Design-Build Contract

Chapter 2 - Technical Specifications
Washington State Department of Transportation

I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1)

Final Package Review – 15%

January 25, 2004

INTERSTATE 405 Project Team

Congestion Relief & Bus Rapid Transit Projects

CHAPTER 2
TECHNICAL SPECIFICATIONS

2.1 GENERAL INFORMATION 3
2.1.1 General Requirements 3
2.1.2 Units of Measurement 3
2.1.3 Purpose 3
2.1.4 Description of Work 3
2.1.5 Project Management Criteria 7
2.1.6 Project Documentation 11
2.1.7 Software 14
2.2 NOT USED 17
2.3 NOT USED 19
2.4 DESIGN DEVIATIONS 21
2.4.1 Pre-Approved Deviations 21
2.4.2 Additional Deviations 21
2.5 SURVEYS AND MAPPING 23
2.5.1 General 23
2.5.2 Mandatory Standards 23
2.5.3 Performance Requirements 24
2.5.4 Design and Construction Criteria 24
2.5.5 Submittals 26
2.6 GEOTECHNICAL DESIGN 29
2.6.1 General 29
2.6.2 Mandatory Standards 29
2.6.3 Historical and Recent Geotechnical Data 29
2.6.4 Performance Requirements 30
2.6.5 Design and Construction Criteria 32
2.6.6 Submittals 33
2.7 PAVEMENT 35
2.7.1 General 35
Mandatory Standards 35
2.7.2 35
Performance Requirements 36
2.7.3 36
2.7.4 Design and Construction Criteria 38
2.7.5 Submittals 39
2.8 ENVIRONMENTAL 41
2.8.1 General 41
2.8.2 Mandatory Standards 41
2.8.3 Performance Requirements 43
2.8.4 Design and Construction Requirements 49
2.8.5 Submittals 54
2.9 PUBLIC INFORMATION 55
2.9.1 General 55
2.9.2 Public Information Staff 55
2.9.3 Mandatory Standards 56

2.9.4 Communications Coordination with WSDOT's I-405 Project Team 56
2.9.5 Approach to the Public Involvement Plan 57
2.9.6 Coordination with Context Sensitive Solutions Process 63
2.9.7 Quality Assurance and Quality Control 63
2.9.8 Submittals 64
2.10 UTILITIES 65
2.10.1 General 65
2.10.2 Utility conflict procedures 65
2.10.3 Mandatory Standards 66
2.10.4 WSDOT Supplied Information 67
2.10.5 Performance Requirements 68
2.10.6 Design and Construction Criteria 70
2.10.7 Submittals 72
2.11 HIGHWAY DESIGN AND GRADING 75
2.11.1 General 75
2.11.2 Mandatory Standards 75
2.11.3 Performance requirements 76
2.11.4 Design and Construction Criteria 77
2.11.5 Submittals 82
2.12 PLANS PREPARATION AND PROJECT DOCUMENTATION 87
2.12.1 General 87
Mandatory Standards 87
2.12.2 87
2.12.3 Performance Requirements 87
2.12.4 Not Used 90
2.12.5 Submittals 90
2.13 BRIDGES AND STRUCTURES 93
2.13.1 General 93
Mandatory Standards 93
2.13.2 93
2.13.3 Performance Requirements 94
2.13.4 Design and Construction Criteria 95
Submittals 103
2.13.5 103
2.14 DRAINAGE 105
2.14.1 General 105
2.14.2 Mandatory Standards 105
2.14.3 Performance Requirements 108
2.14.4 Design and Construction Criteria 110
2.14.5 Submittals 118
2.15 ROADSIDE RESTORATION DESIGN (LANDSCAPING AND AESTHETICS) 125
2.15.1 General 125
Performance Requirements 125
2.15.2 125
Mandatory Standards and Reference Documents 125
2.15.3 125
2.15.4 Design and Construction Criteria 126
2.15.5 Submittals 132
2.16 ILLUMINATION 135
2.16.1 General 135

2.16.2 Mandatory Standards 135
2.16.3 Performance Requirements 136
2.16.4 Design and Construction Requirements 136
2.16.5 Submittals 140
2.17 TRAFFIC SIGNALS 143
2.17.1 General 143
2.17.2 Mandatory Standards 143
2.17.3 Performance Requirements 144
2.17.4 Design and Construction Requirements 144
2.17.5 Submittals 148
2.18 INTELLIGENT TRANSPORTATION SYSTEMS (ITS) 151
2.18.1 General 151
2.18.2 Mandatory Standards 151
2.18.3 Performance Requirements 152
2.18.4 Design Requirements 159
2.18.5 Construction Requirements 171
2.18.6 Submittals 189
2.18.7 ITS Testing and Checklists 191
SIGNING 193
2.19 193
2.19.1 General 193
2.19.2 Mandatory Standards 193
2.19.3 Performance Requirements 194
2.19.4 Design and Construction Requirements 194
2.19.5 Submittals 197
PAVEMENT MARKING 199
2.20 199
2.20.1 general 199
2.20.2 Mandatory Standards 199
2.20.3 Performance Requirements 200
2.20.4 Design and Construction Requirements 201
2.20.5 Submittals 202
TRAFFIC OPERATIONS 205
2.21 205
2.21.1 General 205
2.21.2 Mandatory Standards 205
2.21.3 Performance Requirements 205
2.21.4 Accident Analysis and Mitigations Proposed 206
Submittals 206
2.21.5 206
2.22 MAINTENANCE OF TRAFFIC (MOT) 209
2.22.1 General 209
2.22.2 Mandatory Standards 209
2.22.3 Performance Requirements 211
2.22.4 Design and Construction Requirements 213
2.22.5 Submittals 241
2.23 RAILROAD 245
2.23.1 General 245
2.23.2 Permits 246
2.23.3 Performance Requirements 246
2.23.4 Not Used 248

2.23.5 Submittals 248
2.24 RIGHT-OF-WAY 251
2.24.1 General 251
2.24.2 Mandatory Standards and Publication 251
2.24.3 Right-of-Way Acquisition 252
2.25 CONTROL OF MATERIALS 255
2.25.1 General 255
2.25.2 Mandatory Standards 255
2.25.3 Materials Approval 255
2.25.4 Acceptance of Materials 258
2.25.5 Statistical Acceptance of Materials 259
2.25.6 Acceptance of Small Quantities of Materials 259
2.25.7 Handling and Storing Materials 260
2.25.8 Portland Cement Concrete Mix Design and Batch Plant 260
2.25.9 State Inspected and Tested Items 261
2.26 AS-BUILT DOCUMENTS 263
2.27 NOT USED 265
2.28 DESIGN-BUILD QUALITY MANAGEMENT PLAN REQUIREMENTS 267
2.28.1 General 267
2.28.2 Design-Builder Quality Control and Quality Assurance Staff 269
2.28.3 Design Quality Control and Quality Assurance Plan/Manual Requirements 271
2.28.4 Materials Quality Assurance Plan Requirements 276
2.28.5 Construction Quality Control and Quality Assurance Plan Requirements 281
2.28.6 Submittals 290
2.29 MAINTENANCE DURING CONSTRUCTION 293
2.29.1 General 293
2.29.2 Maintenance of the Right-of-Way 293
2.29.3 Maintenance of Roadways 294
2.29.4 Snow and Ice Operations 296
2.29.5 Electrical 296
2.29.6 Hazardous Spills Response 296
2.29.7 Structures 297
2.29.8 Emergency Response 297
2.29.9 Maintenance of Property 297
2.29.10 Maintenance of Aesthetic Treatment 298
2.30 PRODUCT WARRANTY PROVISIONS 299
2.30.1 General 299
2.30.2 Performance 299
2.30.3 Hot Mix Asphalt 301
2.30.4 Required Corrective Actions 302
2.30.5 Approach Slabs 302

CHAPTER 2

TECHNICAL SPECIFICATIONS

2.1 GENERAL INFORMATION

2.1.1 GENERAL REQUIREMENTS

Design-Build Flexibility. The WSDOT's intent is to permit flexibility in design and subsequent construction to accommodate processes, procedures, and innovative techniques that are preferred by the Design-Builder, as long as they are consistent with Site conditions, good engineering practices, and the standards, guidelines, and procedures identified in the Contract Documents.

Other Agencies. The WSDOT has briefly reviewed the Project with the local agencies, public and private, and has incorporated some of those agencies' feedback into the Technical Specifications and in the various appendicies. The WSDOT does not guarantee that the agencies will not impose additional requirements with their review of the Design-Builder's Project design.

For any such additional requirements that are outside the requirements of the Contract, the Design-Builder is responsible for negotiating and coordinating the Work with the appropriate agency(ies).

2.1.1.1 Document's Intent

Unless specifically addressed to be performed by others or by the WSDOT, all Work described and listed in the Technical Specifications of the Request For Proposal is the responsibility of the Design-Builder to perform, deliver or construct.

2.1.2 UNITS OF MEASUREMENT

The Project shall be designed, constructed and documented in English Units of Measure.

2.1.3 PURPOSE

The purpose of the Project is to construct highway improvements which in general scope is described in I-405, SR 520 to SR 522 – Kirkland Project Environmental Assessment (EA). The general scope of the Work is also shown in RFP Appendix H – *Preliminary Hydraulic Report*, RFP Appendix L – *Landscape and Aesthetics Report*, RFP Appendix M1 – *Conceptual Plans*, RFP Appendix P – Permits and RFP Appendix W – *Wetlands Mitigation* and other documents included in the RFP.

2.1.4 DESCRIPTION OF WORK

The Project shall be constructed in conformance with the WSDOT and other requirements as defined in the Contract Documents. The Design-Builder shall Perform, Design, Furnish Materials and Construct all the necessary Work to deliver a complete Project which meets or exceeds the following:

- Construct one additional general purpose lane in each direction on I-405 from NE 85th Street to NE 124th Street.
- Remove and replace the inside shoulder pavement section on Northbound and Southbound I-405 between NE 85th Street and NE 124th Street, and widen the shoulders from approximately 7 feet to 10 feet.
- Relocate the crown line to the permanent lane line between the left-most two general purpose lanes.
- Plane and resurface the entire I-405 Northbound and Southbound mainlines within the project limits to provide a smooth wearing surface on all travel lanes and shoulders.
- Overlay and reconstruct superelevation run-out transitions to accommodate the Implementation Plan pavement width.

- Remove and replace the existing outside shoulders on Northbound and Southbound I-405 within the project limits.
- Reconstruct portions of the NE 116th Street Interchange with forward compatibility to Kirkland Stage 2, and the Implementation Plan.
- Construct any retaining walls necessary at Implementation Plan compatible locations to keep the roadway grading prism within defined right-of-way.
- Construct noise walls as shown on the Conceptual Plans and as described in the Noise Discipline Report, Appendix E7.
- Provide stormwater treatment and detention facilities.
- Provide environmental mitigation for the Project as described in the Project EA, Project Permit conditions, and as depicted on the Conceptual Plans.
- Construct a fish passage system (new culvert or bridge) on Forbes Creek at I-405, according to WDFW guidelines.
- Install new trunk-line conduits for the length of the project for ITS.
- Install signing, pavement markings and lighting.
- Construct and/or modify traffic signal elements.
- Implement safety upgrades at High Accident Locations (HAL's).
- Other requirements described in the Contract.

The WSDOT's vision of a successful Project is, a project that:

- Can be maintained at the lowest possible cost
- Reduces the frequency and severity of accidents
- Maintains or improves the level of service for all movements
- Provides connectivity to the local roadway system
- Provides for safe and efficient flow of traffic during construction
- Avoids/minimizes impacts to the environment
- Increases availability of critical habitat for fish by providing fish passage at Forbes Creek
- Provides for temporary and permanent pedestrian and bicycle traffic
- Communicates effectively with the public and all pertinent parties
- Is cost effective, and
- Meets or exceeds the service life for all components.

2.1.4.1 WSDOT Developed Project Conceptual Designs

The Design-Builder shall develop the Project design so as to meet all the requirements of the Contract Documents. The Project Conceptual Design in RFP Appendix M1 was developed only to a limited level. If the Design-Builder adopts the Conceptual Design as the basis from which it will design the Project, the Design-Builder is responsible for:

- Ensuring that the resulting design meets the requirements of the Contract Documents.
- Assuming responsibility for any Project requirements arising from using the Conceptual

Designs as the basis of the Project design and construction.

2.1.4.2 Basic Configuration Elements

Section 1-01.3(1) of the General Provisions defined Basic Configuration for the Contract Documents. Following is a description of each Basic Configuration element and it's defining parameters for the Kirkland Stage 1 Contract.

- **Horizontal and Vertical Alignments for the Highway:**

The Horizontal and Vertical Alignments s hall be as defined on the Alignment and Paving Plans and Profile and Superrelevation Plans respectively. Horizontal Alignments may be adjusted by up to ten feet, and Vertical Alignments may be adjusted by up to two feet, providing that all of the following conditions are met: 1) The final Cut/Fill limits remain within the Impact Area Line as shown on the Conceptual Plans, 2) The adjustments do not result in the need to acquire additional right-of-way, and 3) The adjustments do not result in net increases to impacts of wetlands, wetland buffers, trees, or other environmentally sensitive areas that are depicted on the Conceptual Plans.

- **Number of Ramps/Overpasses/Underpasses**

All existing intersections/overpasses/underpasses shall remain, with the exception of the I-405/NE 116th Street interchange, which shall be redesigned and partially reconstructed. The on and off-ramps at the north end of the NE 85th Street interchange, and the south end of the NE 124th Street interchange will require modification to accommodate the additional lanes on I-405. All ramp modifications shall meet full standards as described in the WSDOT *Design Manual*.

- **I-405/NE 116th Street Interchange Design:**

The Design-Builder shall design the entire interchange as a ½ Single Point Urban Interchange (SPUI), including improvements to NE 116th Street and 120th Avenue NE, to the limits depicted on the Conceptual Plans, up to the level of design described in Section 2.11. All retaining walls, bridge abutments and other elements must be designed at Implementation Plan locations, wherever possible.

The bridge design and type selection shall accommodate simple widening of the I-405 mainline in the future Implementation Plan phase.

Design refinements are encouraged by the Design-Builder within the parameters of the other basic configuration elements as described in this Section. Should the Design-Builder choose to pursue an alternative interchange type to the ½ SPUI, a new traffic study report and other supporting documentation must be submitted as part of the Category A or VECP Change Proposal.

