protect existing utilities, avoid disruption of service, and avoid disruption of, or restrictions on, access, maintenance, and repairs during project construction and operation.
- If utility relocations are required, establishing service agreements for reimbursement of utility relocation cost and sequencing of the design and construction work.
- To mitigate for the poor soils in the area, coordinating with utility agencies, including Seattle Public Utilities, on techniques to minimize construction-related effects, such as vibrations, which could damage or destroy utility lines.
- Notifying area businesses and residents of utility interruptions, if any are required, by providing a schedule of construction activities in those areas. Any anticipated

interruption of City services will be coordinated 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). The plan will include the sequence and coordinated schedules for utility work and detailed descriptions of any service disruptions, potential construction methods, and best management practices to be incorporated. This plan will be reviewed and discussed with affected utility providers prior to the start of construction to reduce effects.

Operational Mitigation

No mitigation relating to public services or utilities will be required during operation of the project. WSDOT will determine how street-level access to emergency response vehicles will be provided on South Royal Brougham Way at the railroad crossing.

Visual Quality

Many of the mitigation measures discussed below were developed as part of the planning process for this project in order to avoid and minimize undesirable effects on visual quality. These measures were identified to help the project fit into the neighborhood context from a visual quality and urban design perspective. Special attention will be paid to how a potential measure would fit into the existing visual setting in terms of scale, line, form, texture, and color. The following discusses mitigation measures that could be applied during project construction and operation. WSDOT will determine visual quality and urban design mitigation measures during the detailed engineering design and construction planning process.

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 BMPs required by WSDOT.

Operational Mitigation

A number of mitigation measures have been identified that could help the proposed project fit in with its visual environment, minimize negative effects on visual quality, and, in some cases, improve existing visual quality (refer to the *Visual Quality Discipline Report* prepared for this EA). WSDOT generally incorporates context-sensitive design principles and considerations into the design of its projects. Considerations for this project could include incorporating architectural or urban design themes or elements from the study area (particularly from the stadiums) into the project components to link them visually to their environments. In addition, following some of the existing design features of I-90 and Phase 1 of SR 519 will help to ensure the project's visual consistency with its surroundings.

Many of the potential measures identified 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 more detailed examination and selection of mitigation measures as outlined in the *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 the City of Seattle and other stakeholders to help ensure that the proposed project fits in visually as well as functionally with its neighborhood.