- **I-405/NE 116th Street Interchange Construction:**

The I-405 bridges over NE 116th Street, and the on and off-ramps shall be reconstructed, leaving the interchange as a ½ diamond upon completion of Stage 1, setting up for the ½ SPUI interchange completion in Stage 2. All constructed features in Stage 1 shall maximize forward compatibility with the completed ½ SPUI interchange in Stage 2 and the I-405 Implementation Plan as depicted in the Conceptual Plan. The entire northbound off-ramp shall be reconstructed, with placement at the Implementation Plan location to the greatest extent possible.

The Design-Builder shall construct the bridge abutments to full Implementation Plan width. All constructed features for the interchange, including but not limited to bridge abutments, retaining walls and planters, shall be constructed at Implementation Plan locations.

- **Number of Highway Lanes**

The Project shall include the addition of one (1) northbound and one (1) southbound lane between NE 85th Street and NE 124th Street on I-405. The completed configuration shall be one (1) High Occupancy Vehicle (HOV) and four (4) General Purpose (GP) lanes in each direction on I-405. All lane and shoulder widths shall be designed and constructed to full standard as described in the WSDOT *Design Manual*. The lane additions and drops shall be connected to the on and off-ramps at NE 85th Street and NE 124th Street, generally as depicted in the Conceptual Plan.

- **Number and Type of Signalized Intersections**

All existing traffic signals and ramp meters shall remain in place. The Design-Builder shall develop a traffic signal design for the SPUI interchange at NE 116th Street, and install conduits or conduit provisions on the new bridges over NE 116th Street. The traffic signal for the SPUI shall be designed to a 100 percent level to fully evolve conduit, pull box and signal post and head locations. Any of these features that will interact with or be installed on the new structures or abutment walls shall be accommodated. Any required mounting plates, surface mounted or embedded conduits, pull boxes, etc. that will be required on the new structures or abutment walls shall be installed as part of this contract.

- **Noise Walls**

The basic configuration components for noise walls shall be defined as the horizontal limits, and noise mitigation line (minimum top of wall) elevations as depicted in the Conceptual Plans, Appendix M1. At a minimum, all noise walls must be constructed to the horizontal and vertical limits depicted on the Conceptual Plans. Noise wall alignments may be revised or adjusted by up to five feet in offset to the roadway to accommodate design efficiency, without consequence, but the begin/end limits and minimum top of wall elevations shall remain unchanged.

If the Design-Builder chooses to shift the roadway horizontal alignment by more than two feet, and/or the roadway vertical profile by more than one foot, a new or supplemental noise analysis report must be submitted to WSDOT for approval. In no circumstance can the basic configuration of the noise walls, as depicted on the Conceptual Plans be reduced.

- **Fish Passage**

The current fish barrier at Forbes Creek is to be removed. At a minimum, a 78-inch diameter culvert will be installed under I-405 using trenchless technology and a concrete fishway will be installed that meets parameters set forth in Washington Department of Fish and Wildlife (WDFW) Design of Road Culverts for Fish Passage (May, 2003) and permit conditions. If the proposed culvert is to be constructed using construction practices other than trenchless technologies, the culvert will be required to meet WDFW stream simulation design guidelines. The new system is generally depicted on the Forbes Creek Culvert and Fishway Plans in Appendix M1. The system provides one possible solution and the Design-Builder is encouraged to seek other solutions such as a culvert system, or a 30-foot minimum span bridge. The Design-Builder shall submit plans for approval to Washington State Department of Transportation (WSDOT) and WDFW. Both agencies must grant design approval in writing prior to commencement of work on any Forbes Creek Fish Passage elements.

- **Impact Area Line**

All permanent grading is constrained by the Impact Area Line or Right-of-Way line (whichever is closest to I-405 traveled way) as depicted on the Conceptual Plans, Appendix M1. Permanent grading may be refined from the cut/fill lines out to the Impact Area Line shown on the Conceptual Plans without consequence.

- **Wetlands, Streams, Buffers and Trees**

The wetland and stream buffer boundaries and tree protection areas are Basic Configuration elements. The Design-Builder shall install high visibility construction fencing outside the buffers of each of these areas to protect them from all construction activities. The fence installation shall be monitored by the Environmental Compliance Manager on the Project. All wetland, stream, buffer and tree areas must be fenced within the project limits prior to the start of any clearing and grubbing activities on the Project.

- **Right-of-Way Limits**

The existing WSDOT right-of-way is defined in Appendix R. Generally, no additional right-of-way will be acquired by WDOT for the Project. The Conceptual Plans development process has determined that the Project is constructible within the existing right-of-way, newly acquired parcels and construction easements as depicted on the Conceptual Plans. The Design-Builder may propose additional right-of-way acquisition as part of a VECP to achieve additional design efficiency. The acquisition of additional right-of-way shall have no impact on project delivery dates as specified in the Design-Builder's schedule.

- **Pavement Resurfacing and Crown Relocation**

The Design-Builder shall resurface the I-405 northbound and southbound mainlines within the Project limits. This shall also include the roadway crown relocation by approximately three (3) feet to the outside, so that the final crown line will lie on a lane line.

- **Wetland Mitigation Sites**

The Design-Builder shall construct the wetlands mitigation sites as designed on the 100 percent design plans included in the Conceptual Plans, Appendix M1. Construction of the mitigation sites shall commence as early as possible in the construction sequence.

- **Forward Compatibility**

The Design-Builder shall ensure forward compatibility for all designs and constructed elements to the greatest extent possible with the Kirkland Stage 2 and Implementation Plan. Electronic design files for these future phases will be provided by WSDOT to the Design-Builder.

2.1.4.3 Coordination with Other Projects

The Design-Builder is responsible for coordination of the Work with other projects by the WSDOT or others that could hinder the progress of the Design-Builder or affect the operation of the roadway in a manner other than as approved by the WSDOT. This includes roadway closures not in the immediate area of the Project but that affect the operation of the roadway.

Several Projects that are known that could possibly occur within the same location or in the immediate vicinity or occur within the projected time for the Project are:

- Sound Transit: Totem Lake Freeway Station
- City of Kirkland NE 85th Street / 132nd Avenue NE intersection improvements
- City of Kirkland NE 85th Street / 124th Avenue NE intersection improvements
- City of Kirkland NE 85th Street / 114th Avenue NE intersection improvements

2.1.5 Project Management Criteria

The Design-Builder shall manage the entire Project and coordinate all activities necessary to accomplish the requirements of the Contract Documents.

2.1.5.1 Management

The Design-Builder shall achieve organizational performance that provides to the public a roadway system that incorporates Context Sensitive Solutions, meets the quality described herein at a fair cost, addresses the transportation need, and minimizes the Project impacts on the environment.

The Design-Builder shall keep communications with the Department continually open to promote betterment opportunities. Continuously look for opportunities to improve efficiency, and at the same time, meet the goals and quality needs described in the Contract. Empower personnel at all organizational levels to meet these goals and their associated tasks.

2.1.5.2 Key Personnel

Key Personnel Directory: Within seven (7) calendar days of the Notice to Proceed the Design-Builder shall provide a comprehensive Project directory, including the names of the previously committed Key Personnel; their Project office address and location, e-mail address, office, fax number, cellular and/or pager number(s); and their Project title and area(s) of responsibility.

On an organization chart, the Design-Builder shall graphically represent the Project hierarchy and, as a minimum, identify personnel with responsibility for the following functions:

- Project Management
- Quality Control / Quality Assurance
- Quality Management
- Construction Management
- Design Management
- Environmental
- Environmental Compliance
- Subcontracts and Procurement
- Design:
  - Roadway
  - Structures
  - Drainage
  - Geotechnical
  - Intelligent Traffic System
  - Materials
  - Pavement
  - Traffic
  - Coordination
  - Agencies
- Safety
- Project control
- Public information

- Survey
- Materials testing

The Design-Builder shall update the directory throughout the course of the Project. Key personnel cannot be replaced without the WSDOT approval. Submit the names and qualifications of the proposed replacement(s) to the WSDOT for advance approval.

2.1.5.3 Communications

2.1.5.3.1 Communications Systems

General: The Design-Builder shall establish the communication systems necessary to control all facets of the Project. The Design-Builder shall maintain communications with the Department, other entities as required for the management of the Project, the WSDOT and local and regional emergency response agencies or entities (including the Washington State Highway Patrol), in accordance with the requirement of the Contract Documents.

Co-Location Office: The Design-Builder shall provide email addresses for the WSDOT staff compatible with the WSDOT's system and maintain capability to access the State web site. The Design-Builder shall provide the capability for the WSDOT staff to connect to the WSDOT email system and other WSDOT network resources. For details of system requirements, see Section 2.1.7 Software.

2.1.5.4 Meetings and Coordination

2.1.5.4.1 Weekly Meetings

Plans and schedule for weekly meetings with the WSDOT Project representatives to discuss Project progress, issues, and planned Work for all phases of design and construction.

The Design-Builder shall develop the meeting agendas and shall provide meeting facilities.

The Design-Builder shall record minutes of each coordination meeting and distribute copies to the WSDOT participants within five (5) calendar days of the meeting date for the Department's information and confirmation.

2.1.5.4.2 Speciality Meetings

The Design-Builder shall plan for specialty meetings for safety, quality, public and environmental issues.

2.1.5.4.3 Public Information and Public Relations

See Section 2.9 – Public Information for staffing and requirements.

2.1.5.4.4 Community Involvement Groups

The Design-Builder shall organize, participate and provide support for community involvement groups pertaining to Work on the Project.

The Design-Builder shall interface with advisory committees, whose meetings will continue throughout the design and construction phases.

See Section 2.9 – Public Information and Section 2.15 – Roadside Restoration and Aesthetics for additional information.

2.1.5.4.5 Design Task Force Meetings

The Design-Builder shall meet and coordinate with WSDOT for all civil disciplines prior to design to

reach agreement and clarify design criteria.

2.1.5.5 Emergencies

Emergency Actions: In any emergency affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the Design-Builder shall act to prevent any threatened damage, injury, or loss. If the Design-Builder believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof, the Design-Builder shall give the Department prompt written notice.

2.1.5.6 Subcontracts

2.1.5.6.1 General

The Design-Builder shall incorporate into each subcontract the provisions specified in Section 1-08.1 Subcontracting.

2.1.5.6.2 Communication

The Design-Builder shall require all subcontractors, suppliers, and other such individuals or entities performing or furnishing any of the Work, to communicate with WSDOT only through the Design-Builder.

2.1.5.6.3 Coordination

The Design-Builder shall accept sole responsibility for scheduling and coordinating the Work of subcontractors, suppliers, and other such individuals or entities performing or furnishing any of the Work under direct or indirect Contract with the Design-Builder.

2.1.5.7 Co-location Office

The Design-Builder shall provide and pay for all office and other building space, facilities, equipment, and vehicles necessary to construct the Project and meet the requirements of the Contract and of this Section.

2.1.5.7.1 WSDOT Staff Facilities

The Design-Builder shall provide for WSDOT's staff, a minimum of two (2) office spaces of 100 square feet each that are co-located with the Design-Builder's design, construction management and Project controls/business staff and computers with at least the software and connections listed in Section 2.1.7.

Design-Builder shall provide secured free parking spaces for three (3) WSDOT staff vehicles.

General Requirements:

- Include desks, chairs, and telephones in all offices. Provide copying and fax equipment services.
- Secure sites, obtain all Site permits, install and pay for all utility services, and maintain the facilities as part of the Work.
- Include in the offices at least two (2) exits from each building or trailer and secure each entrance with a door lock plus a deadbolt lock.
- Provide daily janitorial service (except holidays) and maintain trash containers and trash pickup service.
- Maintain the exterior areas of office spaces, including access to parking areas and snow

removal.

- In all interior spaces, include overhead lighting that meets the requirements of U.S. Occupational Safety and Health Administration (OSHA) and building and electrical codes for office space that has a minimum circuit capacity of 20 amperes, and provide at least two (2) duplex receptacles for each office space.
- Provide restrooms until Physical Completion of the Project, unless otherwise agreed by the Department in writing.
- Meet all access requirements of the Americans with Disabilities Act.
- Provide heating, ventilation, air conditioning, and cooling systems capable of maintaining temperatures between 65 and 75 degrees Fahrenheit in all spaces throughout the year.
- Meet all local building code requirements.
- Provide one touch-tone speaker telephone for each office, each with a status indicator and access to all outside lines and conference call systems.
- Dispose or remove all Design-Builder provided facilities and perform any required Site restoration Work prior to Physical Completion.
- For all Department offices that are provided, maintain them for at least 90 calendar days after physical completion of the Project, unless otherwise agreed by the Department in writing.

2.1.6 PROJECT DOCUMENTATION

2.1.6.1 General

The Design-Builder shall accept sole responsibility for the documentation of all Project Work activities.

Maintain in good order, in a secure and protected place at the Site, one (1) record copy of all drawings, specifications, addenda, written amendments, change orders, Work change directives, field orders, and written interpretations and clarifications. Annotate them to show changes made during construction. Make these record documents, together with all approved samples and approved shop drawings, available to the Department for reference.

The Design-Builder shall use an electronic Document Control System to manage all Project documents. The Design-Builder's Document Control System must be able to be integrated into the Department's system; implementation details will be arranged after Contract award.

2.1.6.1.1 Format

The Design-Builder shall maintain all files in both the electronic media indicated in Section 2.1.7 and as hard copies.

2.1.6.1.2 Communications Distribution

As a minimum, the Design-Builder shall prepare and circulate to the Department and attendees of all meetings, hard copies and electronic files of all correspondence, minutes of meetings, etc., developed as a result of any and all communications with:

- WSDOT
- Utility owners
- Communities
- Agencies

- Members of the public

Accept sole responsibility for ensuring that all communications are distributed to the appropriate parties.

2.1.6.1.3 Electronic Files

Backups: The Design-Builder shall backup all electronic files partially every day and fully every week and shall store all backup media in a secure area. See Section 2.1.7 – Software for software requirements.

Data Backup and Recovery: The Design-Builder shall develop and implement data security, backup and recovery plan for Project information under the control of the Design-Builder.

2.1.6.2 Design Documentation

2.1.6.2.1 Communication and Submittal Documentation

The Design-Builder shall maintain throughout the course of the Project, in the Design-Builder's engineer's office, two (2) complete sets (at a minimum) of:

- Project Contracts
- Calculations
- Reports
- Studies and investigations
- Plans
- Communications
- Minutes of meetings
- Review comments
- Permits
- Easement Agreements

2.1.6.3 Field Documentation

2.1.6.3.1 Communication and Submittal Documentation

The Design-Builder shall maintain in the on-site Project office, and make available for Department review, two (2) complete hard copy sets of orderly files (at a minimum) that include the following:

- Contracts
- Subcontracts
- Change orders
- Shop drawings
- Pay invoices
- Minutes of meetings
- Field directive changes
- Claims
- Calculations

- Reports
- Tests
- Drawings. Do not mark on one set of the drawings, and use the other set as the master copy for As-Built control records.

At the completion of the Project, submit one (1) set of the documents listed above to the Department for its retention and use.

2.1.6.3.2 Record Drawing Documentation

2.1.6.3.2.1 ***Work in Progress***

The Design-Builder shall maintain a complete, neatly marked-up set of drawings upon which daily changes, alterations, and deletions are made to the "Release for Construction" documents. All markup revisions shall be made with a red pencil and dated for correlation with field directive changes and change orders.

As-Built changes shall not be made without approval by the Engineer of Record.

2.1.6.3.2.2 ***Project As-Builts***

Prior to Physical Completion, the Design-Builder shall provide WSDOT with the following:

- As-Built Plans, files and a signed hard copy.
- Relevant data not previously submitted.

Take special care to ensure that all construction changes have been entered on all As-Built documents affected by the change.

The Design-Builder shall include in the As-Built Plans all changes and corrections to the plans that depict the final completed component, with relevant data showing (including copies of calculations not previously submitted with shop drawings or Final Design Documents).

2.1.6.3.2.3 ***Format***

The Design-Builder shall submit the As-Built Plans in the Department's standard format, organized in accordance with standard Department numbering and naming conventions. The Design-Builder shall make all electronic files consistent with the software requirements of Section 2.1.7 and shall submit two (2) complete electronic sets on CD ROM (in conformance with the I-405 CADD Standards) and as specified in Section 2.1.7 as follows:

- Enclose an accompanying index and instructions.
- Attach a cover sheet to the As-Built Plans of each constructed Work component. On the cover sheet, include a written certification by the Construction QA Manager that the As-Built Plans accurately and completely indicate all changes and corrections made during construction.
- Obtain the signature, certification, and stamp of the Design QA Manager, and the Engineer of Record on the cover sheet of the As-Built Plans for each constructed Work component.
- Stamp or otherwise clearly mark each sheet of the As-Built documents "AS-BUILT".

2.1.6.4 Document Control Verification

2.1.6.4.1 General

Monthly, or more often as the situation may warrant, WSDOT will review the Design-Builder's document control performance. The Design-Builder shall develop a sign-off sheet that is filled out monthly, signed by the Project Manager, Design QA Manager and Construction QA Manager, and submit it with each monthly invoice as indicated in General Provisions Section 1.09.9(1).4 Progress Report. The Department, as indicated in General Provisions Section 1.090.9(2) (Payment), may withhold payment until documentation issues are corrected as specified herein.

2.1.7 SOFTWARE

2.1.7.1 General

The Design-Builder shall acquire, use, and maintain for Project the software as specified in this Section or as specified elsewhere in the Contract.

Version: The Design-Builder shall use the current version of the specified software in effect as of Notice to Proceed, unless otherwise called for in this Section.

Updates: The Design-Builder shall update software programs throughout the Contract within six (6) months of release of a software update, or earlier if mutually agreed to with the Department. The Department will similarly update its software.

File Server: The Design-Builder shall store all data files for the applications included in this Section on, or have them accessible through, the Design-Builder's central file server.

2.1.7.1.1 Required Project Software

The Design-Builder shall submit all design documentation, whether it is in process, final, or As-Built, to the Department as both hard-copy printouts and electronic files on CD ROMs.

The Design-Builder shall use the following software programs for Project Work in addition to all other software specified in the Contract Documents:

2.1.7.1.1.1 ***Roadway***

InRoads (by Bentley) – Same version the Department is using at Notice to Proceed.

MicroStation (by Bentley) – Same version the Department is using at Notice to Proceed.

2.1.7.1.1.2 ***Structures***

MicroStation (by Bentley) – Same version the Department is using at Notice to Proceed.

2.1.7.1.1.3 ***Traffic Signals***

See Section 2.17.

2.1.7.1.1.4 ***Intelligent Transportation System and Maintenance of Traffic***

See Section 2.18 and Section 2.22.

2.1.7.1.1.5 ***Viewing of CADD Files***

Bentley MicroStation.

2.1.7.1.1.6 ***Word Processing and Spreadsheets***

Microsoft Word (for word processing)

Microsoft Excel (for spreadsheets)

Microsoft Access (for database)

Contract Software Programs

2.1.7.1.1.7 ***Text Documents***

Text Documents generated in the RFP were produced in Microsoft Word. The filenames are designated by a ".doc" extension.

2.1.7.1.1.8 ***Spreadsheets***

All spreadsheet files in the RFP were created in Microsoft Excel. The filenames are designated by an ".xls" extension.

2.1.7.1.1.9 ***CADD Drawings***

All CADD files in the RFP were created in MicroStation. The filenames are designated by a ".dgn" extension.

2.1.7.1.1.10 ***Scanned Documents***

The filenames of scanned documents are designated by a ".pdf" extension.

2.1.7.1.2 **Department Electronic Communications**

The Department uses the following software for its electronic communications, but use by the Design-Builder is optional.

2.1.7.1.2.1 ***Network Communications***

The Design-Builder shall provide a T-1 or better connection for network connections to WSDOT system. Contact David Schmidt at (206) 440-4926, email: schmidtd@wsdot.wa.gov, to coordinate network connections.

2.1.7.1.2.2 ***E-Mail and Scheduling Software***

WSDOT uses Microsoft Outlook and Exchange Server for email services. Contact David Schmidt at (206) 440-4926, email: schmidtd@wsdot.wa.gov, to coordinate network connections and establish email services required.

2.1.7.1.2.3 ***Document Control***

The Design-Builder and WSDOT shall share Project data. The Department's document control and data system software for the Project has been developed. The Design-Builder's document control system must be able to be integrated into the Department's system; implementation details will be arranged after Contract award.

End of Section

2.2 NOT USED

2.3 NOT USED

2.4 DESIGN DEVIATIONS

2.4.1 PRE-APPROVED DEVIATIONS

The following Design Deviations have been pre-approved for this project:

- Design Deviation #1 – NB I-405 Superelevation Transition Location (north of NE 116th Street)
- Design Deviation #2 - Arterial Vertical Stopping Sight Distance (NE 116th Street and NE 120th Avenue)
- Design Deviation #3 - Limited Access Along NE 116th Street (East of the northbound off-ramp)

Copies of the approved Design Deviations are included in Appendix O2. If the Design-Builder chooses to change the design depicted in the Conceptual Plans, on which these deviations were based, revised Design Deviations, if required, must be submitted to WSDOT for approval. Approval of any revised deviation is not guaranteed if the design proposed by the Design-Builder would further reduce the design parameter(s) for which the original deviation was approved.

2.4.2 ADDITIONAL DEVIATIONS

Additional deviations may be requested, however the Design-Builder is advised that there is no assurance that they will be approved. Design deviations shall be developed in conformance with the WSDOT *Design Manual* and in the same format as the pre-approved deviations, and shall be stamped by a Professional Engineer, licensed in the State of Washington.

Four (4) complete sets of deviation requests shall be submitted to WSDOT for review and approval.

Cost savings resulting from design deviations, approved after award of the Contract to the Design-Builder, shall be treated as described in Section 1-04.4 of the General Provisions.

End of Section

2.5 SURVEYS AND MAPPING

2.5.1 GENERAL

The Design-Builder shall conduct all work necessary to meet the requirements associated with land surveying and survey mapping, including secondary horizontal and vertical control surveys, topographic surveys, right-of-way surveys, bridge surveys, utility surveys, design surveys, construction surveys, as-built surveys, records of surveys, Permits to Destroy and Remove Monuments, Land Corner Records and all other land surveying services necessary to complete the Project in an accurate, neat, and timely fashion.

Existing WSDOT survey monumentation can be found at the WSDOT website www.wsdot.wa.gov/monument.

2.5.2 MANDATORY STANDARDS

2.5.2.1 General

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications maybe required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from the WSDOT. The WSDOT's interpretation and decision shall be final.

2.5.2.2 Mandatory Standards

- The meaning of words and terms used in this Section 2.5 and not otherwise defined in the Contract Documents shall be as listed in "Definitions of Surveying and Associated Terms" current edition, published by the American Congress on Surveying and Mapping and the American Society of Civil Engineers.
- WSDOT has prepared mapping for the Project from MP 18.10 to MP 20.1. Primary and secondary survey horizontal control was established by the WSDOT with GPS equipment in the Washington coordinate system, North zone, North American Datum of 1983 (NAD 83/91) with a data set accuracy is <0.02 M @ 2 Sigma. The WSDOT photogrammetric digital map data set accuracy is <0.1 M @ 2 Sigma, which could also be stated as, well defined visible detail points in the digital file are within 0.1 M of true ground position at the 95 percent confidence level.
- Vertical control is based on North American Vertical Datum of 1988 (NAVD 88).
- Supplied 3D Microstation. .dgn file comprised of photogrammetric data is in State Plane coordinates.
- Appendix B1, Project Special Provisions, Amendments to the Standard Specifications, Appendix B2.
- WSDOT Standard Specifications for Road, Bridge and Municipal Construction (M41-10) (2004).
- WSDOT *Highway Surveying Manual* (M22-97)
- WSDOT *Design Manual* (M22-01)
- WSDOT *Plans Preparation Manual* (M22-31)
- WSDOT *Standard Plans* (M21-0)

- All field survey work, design and construction shall be done in project ground datum. The conversion to project datum will be; (State Plane Coordinate + 100,000 meters) x 0.304800610 ft/m x 0.99996295 = Project Datum
- Any conversion from Metric to English shall use the U.S. Survey foot definition: 1 meter = 39.37-inches exactly
- Areas that were obscured due to dense trees, brush or dark shadows may contain weak x, y, z data which may require a field survey check or verification by the Design-Builder
- The Design-Builder is solely responsible for the accuracy of all survey information provided in the Technical Specifications.

2.5.3 PERFORMANCE REQUIREMENTS

2.5.3.1 General

The Design-Builder shall verify and confirm the location, accuracy and datum of all information provided to the Design-Builder, regardless of the source of information. The Design-Builder shall document all forms of data verification. If the Design-Builder identifies any discrepancy; the discrepancy shall be reported in writing to the WSDOT for review. The WSDOT will respond to the discrepancy within five (5) business days.

A Maintenance of Traffic Plan shall be prepared whenever work, or when the work crew's vehicle, will be within any roadway clear zone. The Maintenance of Traffic Plan shall meet the requirements of Chapter 2.22, Maintenance of Traffic of this RFP. All survey crews working or work crew vehicles within the WSDOT's right-of-way shall have a Survey Permit in each vehicle.

2.5.3.2 Survey Manager

The Design-Builder shall designate a Survey Manager for the Project. The Survey Manager must be currently licensed as a Professional Land Surveyor in the State of Washington. The Survey Manager will manage all survey activities associated with the Project and shall be responsible for directing and reviewing all survey work and be the point of contact for all survey activities.

2.5.4 DESIGN AND CONSTRUCTION CRITERIA

2.5.4.1 General

Survey accuracy shall meet the accuracy required by the Design-Builder to meet design standards and at each stage of construction shall meet the criteria shown in the plans for the final widths, depths, cross sections, and heights.

For control points for I-405 alignment, see right-of-way sheets in Appendix R.

2.5.4.2 Design Survey Work

The Design-Builder shall review data provided by the WSDOT. Any discrepancies found in the data provided shall be brought to the attention of the WSDOT.

The Design-Builder shall be responsible for additional field survey work. All field survey work shall be suitable for Design and Construction Document preparation and meet the technical requirements of the WSDOT and the Washington State Board of Registration for Engineers and Land Surveyors.

- The Design-Builder shall obtain any permits that may be required prior to beginning field work. (See the WSDOT *Design Manual*, Chapter 1450 for Permits). Preparation of surveys shall conform to requirements referenced in the WSDOT *Highway Surveying Manual*, including, (but not limited to), procedures, record-keeping requirements, equipment use, and safety precautions.

- The Design-Builder shall utilize Chapter 9 of the WSDOT *Highway Surveying Manual* for modifying the monumentation. See Section 2.5.4.5.

2.5.4.3 Construction Surveying

The Design-Builder shall be responsible for all survey necessary to complete the work. All survey control data including that furnished by the WSDOT, calculations, surveying, and measuring required for setting and maintaining the necessary lines and grades shall be the Design-Builder's responsibility.

Detailed survey records shall be maintained, including a description of the work performed on each shift, the methods utilized and the control points used. The record shall be adequate to allow the survey to be reproduced. This record shall include graphic notes depicting Control Points used and relationship to other control points or reference points, description, coordinates and location description. Bench marks and Temporary Bench marks shall also have graphic notes depicting description, elevation, coordinates and location description. A data collector printout of the day's activities only, will not be acceptable. The Survey Manager shall provide a copy of each day's record to the WSDOT when requested within three (3) calendar days after the end of the shift.

The survey work by the Design-Builder shall include but not be limited to the following:

- Verify the primary horizontal and vertical controls furnished by the WSDOT, and expand into secondary control by adding stakes and hubs as well as additional permanent survey control needed for the Project. Provide descriptions of permanent secondary control to the WSDOT. All permanent secondary control points set will be shown on a Report of Survey Mark form with ties to the right-of-way centerline alignment on a Post Construction Record of Survey. Permanent secondary control points shall be established to Specifications listed in the WSDOT *Highway Surveying Manual.*

For all other types of construction included in this provision, (including but not limited to channelization and pavement marking, illumination and signals, guardrails and barriers and signing) provide staking and layout as necessary to adequately locate, construct and check the specific construction activity.

Upon request, the Design-Builder shall provide the WSDOT copies of all calculations and staking data prior to staking.

See Sections 2.6, 2.8, 2.10 and 2.14 for possible other survey needs.

The Design-Builder shall ensure surveying accuracy.

2.5.4.4 Monumentation

General - Document all the WSDOT, Governmental monumentation and property corners that will be disturbed or destroyed during the contract. The Design-Builder shall follow the procedures as set forth under Chapter 9 of the WSDOT *Highway Surveying Manual* relating to the destruction and replacement of monumentation. Copies of any and all permits that are required for the removing and resetting of monuments shall be submitted to the WSDOT within three (3) days of submittal to the Department of Natural Resources. The Design-Builder shall submit to the WSDOT the approved Department of Natural Resources copy of the Record of Survey.

2.5.5 SUBMITTALS

2.5.5.1 Survey Records

Survey records shall be delivered in a hardcopy format and also in electronic file format. The electronic format shall be compatible with that of the WSDOT's. They shall be delivered at the time of Substantial Completion unless requested by the WSDOT at an earlier time.

2.5.5.2 As-Builts

The Design-Builder shall produce reports documenting the location of the as-built alignments, profiles, drainage structure locations, utilities, and survey control monument placement. These reports shall include descriptive statements for the survey methods used to determine the as-built location of the feature being surveyed. The Design-Builder as-built data shall include the coordinate types (x, y, and/or z) and feature codes in the same format that the preliminary construction data was generated in. Where data has been provided to the Design-Builder from the WSDOT in x, y, z coordinate format the Design-Builder shall provide the WSDOT with data in an x, y, z coordinate format. Where data has been provided to the Design-Builder from the WSDOT in an x, y only coordinate format, or z only coordinate format, the Design-Builder shall provide the WSDOT with data in x, y only coordinate format, or z only format.

All x, y and z coordinates shall be in State Plane.

The Design-Builder shall provide to the WSDOT an as-built survey base map file in MicroStation Version 8 format.

All as-built survey files shall be delivered within thirty (30) days of Substantial Completion of the Project.

2.5.5.3 Post Construction Record of Survey

The Design-Builder shall provide to the WSDOT a Post Construction Record of Survey in hard copy and electronic format. A draft copy shall be submitted to the WSDOT for review prior to recording. A mylar hard copy, with the county recording numbers and electronic format shall be delivered at the time of Substantial Completion unless requested by the WSDOT at an earlier time. The electronic format will be compatible with that of the WSDOT's. The Post Construction Record of Survey shall include but not be limited to:

- All monuments that have been removed by construction activities and indicate if they have been replaced or not.
- All permanent secondary and tertiary horizontal and vertical control points established by the Design-Builder shall be defined by State Plane Coordinates (X, Y and Z) and by station and offset. All permanent control points will be accompanied with a Report of Survey Mark.
- All monuments, remaining and set, will be defined by station and offset to the right-of-way centerline if construction centerline alignment is different.

2.5.5.4 Special Provisions

The WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require the WSDOT's approval prior to application during construction.

End of Section

2.6 GEOTECHNICAL DESIGN

2.6.1 GENERAL

The Design-Builder shall review the existing geotechnical information which includes the Geotechnical Baseline Report (Geotechnical Baseline Report, I-405, SR 520 to SR 522 Stage 1, Kirkland, Washington, prepared by GeoEngineers Inc., September 7, 2004) for this Project (Appendix G1). The Design-Builder shall evaluate the requirements of the Work, and perform geotechnical explorations, geotechnical analyses, and laboratory testing, sufficient to supplement the existing data, and provide geotechnical designs and construction support in accordance with this RFP Section 2.6. The Design-Builder shall cooperate and coordinate with State and Municipal Agencies to facilitate the completion of the Project.

2.6.2 MANDATORY STANDARDS

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list and other applicable publications maybe required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from the WSDOT. The WSDOT's interpretation and decision shall be final.

2.6.2.1 Mandatory Standards

WSDOT Standards and References:

- WSDOT *Geotechnical Design Manual - 2004 (GDM)* * Modified for Design-Build
- WSDOT *Bridge Design Manual* (M23-50)
- WSDOT *Design Manual* (M22-01)
- WSDOT *Highway Runoff Manual* (M31-16)
- WSDOT *Qualified Products List* (M46-02)
- WSDOT *Materials Manual* (M46-01)
- WSDOT *Construction Manual* (M41-01)
- WSDOT *Standard Specifications* (M41-10)

AASHTO References:

- AASHTO *Manual on Subsurface Investigations, 1988*
- AASHTO *LRFD Bridge Design Specifications, US Units, 2004*
- AASHTO *Standard Specifications for Transportation Materials and Methods for Sampling and Testing, 24th Edition, 2004*

2.6.3 HISTORICAL AND RECENT GEOTECHNICAL DATA

Historical records for previous geotechnical studies and related contract work along the I-405 Project alignment are provided in Appendix G2 of this RFP. This information includes test boring logs, memos and reports substructure details, (foundation type and bearing elevation), and subsurface profiles for many, but not all, of the existing bridges. The Design-Builder shall use this information at the Design-Builder's own discretion. The WSDOT makes no warranty, either expressed or

implied, on the accuracy of this information.

The recent geotechnical information indexed as "I-405 Team borings" is included in the Geotechnical Baseline Report (GBR) and in Appendix G1. The soil conditions and groundwater levels provided in the GBR are known only at each specific boring location at the time of the boring. Included in Appendix G1 is a time history of groundwater levels at nine specific piezometer locations. These data and future collection of groundwater information from these borings, are the responsibility of the Design-Builder upon Notice to Proceed of the contract. The Historical and Recent Geotechnical data are provided on CD ROMs, included in Appendix G1 and G2. Drawings developed in Microstation™ of the Kirkland Stage 1 segment are also included on these CD ROMs. These drawings include locations of the geotechnical borings. Recent geotechnical information for the Forbes Creek area is included in Appendix G-4 and the Stormwater Infiltration Studies Report for Kirkland Stage 1 by Landau Associates is included in Appendix G-3.

2.6.4 PERFORMANCE REQUIREMENTS

2.6.4.1 Personnel Requirements

The Design-Builder shall provide a Geotechnical Group Manager with a minimum of ten (10) years of supervisory experience in geotechnical design and construction support of roadways, bridges, retaining walls and other highway related elements. This individual shall have at least five (5) years of experience working in Washington State and shall be familiar with the AASHTO LRFD bridge design specifications. This individual shall be a Professional Engineer licensed by the State of Washington and shall be in responsible charge of the geotechnical design elements of the Project.

The individuals responsible for the installation and monitoring of instrumentation such as inclinometers, piezometers, settlement indicating devices, SPT testing, Becker Hammer testing, etc., shall have a minimum of two (2) years experience with the specific type of instrumentation the individual will be using.

2.6.4.2 Subsurface Investigation Plan (SIP)

The Design-Builder shall conduct a Subsurface Investigation Plan (SIP) to supplement information provided in the GBR to complete the final geotechnical design for the Project. Additional explorations, as determined necessary by the Design-Builder and to meet mandatory standards, shall occur at bridge foundation locations, along the alignment of planned retaining walls, at significant cuts and fills, building structures, noise walls, culverts, signs, signals, and storm-water retention-detention ponds.

The investigation shall be conducted in accordance with the WSDOT *Geotechnical Design Manual (GDM)*. The Design-Builder shall determine the specific locations, frequency, and scope of the SIP. Geotechnical investigations at locations of stormwater retention-detention ponds, infiltration ditches, and structures shall be performed as specified in the WSDOT *Highway Runoff Manual*.

The SIP shall be submitted to the WSDOT for review and comment prior to start-up of any earthwork or excavation. This submittal shall include the number and depths of the proposed borings/cone penetration tests and other field investigations, and the proposed sampling and testing, to meet the minimum requirements of the Project. Instrumentation to be used for design and construction monitoring purposes shall also be included in the Geotechnical Instrumentation Plan (GIP) as described in this Chapter (e.g. piezometers, slope inclinometers, etc). The submittal shall also include a Traffic Management Plan in accordance with Section 2.22 Maintenance of Traffic, where investigations are in or adjacent to active freeway or city streets. The Design-Builder shall secure an access permit from the appropriate Agency, if required.

Soil properties used for design shall be determined in accordance with the GDM. Field tests shall be

conducted in general accordance with appropriate AASHTO and the WSDOT standards.

Following completion of exploratory work, all boring locations shall be surveyed, and station and offset, elevation, and state plane coordinates, shall be determined and included on the boring logs. Following drilling and laboratory work, the Design-Builder shall retain all samples until the completion of the Project, i.e. Project Acceptance, and shall provide such samples to WSDOT, if requested, before the end of this time period.

2.6.4.3 Laboratory Testing Requirements

Laboratory testing of collected soil and groundwater samples shall be conducted in accordance with the GDM and applicable WSDOT and AASHTO testing procedures. Laboratories conducting geotechnical testing shall be either AASHTO accredited for the testing being performed or fulfill the requirements AASHTO R18 for qualifying testers and calibrating/verifying of testing equipment for those tests being performed. All test results shall be included in the Draft and Final Geotechnical Reports.

2.6.4.4 Geotechnical Instrumentation Plan (GIP)

The Design-Builder shall develop, implement, and maintain a documented Geotechnical Instrumentation Plan (GIP) to satisfy design and quality control requirements. The GIP shall be available to the WSDOT for review throughout the Project.

The Design-Builder shall install geotechnical instrumentation where necessary to monitor parameters such as the following:

- Settlement and settlement rates of embankments and structures
- Pore water pressures
- Groundwater levels
- Stability of walls and slopes, and
- Ground vibration.

The Design-Builder is responsible for all damage caused by their construction activities to structures on or immediately adjacent to State right-of-way. "Structures" are defined herein as all commercial buildings, private residences and all existing and proposed public facilities including, but not limited to, utilities, drainage facilities, bridges and buildings.

Damage to structures may be caused by excessive vibrations, embankments-induced settlement, physical impact, and others. Before construction operations commence, the Design-Builder shall identify instrument types, locations, zones of influence, critical readings, and frequency of readings in the GIP. For non-WSDOT owned buildings and other structures, including private residences within 200 feet of the project boundaries, the Design-Builder shall conduct a pre-condition survey. This survey should include video or photographic documentation of internal and external building walls and foundations. The pre-condition survey and GIP shall be submitted to the WSDOT prior to beginning any construction activity.

Where embankments are planned, the Design-Builder shall install instrumentation to monitor settlements of structures, utilities, and other features within the zone of influence of the embankment, where existing and proposed facilities are founded on settlement-sensitive or soft ground. For embankments, the zone of influence shall be defined as a zone extending a minimum horizontal distance (H) from the toe of the embankment, where H is the height of the embankment. For retaining walls, the zone of influence shall extend from the toe of the footing to a minimum distance of twice the height of the wall.

Where impact or vibratory pile driving is planned, vibration monitoring shall be conducted where sensitive structures or utilities are within 100 feet of pile driving operations. The Design-Builder is required to cease all operations when vibration recording equipment exceeds a peak particle velocity of 2 in/sec.

Any instruments that are damaged during construction and require removal and/or recalibration shall be replaced and/or recalibrated by the Design-Builder.

The draft and final Geotechnical Reports shall include the GIP and all critical readings collected for design and construction related purposes.

2.6.4.5 Borehole Site Cleanup

Backfilling of borings, test pits, CPT holes, etc., shall be performed in accordance with the provisions of applicable local, State, or Federal laws and regulations. Borings shall be abandoned in accordance with Washington State Department of Ecology regulations.

The Design-Builder shall backfill all test holes in a manner that ensures against subsequent settlement of the backfill and holes hazardous to persons, animals, or equipment. Upon completion of the field investigation Work, the Design-Builder shall remove all surplus material, temporary structures, and debris resulting from the Work on land and water.

2.6.4.6 Field Logs

The field logs shall be prepared in accordance with the requirements of the GDM. Logs of all field explorations shall be included in the Design-Builder's Final Geotechnical Report for the Project.

2.6.4.7 Geotechnical Analysis

The Design-Builder shall perform geotechnical engineering and geologic analyses based on the findings from subsurface investigations and laboratory testing programs, and results of engineering analyses, including information provided in the GBR, in accordance with the GDM and standards and publications referenced herein.

2.6.5 Design and Construction Criteria

2.6.5.1 Bridge Foundation Design

All new bridge foundations shall be designed using the LRFD specifications, as described in the GDM, the WSDOT *Bridge Design Manual*, and AASHTO LRFD Bridge Design Specifications.

2.6.5.2 Wall Design

All retaining walls and wall foundations shall be designed using the LRFD specifications, as described in the GDM, the WSDOT *Bridge Design Manual*, and AASHTO LRFD Bridge Design Specifications, except for soil nail walls, MSE Walls and noise walls. Soil nail walls shall be designed using the Service Load Design (SLD) method as required in the GDM. Noise walls shall be designed using the Load Factor Design (LFD) method as required in the GDM. MSE walls shall be designed using either the Service Load Design (SLD) method or the LRFD method as required in the GDM.

The Design-Builder shall meet applicable Landscape and Aesthetic requirements per Section 2.15.

2.6.5.3 Deflection Criteria

Criteria for allowable settlement and horizontal deformation of retaining structures, hydraulic structures, and bridge foundations/piers provided in the GDM and the WSDOT *Bridge Design Manual* shall be used for the design of these structures.

2.6.5.4 Slope Stability and Protection

The Design-Builder is responsible for slope stability throughout the Project corridor, both on- and adjacent to State right-of-way. Should any landslides develop during construction, the Design-Builder shall cease all activities in the immediate area within and around the unstable ground until the situation is fully assessed by the Design-Builder. The Design-Builder shall immediately contact WSDOT informing them of the situation. Before the Design-Builder returns to work in the immediate area of unstable ground, the Design-Builder shall implement temporary slope stabilization measures to ensure public and Design-Builder personnel safety. Permanent slope stabilization measures shall be developed and constructed by the Design-Builder. WSDOT will review and comment on the temporary and final slope stabilization measures. Where necessary during construction, the Design-Builder shall be required to drain areas of observed or suspected groundwater seepage to avoid the risk of landslide and surface sloughing through the use of gravel drainage blankets, French drains, horizontal drains, and/or placement of a surface rock facing.

2.6.5.5 Special Provisions

WSDOT Standard Specifications for Road, Bridge and Municipal Construction (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require WSDOT approval prior to application during construction.

2.6.6 SUBMITTALS

2.6.6.1 General

All submittals shall be submitted in draft form to WSDOT for review and compliance with the RFP and the standards referenced herein. Comments submitted by WSDOT shall be addressed by the Design-Builder to the satisfaction of WSDOT. Final versions of technical memorandums and the Geotechnical Report shall be signed and sealed by either a geotechnical engineer or an engineering geologist in accordance with the applicable RCW's and WAC's licensed to practice in Washington State.

2.6.6.2 Design

- Subsurface Investigation Plan (3 copies)
- Technical Memorandums (3 copies of each memo)
- Geotechnical Instrumentation Plan (3 copies)
- Settlement and Vibration Monitoring Plan, if applicable (3 copies)
- Geotechnical Report (3 copies of draft, 10 copies of final)

The Design-Builder shall prepare a Final Geotechnical Report that summarizes the results of the field and laboratory investigation programs, engineering studies and geotechnical design recommendations, including those provided in the technical memorandums, in accordance with the GDM.

2.6.6.3 Construction

The Design-Builder shall include in the contract provisions all notes related to materials found on the final construction documents and not already covered by the Standard Specifications or the Technical Specifications in the Request for Proposal.

The Design-Builder shall not be relieved of obligations to perform the Work in accordance with the Contract Provisions by reviews, tests, inspections or approvals performed by any persons, or by any failure of any person to take such action.

The reviews, inspections, tests and approvals conducted by WSDOT and others do not constitute acceptance of the materials or Work reviewed, tested or inspected, and WSDOT may reject or accept any Work or materials, request changes and/or identify additional Work which must be done at any time, whether or not previous reviews, inspections, tests or approvals were conducted by WSDOT.

End of Section

2.7 PAVEMENT

2.7.1 GENERAL

The term Pavement, or Pavement Section, shall be defined as the entire pavement Structural Section, including, but not limited to; Hot Mix Asphalt (HMA), base and sub-base materials.

The Design-Builder shall design and construct pavement sections for all roadways in accordance with the requirements of this Section, including referenced standards and publications, performance requirements, design and construction criteria, and submittals. Paving for this Project will involve three general categories; **New Mainline Pavement Reconstruction** (full section replacement, including shoulders), **Widening of Existing Pavement** and **Pavement Resurfacing Plane and Overlay**. All pavements shall be Hot Mix Asphalt (HMA), unless otherwise defined elsewhere in this document or appendices. The paving limits are shown in Appendix M1 (Conceptual Plans). Warranty pavement work shall be in accordance with Section 2.30 (Product Warranty Provisions). Existing pavement shall be maintained during construction in accordance with the requirements in Section 2.29 (Maintenance During Construction).

Within the pavement limits depicted on the Conceptual Plans, the inside shoulder for northbound and southbound I-405 shall be removed and replaced with a full HMA structural section as described in Section 2.7.3.8.

As a final pavement work item, the entire limits as defined on the Alignment and Paving sheets of the Conceptual Plans (Appendix M1) shall receive a HMA overlay, as defined in the Conceptual Plans. The final HMA overlay shall be placed over widened, reconstructed, and the planed existing mainline pavement sections concurrently to achieve a consistently smooth wearing surface. The HMA overlay may be placed at a variable thickness to accommodate the crown relocation to the proposed lane line, but the overlay thickness shall be 0.15 foot minimum at all locations. All pavements shall be constructed in conformance with WSDOT *Standard Specifications for Road, Bridge and Municipal Construction 2004 (M 41-10)*, except as noted in this section or elsewhere in the Contract Documents.

2.7.2 MANDATORY STANDARDS

The following is a list of publications that shall be used for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications maybe required to complete all design and construction elements.

2.7.2.1

- WSDOT *Pavement Guide, 2004*
- AASHTO *Guide for the Design of Pavement Structures, 1993*
- WSDOT *Materials Manual* (M46-01)
- WSDOT *Pavement Surface Condition Rating Manual, 1992*
- WSDOT *Construction Manual* (M47-01)
- FHWA *Guidelines for the Design of the Subsurface Drainage Systems for Highway Structural Sections* (RD-72-30)
- WSDOT *Design Manual (DM)* (M22-01), including all revisions and supplements
- Amendments to WSDOT Standard Specification for Roads, Bridge and Municipal Construction: 2004 (M41-10), provided in Appendix C

- WSDOT *Standard Specification for Roads, Bridge and Municipal Construction: 2004 (Standard Specifications)* (M41-10)
- WSDOT *Standard Plans for Roads, Bridge and Municipal Construction (Standard Plans)* (M21-01)
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- AASHTO *LRFD Bridge Design Specifications*
- AASHTO *Standard Specification for Highways and Bridges*
- WSDOT *Qualified Product List*
- WSDOT *Plans Preparation Manual (PPM)* (M22-31)
- Conceptual Plans for I-405, SR 520 to SR 522 Stage 1, Appendicies M1 through M4
- I-405 *Congestion Relief and Bus Rapid Transit Project, CADD Standards Manual*, Appendix V.

2.7.3 PERFORMANCE REQUIREMENTS

2.7.3.1 General

The Design-Builder shall perform analyses and prepare a design using the criteria specified within this Section, and produce pavement that meets the following performance requirements:

- Design and construct a HMA Pavement Structural Section with a 50-year pavement life cycle, in accordance with the ESAL volumes provided in Section 2.7.4.1. The design shall assume a 15-year interval for preventative maintenance treatments to the wearing course.
- Provides a durable, long-lasting pavement system with the specified structural capacity; skid resistance, and superior ride quality
- Includes pavement-to-structure transition areas as a part of ride quality
- Minimizes pavement-to-structure transition deviations
- Comprises materials that meet Standard Specifications Division 9 requirements as provided
- Provides pavements with no identifiable distress.

The Design-Builder shall evaluate these distress parameters, in coordination with WSDOT, on an as needed basis. If corrective action needs to be taken, the Design-Builder shall coordinate all such activities to minimize disruption to traffic and with the approval of WSDOT. See Section 2.30 (Warranty) for additional information.

2.7.3.2 Pavement Type

The Design-Builder shall design and construct a HMA pavement section for all reconstruction and widening areas on mainline I-405 and on and off-ramps, including all roadway shoulders.

2.7.3.3 Pavement Report

A draft pavement report shall be submitted for approval to WSDOT. Any comments on the draft pavement report will be returned to the Design-Builder within ten (10) business days. Comments on the draft report shall be addressed and incorporated by the Design-Builder and a final report submitted for approval. The final report must be approved by WSDOT prior to the commencement of any paving operations.

The pavement report shall address site-specific conditions and proposed treatments, including, but not

limited to:

- Joint treatment between new and existing pavement surfaces, where the saw-cut line will lie within a travel lane – to prevent crack propagation through to the wearing surface.
- Any unstable slope areas or subgrade soil conditions that must be stabilized prior to pavement construction.
- Remediation of existing distressed pavement by removal and replacement or crack sealing.

2.7.3.4 New Mainline Pavement (Reconstruction)

A portion of the Project will require removal of the I-405 mainline pavement, raising the mainline profile, and constructing a new pavement section over the compacted fill – see Conceptual Plans, Appendix M1, and Cross Sections, Appendix M2, for approximate limits and quantities for this work. The inside and outside shoulders for new mainline pavement shall be constructed with the equivalent depth of HMA and base as the adjacent travel lanes.

2.7.3.5 Widening of Existing Pavement

Most of the Project Limits will require pavement widening to accommodate full lane and shoulder width standards and the additional travel lane for NB and SB I-405 – see Conceptual Plans, Appendix M1, and Cross Sections, Appendix M2, for approximate limits and quantities for this work.

The existing subgrade is thought to consist of densely compacted glacial till which can be impervious. Additional Crushed Surfacing Base Course (CSBC) depth may be necessary at some locations to eliminate the potential for constructing a bathtub section for subsurface drainage. Prior to the placement of the pavement section, all existing cement treated base shall be removed. Where cement treated base is removed, vertical cuts will be necessary to prevent undermining of the adjacent lanes.

Newly constructed inside or outside mainline shoulder(s) shall be constructed with equivalent depth of HMA and base as the adjacent travel lanes.

2.7.3.6 Ramps and City Streets

See the Conceptual Plans, Appendix M1, and Cross Sections, Appendix M2, for approximate limits and quantities for this work. Parameters for reconstruction and widening of ramps, ramp shoulders, or city streets not defined elsewhere shall conform to Section 2.7.3.5 Widening of Existing Pavement.

2.7.3.7 Pavement Resurfacing (Plane and Overlay)

All existing pavement within the Project Limits, as defined on the Alignment and Paving sheets of the Conceptual Plans, that is not to be reconstructed shall be resurfaced by planing to a minimum depth of 0.15 ft. and overlaying with 0.15 ft. minimum HMA. Pavement resurfacing shall be staged with the widening and new pavement areas such that the final overlay shall be placed as a 0.15 ft. thick surface over all travel lanes and shoulders as a final stage to the paving operation.

Transverse butt joints, at a depth of 0.15 ft., shall be provided at the beginning and ending Project Limits to accommodate the overlay. Butt joints shall be tapered from 0.15 ft. to 0.00 ft. in no less than 30 feet.

2.7.3.8 Roadway Shoulders

Preliminary information indicates that the northbound and southbound inside and outside shoulders on I-405 are not adequate to bear traffic loads. Both the inside and outside shoulders shall be removed and replaced with full depth HMA pavement. The inside shoulder area contains drainage inlets and electrical pull boxes, which shall be adjusted to final grade. The outside shoulder shall be

removed and replaced as part of the pavement widening.

The sawcut line for pavement replacement of all shoulders shall be at least 0.5 foot into the existing full depth HMA section that the new shoulder pavement will abut. All newly constructed I-405 mainline shoulders shall match the HMA section and base depth of the adjacent travel lane. The cross-slope of the inside shoulders shall match that of the adjacent travel lane.

2.7.3.9 Miscellaneous Pavement

All Miscellaneous Pavement shall be designed and constructed in accordance with Section 2.7.3.8, Roadway Shoulders.

2.7.4 Design and Construction Criteria

2.7.4.1 Design Criteria

Design the pavement sections with the following parameters:

- Pavement sections for reconstruction and widening shall be designed to accommodate 150 million ESAL's. Pavement sections for ramps shall be designed to accommodate 30 million ESAL's.
- The new shoulder sections on the I-405 mainline shall be constructed with the same HMA and base depth as the adjacent travel lane.
- The new shoulder sections on the ramps shall be constructed with the same HMA and base depth as the adjacent ramp travel lane.
- For the new and widened pavement sections, provide for surface and subsurface drainage to eliminate trapped water. The design shall detail pavement section drainage layers and transitions between existing layers and widened or reconstructed pavement layers, to ensure proper subsurface drainage of the pavement section. If necessary, an underdrain system shall be provided to adequately drain the pavement section. FHWA Guidelines (RD-72-30) shall be met for base course drainage, collector systems, and outlets.
- The Design-Builder shall make adjustments to the minimum layer thickness to accommodate climatic conditions such as frost depth. A total minimum pavement depth (HMA and base) of 12 inches is required to minimize the effects of freeze-thaw cycles.
- If the existing shoulders that are to remain are utilized as temporary travel lanes to facilitate construction, a pavement report, including existing condition photos shall be submitted. The report shall include the anticipated duration for shoulder use, and specify whether the existing pavement section is adequate to sustain the load without damage to structural integrity. If the existing shoulder pavement section is found to be inadequate to sustain traffic, and the Design-Builder still chooses to use them as a portion of a travel lane, any distressed areas shall be removed and replaced, including any necessary base or subgrade remediation. The Pavement Section shall match the existing shoulder adjacent to the remediation area.
- Provide 25 foot minimum reinforced concrete approach slabs on both sides of all new bridge decks. The approach slab joints with the HMA pavement section shall be perpendicular to the travel lanes. Approach slabs shall be designed and constructed in accordance with Section 2.13.4.2.13.

2.7.4.2 Pavement Design

A Professional Engineer, licensed in the State of Washington, with at least two years of experience in pavement design shall be responsible for the design of the HMA pavement sections. The Design-Builder shall submit a Pavement Report addressing all pavement design sections for the project, in accordance with Section 2.7.5.1. The pavement design shall be in accordance with Section 2.7 and the WSDOT Standard Specifications.

2.7.4.3 Pavement Materials

- The base material shall not be cement treated base.
- Asphalt millings shall not be used as a base aggregate beyond that allowed in WSDOT Standard Specifications.
- The base material, if crushed stone, shall contain less than 7 percent passing the No. 200 sieve and have a minimum resilient modulus (T-307 modified – see WSDOT *Materials Manual*) of 25,000 psi.
- The Design-Builder shall develop the HMA mix design. The gradation, asphalt content, and anti-strip requirement shall be determined according to the Standard Operating Procedure 732 in the Materials Manual. The Design-Builder's Construction Quality Assurance Manager shall certify that the HMA mix design meets all of the requirements of the Contract documents and the Standard Specifications.
- The asphalt concrete plant(s) that the Design-Builder uses for the production of asphalt concrete shall meet all of the requirements as specified in the Standard Specifications. The Design-Builder's Construction Quality Assurance Manager shall inspect the asphalt concrete plant(s) and document that it meets all requirements.
- The Design-Builder shall send to WSDOT a copy of the completed HMA mix design showing all trial blends and calculations, along with a sufficient amount of prepared aggregate for WSDOT to verify the adequacy of the proposed design. The verification effort by WSDOT will consist of mixing, at the determined asphalt content, eight (8) samples for checking the Air Voids and Stripping requirements, and the Compactive effort. The use of the verified or non-verified HMA mix design shall be in accordance with WSDOT Standard Specifications.

2.7.5 SUBMITTALS

2.7.5.1 Pavement Report

The Design-Builder shall prepare and submit a draft and final pavement report to WSDOT. The final pavement report must be approved by WSDOT prior to the start of any permanent paving on the project. Supplemental submittals may also be required as described in Section 2.7.4.1 for temporarily running traffic on the shoulders of I-405 to accommodate construction activities.

2.7.5.2 HMA Mix Design

The Design-Builder shall send to WSDOT a copy of the completed HMA mix design showing all trial blends and calculations, along with a sufficient amount of prepared aggregate for WSDOT to verify the adequacy of the proposed design.

End of Section

2.8 ENVIRONMENTAL

2.8.1 GENERAL

2.8.1.1 Scope

The Design-Builder shall first try to avoid impacts to environmental resources, the community, and historic, cultural, and archaeological resources. If impacts are unavoidable, the Design-Builder shall make every effort to minimize the unavoidable impacts.

The Design-Builder shall foster good relationships with federal, state, and local agencies, the tribes, and local stakeholders by ensuring that the commitments WSDOT has made, are reflected in the project's final design and fulfilled during construction. The Design-Builder shall accomplish this by meeting all environmental requirements listed in the contract, regulatory agency permits, and resource agency concurrence letters. The Design-Builder shall comply with all federal, state and local laws, regulations, and ordinances (throughout this chapter referred to as regulations) and receive no permit or violations in law.

2.8.1.2 WSDOT Intentions

The design-build process can provide an effective way of delivering transportation projects to the tax payers on time and within budget, while still protecting and enhancing the environment. WSDOT recognizes that the design-build process is a different way of doing business, and has therefore been working with federal, state, and local agencies, the tribes, and local stakeholders to address any concerns they may have. A number of strategies have been developed and incorporated into this section of the RFP to address those concerns and to protect the environment throughout the life of the I-405, SR520 to SR522 Stage 1 Project (Kirkland Stage 1 Project). The Design-Builder shall implement these strategies by designing and constructing the Kirkland Stage 1 Project in accordance with current environmental regulations as well as with the requirements set forth below.

2.8.2 MANDATORY STANDARDS

Implement the environmental commitments of the Kirkland Stage 1 Project in accordance with the relevant environmental regulations as well as the requirements of the standards and publications listed below.

2.8.2.1 Mandatory Standards

The following is a list of Mandatory Standards and Reference Documents that shall be used by the Design-Builder when designing and building the Kirkland Stage 1 Project. If the requirements of an environmental document, programmatic agreement, or permit issued for the Kirkland Stage 1 Project conflict, then the provisions within the project-specific permit shall take precedent. If a requirement or permit condition is unclear or ambiguous, the Design-Builder shall obtain clarification from WSDOT, prior to proceeding with design or construction.

2.8.2.1.1 Environmental Documents and Permits

The Design-Builder shall implement the Kirkland Stage 1 Project environmental commitments in accordance with the environmental documents and permits. A list of the permits required for the Kirkland Stage 1 Project is provided in Section 2.8.4.2.1, *Permit Acquisition*. Copies of the permits and their conditions will be included in Appendix P of the Final RFP. The principal environmental documents for the Kirkland Stage 1 Project, all which are incorporated into this RFP as Appendix E, are:

- I-405, SR 522 to SR 520 Project Biological Assessment. August 2004.

- National Oceanic and Atmospheric Administration's National Marine Fisheries Service Endangered Species Act Concurrence Letter. October 2004.
- United States Department of the Interior's Fish and Wildlife Service Endangered Species Act Concurrence Letter. October 2004.
- I-405, SR 520 to SR 522 - Kirkland Nickel Environmental Assessment. (February 2005).
- I-405 Kirkland Nickel Project Finding of No Significant Impact. Anticipated.
- SEPA Adoption of I-405 Kirkland Nickel Environmental Assessment. Anticipated.
- I-405 Kirkland Nickel Draft Wetland Mitigation Plan. January 2004.
- I-405, SR 520 to SR 522 - Kirkland Nickel Air Quality Discipline Report. February 2005.
- I-405, SR 520 to SR 522 - Kirkland Nickel Noise Discipline Report. February 2005.
- I-405 Corridor Program National Environmental Policy Act / State Environmental Policy Act Final Environmental Impact Statement and Preliminary Section 4(f) Evaluation. June 2002.
- I-405 Corridor Program Record of Decision. October 2002.
- Addendum and Errata to the I-405 Corridor Program Final Environmental Impact Statement. May 2003.

2.8.2.1.2 Interdepartmental Agreements and Memoranda

WSDOT has entered into several interagency agreements with federal and state agencies, which serve to provide guidance and clarifications for meeting regulatory requirements. The Design-Builder shall comply with the Implementing Agreements, Memoranda of Understanding or Agreement, and Instructional Letters identified below:

- Implementing Agreement between the Washington State Department of Ecology and WSDOT Regarding Compliance with the State of Washington Surface Water Quality Standards. November 2004.
- Memorandum of Agreement between Washington State Department of Fish and Wildlife and WSDOT Concerning Construction Projects in State Waters. June 2002.
- Implementing Agreement between the Washington State Department of Ecology and WSDOT Concerning Hazardous Waste Management. April 1993.
- Memorandum of Agreement between WSDOT and the Puget Sound Clean Air Agency (PSCAA) Regarding the Control of Fugitive Dust from Construction Projects. December 1999.
- Washington State Department of Fish and Wildlife Design of Road Culverts for Fish Passage. June 2003.
- Implementing Agreement between the Washington State Department of Ecology and WSDOT Concerning Wetlands Protection and Management. July 1993.
- WSDOT Environmental Compliance Assurance for Construction Projects and Activities Instructional Letter IL 4055.02. August 2004.
- WSDOT Northwest Region and Urban Corridors Office Environmental Compliance Plan. January 2005.

2.8.2.1.3 Referenced Documents

The Design-Builder may use the Referenced Documents listed below as supplementary guidelines for the design and construction of the roadway. Referenced Documents are guidelines that the Design-Builder may use in addressing the requirements, as the Design-Builder deems appropriate. These Referenced Documents have no established order of precedence.

- WSDOT Environmental Procedures Manual (M31-11)
- WSDOT Highway Runoff Manual (M31-16)
- WSDOT Hydraulics Manual (M23-03)
- WSDOT Standard Specifications for Road, Bridge and Municipal Construction (M41-10)
- WSDOT Standard Plans for Road, Bridge and Municipal Construction (M21-01)
- WSDOT Design Manual (M22-01)
- WSDOT Construction Manual (M41-01)

2.8.3 PERFORMANCE REQUIREMENTS

2.8.3.1 Design Innovation and Technology

WSDOT recognizes that innovative thinking during the early design stages of a project can reduce the number of permits, approvals, and mitigation measures required to construct the Kirkland Stage 1 Project.

To encourage the Design-Builder in avoiding and minimizing adverse environmental impacts during the design stage, beyond the standards required in the Contract, WSDOT will make an environmental incentive available for award a total amount not to exceed $200,000. For additional information regarding environmental incentives, see *Section 1-08.11 Incentives and Price Reductions*.

WSDOT has made a number of commitments to design a project that avoids and minimizes project-related impacts. Those commitments are contained in the I-405 Corridor Program Final Environmental Impact Statement (FEIS), I-405 Corridor Program Record of Decision (ROD), I-405 Kirkland Nickel Environmental Assessment (EA), and project-specific permits. The Design-Builder shall implement all commitments listed in the I-405 Kirkland Nickel Commitments Database, which will be provided in Appendix E of the final RFP.

2.8.3.2 Environmental Compliance Plan (ECP)

2.8.3.2.1 Documentation and Approval

The Design-Builder shall prepare and implement an Environmental Compliance Plan (ECP) that identifies roles and responsibilities of key personnel, procedures for environmental compliance, procedures to identify and correct non-compliance events, and procedures for emergency response. WSDOT's goal is to ensure environmental compliance with no permit violations. The development and implementation of an ECP for the Kirkland Stage 1 Project shall be the first step towards achieving environmental excellence.

The Design-Builder shall complete a Draft ECP no later than forty-five (45) Business Days prior to the start of early construction. The Environmental Compliance Manager (ECM) shall lead this effort. The ECM shall provide a copy of the Draft ECP to WSDOT. WSDOT will then have fifteen (15) Business Days to review and comment on the Draft ECP. WSDOT will provide a copy of the Draft ECP to the Regulatory Agencies for their concurrent review. The Design-Builder shall have fifteen (15) Business Days to respond to comments from WSDOT and the regulatory agencies, and

incorporate the necessary changes. The Design-Builder shall provide WSDOT with a final copy of the ECP fifteen (15) Business Days prior to the commencement of any construction activities, so WSDOT can ensure their comments were addressed and incorporated. The ECP shall be consistent with all other requirements of the Design-Builder's quality assurance and quality control system.

The ECP shall consist of three parts:

- Part I: Environmental Personnel, Communication and Training
- Part II: Environmental Plans and Strategies
- Part III: Environmental Compliance Monitoring and Reporting

Upon approval from WSDOT, the Final ECP shall be stored in an electronic format easily accessible by WSDOT and regulatory agencies. The document shall be maintained as one complete file in an Adobe® portable document format (.pdf) file. A copy of the ECP shall be maintained by the ECM, on-site, at the Kirkland Stage 1 Project construction offices in a location where it can be easily accessed.

2.8.3.2.2 Environmental Personnel, Communications, and Training (Part I)

2.8.3.2.2.1 ***Key Personnel: Environmental Compliance Manager (ECM)***

The Design-Builder shall designate an individual to be the ECM for the Kirkland Stage 1 Project. The Design-Builder, with technical guidance from the ECM, shall be responsible for the overall environmental compliance for the Kirkland Stage 1 Project. The ECM shall function as principal technical advisor and coordinator on environmental issues, and ensure environmental compliance for the Kirkland Stage 1 Project.

The ECM must have the qualifications listed below.

2.8.3.2.2.1.1 Minimum Qualifications

The ECM shall have at least five (5) years, ten (10) years preferred, of experience managing environmental compliance issues on projects. At least three (3) years of this experience must be specific to linear transportation projects.

This person must demonstrate the ability to:

- Review engineering plans and ensure the Kirkland Stage 1 Project's design is consistent with conditions outlined in environmental permits.
- Identify wetland and sensitive environmental areas.
- Identify that a violation is occurring or has occurred.
- Avoid violations by understanding design and permit conditions and ensuring these are compatible in advance of construction.
- Prepare and implement a compliance plan and monitoring plan.
- Prepare and implement a Temporary Erosion and Sediment Control (TESC) plan to ensure erosion sediment and spill control devices are effective and maintained.
- Certified through WSDOT Construction Site Erosion and Sediment Control Certification Course within the past three (3) years.

If the Design-Builder chooses to replace the ECM, it shall notify WSDOT twenty (20) Business Days before such removal and provide a suitably qualified replacement for

WSDOT's approval. If during the course of the contract, WSDOT finds that the ECM is not ensuring implementation of the ECP, then WSDOT may require the replacement of the ECM. WSDOT may require this removal for no-cause and shall notify the Design-Builder ten (10) Business Days before such removal is imposed.

2.8.3.2.2.1.2 Roles and Responsibilities

The ECP shall identify critical roles and responsibilities of the Design-Builder's ECM. It is the responsibility of the ECM to ensure compliance and to avoid permit violations. The ECP shall identify the roles and responsibilities of other staff and their role in assuring environmental compliance. The Design-Builder shall identify in their ECP how the ECM will interact with WSDOTs Environmental Compliance Assurance Inspector (CAI), as WSDOT's CAI will be performing compliance inspections and will be working closely with the Design-Builder's ECM.

2.8.3.2.2.2 ***Environmental Communication Protocol***

As part of the Environmental Compliance Plan (ECP), the ECM shall develop, document, and implement an Environmental Communication Protocol. The Environmental Communication Protocol shall spell out the process to be used for non-compliance reporting. This protocol must address internal communications, communications with WSDOT, and provide a procedure for dealing with external communications. When developing the Environmental Communication Protocol, the Design-Builder shall utilize WSDOT Northwest Region and Urban Corridors Office Environmental Compliance Plan (January 2005) and WSDOT Environmental Compliance Assurance Procedure for Construction Projects and Activities Instructional Letter (IL 4055.02) listed in Section 2.8.2.1.2 (and provided in Appendix E).

Use organizational charts to identify the Design Builder's ECM and those personnel who will be assisting the ECM in assuring compliance with all permit conditions and environmental commitments. Discuss the personnel roles and communication procedures that will be used for the following:

2.8.3.2.2.2.1 Internal Communications

Describe the Design-Builder's organizational hierarchy and identify compliance roles and internal reporting responsibilities. Include a clear discussion regarding which key personnel have the authority to stop the project if a violation is occurring and describe the process for reacting to non-compliance events.

2.8.3.2.2.2.2 WSDOT Communications

Describe interactions between the Design–Builder and WSDOT in regard to reporting non-compliance issues. Identify all applicable WSDOT personnel that would be contacted in the event of a spill, inadvertent discovery, or non-compliance event. Ensure the procedure is consistent with WSDOT IL 4055.02.

Describe the Design-Builder's communication process and key personnel that would be responsible for making sure a design change and/or alternative construction technique is covered under a particular permit or approval. Section 2.8.4.2.2, Permit Compliance, Modifications, and Additional Approvals, discusses WSDOT's strategy for dealing with design changes that may require modifications to a particular permit.

2.8.3.2.2.2.3 External Communications

Describe a procedure that defines how all external communications received by the Design-Builder will be handled, including how WSDOT will be involved. Expected sources of external communication may originate from Federal, State, and local regulatory agencies and from the public. Issues may range from public noise complaints to violation notices from regulatory agencies. Where appropriate, this communication procedure shall be consistent with WSDOT IL 4055.02.

2.8.3.2.2.3 ***Training***

Develop and implement an environmental protection training program for the Design-Builder's design and construction staff. The Design-Builder shall be held responsible for its contractors and sub-contractors, should their work practices lead to a negative effect on the environment or result in a permit violation. Therefore, the Design Builder's training program shall orient employees and sub-contractors to the following:

- The overall importance of environmental issues
- The specific environmental sensitivities of the project
- Erosion and sediment control procedures and certification
- Environmental compliance monitoring and reporting procedures
- Emergency response procedures

The Design Builder's ECM shall notify WSDOT of environmental training sessions and invite WSDOT Kirkland Stage 1 Project staff to participate.

2.8.3.2.3 **Environmental Plans and Strategies (Part II)**

2.8.3.2.3.1 ***Temporary Erosion and Sediment Control Plan (TESC)***

The Design-Builder shall prepare a TESC Plan that will describe temporary measures taken to minimize erosion resulting from construction activities. The Design-Builder's ECM shall be identified as the TESC Lead in accordance with WSDOT Standard Specifications Section 8-01.3(1)B.

The TESC Plan (narrative and plan sheets) shall be prepared in accordance with WSDOT Highway Runoff Manual Chapter 6, WSDOT Standard Specifications Section 1-07.15 and Division 8. The Design-Builder's TESC Plan shall accommodate all Kirkland Stage 1 Project-specific permit conditions such as those listed for Forbes Creek in the Hydraulic Project Approval (HPA). A list of relevant permits is located in Section 2.8.4.2.1, Permit Acquisition and copies of the actual permits are will be provided in Appendix P of the Final RFP. In addition, the TESC Plan shall accommodate commitments WSDOT has made with local jurisdictions, such as those listed in the anticipated Memorandum of Agreement between WSDOT and the City of Kirkland (to be provided in Appendix E in the Final RFP).

The Design-Builder's Quality Control and Quality Assurance Plan shall include procedures for ensuring that the TESC Plan has undergone sufficient review. See Section 2.28 for more details regarding the required elements of the Design-Builder's Quality Control and Quality Assurance Plan. Prior to the start of construction, WSDOT will review the Design-Builder's TESC Plan to ensure all relevant permit conditions have been addressed and that are reflected in the TESC plan and respective plan sheets.

2.8.3.2.3.1.1 Fencing Requirements

The Design-Builder shall ensure that all environmentally sensitive areas, mitigation areas, and wetland buffers, are delineated with High Visibility Fencing as a first order of work. The delineation shall consist of High Visibility Fence as described below.

High visibility fence shall be composed of UV stabilized orange or yellow high-density polyethylene material and shall be at least four feet in height. Mesh openings shall be 1.5 inches by 2.5 inches nominal. The fence shall weigh approximately 0.44 pounds per linear foot, and shall be installed in accordance with the manufacturer's recommendations. Posts for the fencing shall be steel or wood and shall be placed at six-foot centers or as needed to provide rigidity. The fencing shall be attached to the post every six inches with a polyethylene tie. Fencing shall not be fastened to trees.

The Design-Builder shall clearly delineate sensitive areas, mitigation areas, wetland buffers, fencing requirements, 401 Water Quality Certification conditions, and National Pollutant Discharge Elimination System (NPDES) permit conditions on plan sheets as appropriate.

No other work shall be preformed on the site until WSDOT has accepted the installation of the High Visibility Fencing. The acceptance shall be evidenced in writing. Throughout the life of the Kirkland Stage 1 Project, the Design-Builder shall preserve and protect the wetland and sensitive area delineation, acting immediately to repair or restore any High Visibility Fencing that has been damaged or removed.

2.8.3.2.3.1.2 Best Management Practices (BMPs)

The Design-Builder shall monitor all erosion and sediment control Best Management Practices (BMPs) in accordance with requirements listed in permit conditions and WSDOT Highway Runoff Manual. Monitoring activities and protocols shall be described in the Design Builder's Environmental Compliance Monitoring and Reporting Program as required in Section 2.8.3.2.4. Failure to implement the TESC Plan measures may result in liquidated damages (see Section 1-08.9(3) for additional details).

The Design-Builder shall remove all temporary BMPs from the Kirkland Stage 1 Project right-of-way, once the site has been finally stabilized, and construction activities are completed. Any temporary BMPs that are not removed from the right-of-way will be removed by WSDOT at the expense of the Design-Builder.

2.8.3.2.3.2 ***Spill Prevention, Control and Countermeasures Plan (SPCC)***

The Design-Builder shall be responsible for the preparation of a Spill Prevention, Control and Countermeasures (SPCC) plan in accordance with WSDOT Highway Runoff Manual to be used for the duration of the Kirkland Stage 1 Project. The plan shall be submitted to WSDOT for review prior to the commencement of any on site construction activities. The ECM shall maintain a copy of the plan at the work site, including any necessary updates as the work progresses.

WSDOT's Hazardous Materials Program has developed a number of documents and guidance materials to assist the Design-Builder in developing a SPCC Plan. The following website, http://www.wsdot.wa.gov/environment/hazmat/haz spcc.htm has links to an example SPCC Plan, an SPCC Plan template, additional tools and templates, and an example site plan. In addition, there is an SPCC Plan preparation training course available for contractors and subcontractors.

2.8.3.2.3.3 ***Violation Avoidance Strategy***

WSDOT's goal is to avoid any permit violations. Therefore, a well-developed strategy for

avoiding violations is key.

2.8.3.2.3.3.1 Design

The ECP shall outline a strategy for ensuring that the design meets permit terms and conditions as well as the environmental requirements of the contract. The Design-Builder's ECM shall show proof of this to WSDOT and the regulatory agencies at the Environmental Pre-Construction Meeting described below in Section 2.8.3.2.4.1.

2.8.3.2.3.3.2 Construction

The ECP shall outline a strategy for anticipating potential environmental compliance issues. For example, as a strategy for avoiding erosion concerns, the ECM could monitor weather reports. The Design-Builder's strategy for contingency planning shall be discussed at the Environmental Pre-Construction Meeting described below in Section 2.8.3.2.4.1.

2.8.3.2.3.4 ***Agency Coordination Plan***

The Design-Builder shall prepare an Agency Coordination Plan. This plan shall define Kirkland Stage 1 Project activities that require coordination with the Regulatory Agencies. The plan shall identify the permit conditions that require the Design-Builder to notify regulatory agencies, before beginning work in environmentally sensitive areas. Other permit conditions may require the Design-Builder to request construction oversight from regulatory agency staff.

The Design-Builder's Agency Coordination Plan shall include a section on local permit acquisition, listing all applications for environmental approvals other than WSDOT provided approvals listed in Section 2.8.4.2.1. The plan shall mention the Design-Builder timeframe and strategy for negotiating all environmental approvals and conditions with the applicable regulatory agencies. The plan should include a process for working with WSDOT on permit modifications.

2.8.3.2.3.5 ***Fugitive Dust Control Plan***

Fugitive dust shall be controlled by the Design-Builder in accordance with the Memorandum of Agreement between WSDOT and PSCAA Regarding Control of Fugitive Dust from Construction Projects (October 1999). The Design-Builder shall prepare a Fugitive Dust Control Plan to reduce short-term construction impacts to air quality. The Design-Builder shall use the measures identified within the Air Quality section of the I-405 Kirkland Nickel EA to control PM10, deposition of particulate matter, and emissions of CO and NOx during construction.

2.8.3.2.4 Environmental Compliance and Monitoring (Part III)

The Design-Builder shall develop and implement an Environmental Compliance Monitoring and Reporting Program to ensure that all permit conditions and environmental performance specifications are met. At a minimum, the Design-Builder's Environmental Compliance Monitoring and Reporting program shall address the following areas.

2.8.3.2.4.1 ***Environmental Pre-Construction Meeting***

The Design-Builder shall attend an Environmental Pre-Construction Meeting with WSDOT and the regulatory agencies to demonstrate that all pre-construction permit conditions and environmental commitments have been met. The Design-Builder shall utilize the I-405 Commitments Database (to be provided in Appendix E of the final RFP) as a tool to document and track the fulfillment of permit conditions and environmental commitments. The Design-Builder shall present their Violation Avoidance Strategy at this meeting, as required in Section 2.8.3.2.3.3.

2.8.3.2.4.2 ***Construction Monitoring***

The Design-Builder shall monitor the Kirkland Stage 1 Project throughout construction to ensure that regulations, approvals, and environmental performance specifications are being fulfilled. In regards to water quality, stormwater runoff monitoring shall be carried out in accordance with WSDOT Highway Runoff Manual. In water work monitoring shall be carried out in accordance with the Implementing Agreement between the Washington State Department of Ecology and WSDOT Regarding Compliance with the State of Washington Surface Water Quality Standards (Appendix E). Monitoring shall be conducted during all periods of construction including: mobilization, active construction, demobilization, and final Kirkland Stage 1 Project restoration.

The ECM shall define and summarize in the ECP which monitoring activities will be carried out on a regular basis and which monitoring activities will be implemented for high-risk activities. Inspection protocols and reporting frequencies shall adhere to all permit conditions and environmental commitments.

2.8.3.2.4.3 ***Post-Construction Monitoring***

Within five (5) Business Days of the Physical Completion Date, the ECM shall conduct final monitoring inspections to assess and document compliance with permitting requirements and all environmental commitments provided to the Design-Builder in the I-405 Commitments Database Inspections should address the success, failures, and remedial actions for site restoration and compensatory mitigation sites.

2.8.3.2.4.3.1 Environmental Commitment Close-Out Report

The Design-Builder shall prepare an Environmental Commitment Close-Out Report to summarize overall compliance with permit conditions and environmental commitments. At a minimum, the Design-Builder's Environmental Commitment Close-Out Report shall include:

- An updated I-405 Commitments Database with fulfillment descriptions completed for all environmental commitments.
- Commitments the Design-Builder was unable to fulfill, and why.
- Significant compliance deficiencies or incidents that may have occurred during the life of the Kirkland Stage 1 Project and the corrective actions taken.
- Future requirements for maintaining permanent BMPs (i.e., cleaning detention ponds).
- Procedures for monitoring mitigation sites to ensure their success beyond contract termination.

The Environmental Commitment Close-Out Report shall be completed within fifteen (15) Business Days of the Physical Completion Date of the Kirkland Stage 1 Project.

2.8.4 DESIGN AND CONSTRUCTION REQUIREMENTS

WSDOT made commitments in the National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA) environmental documents and permits that are considered to be design and construction requirements. Those commitments are listed in the I-405 Kirkland Nickel Commitments Database, which will be provided in Appendix E of the Final RFP. The Design-Builder is required to fulfill and report on the implementation of these commitments. By referencing the I-405 Kirkland Nickel Commitments Database, we are incorporating it into this contract.

2.8.4.1 NEPA/SEPA Documentation

A NEPA Environmental Assessment and SEPA Determination of Non-Significance will be prepared by WSDOT and circulated to address the scope, impacts, and mitigation for the Kirkland Stage 1 Project. If the design of the Kirkland Stage 1 Project is altered in a way which would cause additional impacts to the environment and/or surrounding communities, a supplement to the EA or an Environmental Impact Statement may be required. If required, the Design-Builder shall be responsible for preparing any additional environmental documentation. In addition, the Design-Builder must pay additional Kirkland Stage 1 Project costs and accept responsibility for any schedule delays associated with securing the additional environmental approvals.

If required, the environmental reevaluation shall follow WSDOT *Environmental Procedures Manual* and 23 CFR 771. It is anticipated that the environmental reevaluation and related approvals will not be required provided changes in roadway alignments and grades are negligible and resultant social, economic and environmental affects are not appreciably changed. Coordination with all previously involved agencies shall occur as part of any reevaluation process. Final determination regarding the necessity of environmental reevaluations shall be made by WSDOT and the Federal Highways Administration (FHWA).

All environmental reevaluations shall be subject to written approval by WSDOT and FHWA.

2.8.4.2 Permits and Approvals

2.8.4.2.1 Permit Acquisition

WSDOT will acquire the following permits:

- Section 404 Individual Permit– U.S Army Corps of Engineers
- Section 402 National Pollution Discharge Elimination System (NPDES) General Permit for Construction Activities – Washington State Department of Ecology (Ecology)
- Section 401 Water Quality Certification – Ecology
- Administrative Order for Chemical Treatment – Ecology
- Hydraulic Project Approval – Washington State Department of Fish and Wildlife
- Local Critical Areas Compliance Review (streams, wetlands, geologically hazardous areas, critical habitat, floodplains, aquifer recharge areas) – City of Kirkland and coordination with the Multi-Agency Permitting (MAP) Team.

The Design-Builder shall acquire the following permits:

- Noise Variances
- Air Quality Construction Permit
- Demolition and Excavation permit

2.8.4.2.2 Permit Compliance, Modifications and Additional Approvals

The Design-Builder shall follow the requirements of all permits. WSDOT will own the permits. If the Design-Builder proposes changes to the Basic Configuration that conflict with permit conditions, they must obtain WSDOT approval. If the Design-Builder wants to propose an alternative construction method or a design change that is inconsistent with a particular permit, WSDOT will work with the Design-Builder and will bring final detailed proposals to the regulatory agencies for permit modifications or to obtain new permits.

All Permits obtained by WSDOT will be included in Appendix P of the Final RFP. Conditions and performance standards from the permits will be included in the I-405 Kirkland Nickel Commitments Database, which will be included in Appendix E of the final RFP. The Design-Builder shall utilize the Commitments Database as a tool to document and track the fulfillment of environmental commitments and permit conditions.

2.8.4.3 Other Agreements and Commitments

2.8.4.3.1 Wetlands

A delineation of wetlands within the I-405, SR520 to SR522 Project Area was completed by biologists. WSDOT prepared a *Kirkland Nickel Wetlands Discipline Report* to support environmental documentation for the I-405, SR520 to SR522 Kirkland Nickel Project. The discipline report includes wetland delineations, characterizations, ratings, and functional assessments, and is included in Appendix W.

The Design-Builder shall design the Kirkland Stage 1 Project to minimize impacts to wetlands. WSDOT has determined maximum wetland impacts based on an Impact Line rather than on the Cut-Fill Line as identified in the Conceptual Plans (Appendix M1). As a result, the Design-Builder has the opportunity to further reduce the amount of permanent wetland impacts. A table showing each of the individual wetlands and their permanent impact based on the Conceptual Plans, has been included in Appendix W. The Design-Builder's design shall not result in more than 1.38 acres of permanent wetland impacts for work associated with the Kirkland Stage 1 Project.

2.8.4.3.1.1 ***Mitigating for Unavoidable Impacts***

Based on the Conceptual Plans (located in Appendix M1), WSDOT has determined that construction of Stage 1 and Stage 2 of the I-405, SR520 to SR522 Project will result in no more than 1.832 acres of unavoidable impacts to wetlands. Impacts to these wetlands will be offset through off-site compensatory mitigation constructed as part of the Kirkland Stage 1 Project. WSDOT has prepared a Kirkland Nickel Draft Wetland Mitigation Plan, which provides detailed information about the proposed mitigation (Appendix W). After regulatory agency comments are received and have been addressed, the draft mitigation plan will be revised and finalized. A copy of the final wetland mitigation plan will be included in Appendix W of the final RFP.

The proposed mitigation plan provides for the creation and enhancement of wetlands to meet the "no-net-loss" requirement per both federal and Washington State executive orders (Executive Order 11990; Washington State Executive Order 90-04). WSDOT has selected three sites for the mitigation, all of which are described in detail in the plan.

As part of the Kirkland Stage 1 Project, the Design-Builder shall construct the three wetland mitigation sites in accordance with final wetland mitigation plans to be provided by WSDOT. The Design-Builder shall assure that the Standards of Success, as outlined in the Draft Wetland Mitigation Plan are met through the plant establishment activities (see Section 2.15). The Design-Builder shall achieve the performance standards identified within the finalized Wetland Mitigation Plan.

2.8.4.3.2 Noise

The Design-Builder shall erect permanent noise walls as early as possible in the construction phasing to provide noise shielding. Where possible, Wall R2 shall be constructed prior to or concurrent with removal of the existing walls.

Noise walls are included as a basic configuration of the contract as depicted on the Conceptual Plans in Appendix M1. Changes to the Basic Configuration could affect the performance of the noise walls

identified by WSDOT. As such, changes to the horizontal alignment, profiles of the roadway or noise walls shall require further noise analysis to determine if the decibel reduction targets are still achieved. If necessary, the Design-Builder's new or supplemental noise analysis report shall comply with *WSDOT Traffic Noise Analysis Abatement Policy and Procedures* and be consistent with FHWA guidelines and the methodology used by WSDOT in preparation of the *Kirkland Nickel Noise Discipline Report*.

The Design-Builder is responsible for design and construction costs associated with changes in noise wall heights, lengths, and locations from those included in the Basic Configuration. If the Design-Builder's Supplemental Noise Report permits a reduction in the noise wall locations, the Design-Builder shall, at a minimum, design and construct walls N3, R2 and U4, as described in the Basic Configuration.

The Design-Builder must receive WSDOT's approval of the supplemental noise report and any changes to the Basic Configurations noise walls. In addition, the Design-Builder shall work with WSDOT to communicate the final noise wall locations to the public. This shall be done in accordance with the Public Information Plan as outlined in Section 2.9. In addition, see Sections 2.13 and 2.15 for additional Noise Wall Design Criteria.

2.8.4.3.3 Threatened and Endangered Species

A Biological Assessment (BA) has been completed and is included as Appendix E. Concurrence Letters from the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) were received, and have been included in Appendix E.

If the Design-Builder modifies design or construction activities beyond those agreed to in the BA or Concurrence Letters, an addendum shall be required. If this occurs, the Design-Builder shall provide necessary information and ask WSDOT to prepare an addendum.

If design changes are significant enough to result in different effects determinations, then a new biological assessment may have to be prepared and formal consultation may have to be reinitiated. WSDOT shall be responsible for developing another BA, and the Design-Builder shall be responsible for any delays associated with its development and expenses associated with obtaining concurrence from NOAA Fisheries and USFWS.

The I-405 Kirkland Nickel BA and associated Concurrence Letters contain a number of performance standards. Performance standards have been included in the I-405 Kirkland Nickel Commitments Database, which will be included in Appendix E of the final RFP. The Design-Builder is required to fulfill, and report on the implementation of performance standards and environmental commitments. By referencing the I-405 Kirkland Nickel Commitments Database, we are incorporating it into this contract

2.8.4.3.4 Hazardous Materials

The Design-Builder shall prepare a SPCC Plan in accordance with Section 2.8.3.2.3.2.

Known or Suspected Contamination within the Build Alternative Right-of-Way

- WSDOT may be responsible for the remediation and monitoring of contaminated properties that will be acquired for this Project. In such cases, WSDOT will further evaluate the identified properties to assess their condition before acquisition or construction occurs.
- Prior to construction, the Design-Builder shall have a thorough asbestos containing materials/lead based paint (ACM/LBP) building survey completed by a certified building inspector on all property structures that will be demolished.

- If WSDOT acquires a portion or all of a property (building, structure) suspected of containing ACM/LBP, the Design-Builder shall properly abate and dispose of any existing ACM and LBP contamination prior to construction activities. Depending on the concentration of lead in the demolition debris, some debris may need to be disposed of as dangerous waste, which will require that Ecology be notified and that appropriate regulations are followed.
- If the Design-Builder encounters an underground storage tank (UST) within its right-of-way, WSDOT will assume cleanup liability for the appropriate decommissioning and removal of USTs. If this occurs, WSDOT and the Design-Builder shall follow all applicable rules and regulations associated with UST removal activities.
- Construction waste material such as concrete or other deleterious materials' disposal/treatment will take place at approved sites.
- WSDOT may acquire the responsibility for cleanup of any soil or groundwater contamination encountered during construction within WSDOT right-of-way or staging areas. Contaminated media will be evaluated relative to MTCA cleanup levels.
- The Design-Builder shall be required to meet all regulatory conditions imposed at contaminated properties (e.g., Consent Decree) associated with construction. These conditions could include ensuring that the surrounding properties and population are not exposed to the contaminants on the site: i.e., the Design-Builder shall ensure that the site is properly contained during construction so t hat contaminants do not migrate offsite and so that the health ad safety of all on-site personnel are protected during work at the site. WSDOT may also assume responsibility for ongoing groundwater monitoring of any existing wells within the planned right-of-way.
- WSDOT will consider entering into a pre-purchaser's agreement for the purposes of indemnifying WSDOT against acquiring the responsibility for any long-term cleanup and monitoring costs.

Known or Suspected Contamination Outside of the Right-of-Way

- Contaminated groundwater originating from properties located up-gradient of the right-of-way could migrate to the Project area. WSDOT generally will not incur liability for groundwater contamination that has migrated into the Project footprint as long as the agency does not acquire the source of the contamination. However, the Design-Builder shall manage the contaminated media in accordance with all applicable rules and regulations.

Unknown Contamination

- If WSDOT acquires a property that has unknown contamination, the agency could incur liability for any contamination discovered after acquisition, as well as liability for the removal of any stored materials remaining onsite at the time of the acquisition. WSDOT could be responsible for cleanup or disposal of these unknown substances, for example, USTs and contaminated media (including ACM and LBP). If unknown contamination is discovered during construction, the contractor will follow the SPCC Plan as well as all appropriate regulations.

Worker and Public Health and Safety

The Design-Builder shall comply with the following regulations and agreements:

- State Dangerous Waste Regulations (Chapter 173-303 WAC)
- Safety Standards for Construction Work (Chapter 296-155 WAC)

- National Emission Standards for Hazardous Air Pollutants (NESHAP) (Code of Federal Regulations, Title 40, Volume 5, Parts 61 to 71)
- General Occupational Health Standards (Chapter 296-62 WAC)
- Implementing Agreement between Ecology and WSDOT Concerning Hazardous Waste Management (April 1993)

Hazardous Materials Spills During Construction

- Prior to construction, the Design-Builder shall prepare a SPCC Plan that will be implemented to prevent and minimize effects on soil, surface water, and groundwater.

2.8.5 SUBMITTALS

The Design-Builder shall submit the following documents to WSDOT and to the regulatory agencies as directed by WSDOT as required by this RFP and environmental permits obtained for the Kirkland Stage 1 Project:

- Environmental Compliance Plan
- Environmental Construction Monitoring Reports
- Temporary Erosion and Sediment Control Plan
- Spill Prevention, Control, and Countermeasures Plan
- Asbestos Containing Materials/Lead Based Paint (ACM/LBP) Survey
- Agency Coordination Plan
- Fugitive Dust Control Plan
- Supplemental Noise analysis where necessary for changes to the Basic Configuration that could affect the performance of the noise walls
- Air quality analysis where necessary for ramp metering and for changes to previous modeled intersections
- Noise Variances
- Environmental Commitments Close-Out Report
- Updated I-405 Kirkland Nickel Commitments Database

End of Section

2.9 PUBLIC INFORMATION

2.9.1 GENERAL

WSDOT's goal is to avoid and minimize the physical and community impact of their projects on highway users, businesses and neighborhoods that abut, or are serviced by, Interstate 405. WSDOT is committed to sharing clear, concise and timely information with the public, elected officials, community leaders, businesses, tribes and the media. For the Kirkland Stage 1 Project (the Project), in particular, the following public information and community relations goals apply:

- Support the successful project delivery of the Project.
- Educate the public about environmental benefits and improvements associated with Project (i.e. treating previously untreated stormwater, establishing new wetlands, building additional noise barriers, etc).
- Assure that any potential disproportionately high and/or adverse impacts on minority and/or low-income populations are identified and addressed.
- Provide information to individuals and entities directly affected by construction in as proactive, responsive and complete manner as possible.
- Reinforce positive WSDOT relationships with partner agencies, individuals and groups.
- Educate the public about the need, vision and context for the Project, as determined by the community process.
- Increase understanding of the vital importance of the larger I-405 Corridor Program to the mobility and economic vitality of the region and state, and the Project's relevance to Washington State's transportation system.

The Design-Builder shall develop and maintain a consistent level of public communication with the goal of establishing widespread public awareness and understanding of the Project. To this end, the Design-Builder shall develop, implement, and maintain a Public Information Plan (PIP) that recognizes the fluid nature of the Project as well as the fact that the communications program's goals are critical to the overall success of the Project. A detailed approach to the PIP is required with the Project Proposal, and a draft PIP is the first submittal due within 30 calendar days of Contract execution.

The Design-Builder shall use the PIP as a framework for disseminating and responding to information from the public. With involvement from the Design-Builder, WSDOT shall develop performance-monitoring processes and tools to be used to assess the progress and measure the success of the Design-Builder's overall communications efforts.

2.9.2 PUBLIC INFORMATION STAFF

The Design-Builder will be responsible for providing certain specified public information services to help affected highway users, residents, and businesses understand the Project's design and to help them cope with the effects of construction. The Design-Builder shall designate a Public Information Specialist who will work closely with the WSDOT team in managing the public information and community involvement activities outlined in this RFP. The Public Information Specialist shall work with WSDOT staff in a team effort to maintain public satisfaction with the Project. The Design-Builder's Public Information Specialist must have professional experience in all aspects of communications on significant transportation projects, including:

- Writing for the news media, web and public

- Taking photographs and video
- Providing and presenting information to citizens, news reporters, community groups, and others
- Developing, implementing and measuring results of strategic communications plans and strategic messaging
- Developing and producing maps, charts, graphs diagrams, and other visual images and graphics
- Developing and implementing public involvement and community relations programs

The Public Information Specialist shall have full access to all Project details that may be relevant to the public, public agencies, emergency service providers, businesses, media, and other interested groups. The Public Information Specialist shall share information with WSDOT continually throughout the project.

The Design-Builder's public information staff shall be accessible 24 hours a day, 7 days a week by cell phone and/or answering service, and shall respond within two hours of contact, to address project issues (except in cases of emergency situations, in which case response shall be within 15 minutes). The Design-Builder's public information staff shall provide their contact information, including home, fax, mobile, and pager numbers, to WSDOT (which may include directors of communication, project managers and the appropriate public information officer). These numbers will be used in a prioritized after-hours Call List established within the first 30 calendar days of the design-build phase.

The Design-Builder shall meet at least quarterly with WSDOT and other appropriate representatives as designated by WSDOT to review, assess input, and/or modify the Design-Builder's PIP.

2.9.3 MANDATORY STANDARDS

2.9.3.1 General

The following is a list of publications that shall be used for all design and construction. They are listed in a hierarchical order with the highest order at the beginning of the list. This is not a comprehensive list and other applicable publications maybe required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. WSDOT's interpretation and decision shall be final.

2.9.3.2 Mandatory Standards

- WSDOT Communications Standard & Guide
- I-405 Corridor Communications Plan
- Kirkland Nickel Improvement Project Public Information Plan
- I-405 CSS Process

2.9.4 COMMUNICATIONS COORDINATION WITH WSDOT'S I-405 PROJECT TEAM

The Design-Builder shall coordinate community involvement activities with WSDOT to achieve the communications goals for the Project. At the beginning of the Contract, WSDOT and the Design-Builder will meet in partnering sessions, as defined in Section 2.28.1.1 of these technical specifications, to come to understanding on the goals of the Project, and the roles and responsibilities of each public information team. Throughout the life of the Contract, there will be Project communications meetings between WSDOT and the Design-Builder at least weekly, and more often if determined necessary by WSDOT to maintain regular coordination on all public information

activities. In addition, every six months the Design-Builder will participate in a regional WSDOT-organized communications meeting focused on I-405, that will include WSDOT's Communications Director, Urban Corridors staff, Project Managers and Sound Transit's I-405 Totem Lake/NE 128th Street HOV Direct Access Project's public information staff. As part of the existing coordinated communications program with Sound Transit's I-405 Totem Lake/NE 128th Street HOV Direct Access Project, the Design-Builder will attend focused coordination meetings as necessary.

WSDOT's I-405 Public Information team will retain primary responsibilities associated with the Project as identified below:

- Responses to citizen comments on I-405 Corridor Program (including Renton and Bellevue Nickel Projects), excluding specific Project design or construction questions, which are the responsibility of the Design-Builder to draft and review with WSDOT before sending.
- Kirkland Advisory Committee and context sensitive solutions (CSS) public input process.
- Executive and Steering Committee coordination.
- Communications for corridor-wide programs (TDM, BRT, bicycle/pedestrian, CSS, etc.).
- Coordinating the I-405 Attitude and Awareness survey with WSDOT's contractor.
- Media relations/contact (Design-Builder will provide WSDOT with access to key team members for press interviews, etc.).
- Managing the I-405 Corridor wide website (includes links to the Project website). The Design-Builder will be asked to provide updates as necessary on the Project website through WSDOT's approved Content Management Server (CMS) process.
- Coordinating, as appropriate, major project-related events (open houses, public meetings, groundbreaking, ribbon-cutting) to be conducted by WSDOT with support and coordination from the Design-Builder.
- I-405 Corridor Program communications plan (with exception of items delegated to Design-Builder).
- Overseeing Design-Builder's communications activities; approving Design-Builder's communications materials.
- Monitoring communications work to assure it meets WSDOT standards for form, content and messaging.
- Directing communications for the "vision" and "progress" aspects of the Project.
- Contacting elected officials.

2.9.5 APPROACH TO THE PUBLIC INVOLVEMENT PLAN

The Design-Builder shall supply an approach to the PIP that provides methods for establishing and maintaining communication with the public and key interested parties, involving them in design refinements, and keeping them informed of design and construction impacts. The Design-Builder's PIP approach shall coordinate with the existing Project Public Information Plan, and shall include the following at a minimum.

2.9.5.1 Data Collection and Management

WSDOT has established a contact database of citizens, businesses, community groups, neighborhood associations, local and state government officials, and other parties interested in the Project. The Design-Builder will have access to update, accurately maintain, and utilize this database. The

Design-Builder shall follow WSDOT's protocols for updating and utilizing database information.

The database shall include appropriate interested parties, including but not limited to emergency service providers, school districts, local governmental jurisdictions, local legislators, open house attendees, and local offices of the Washington Trucking Association, Washington State Patrol and Automobile Association of America. Citizens requesting information or complaining about the Project shall be given the option to be included in the database as well. If so, their names and addresses shall be immediately added to the database.

2.9.5.2 Coordination with Traffic Management Plan

The Design-Builder's Public Information Specialist shall coordinate with Project traffic staff to communicate construction traffic information to the public and other affected parties. In addition, the Design-Builder shall be responsible for coordinating traffic and general project communications with the I-405 Totem Lake/NE 128th Street HOV Direct Access Project as part of an established coordinated communications plan. See Maintenance of Traffic Section 2.22 for additional traffic coordination requirements.

2.9.5.2.1 Construction Information Dissemination

The Design-Builder shall coordinate with WSDOT to develop a process to collect and disseminate design and construction information to the Project's public web site, WSDOT's 511, Condition Acquisition and Reporting System (CARS), Highway Advisory Radio (HAR) messages, and Variable Message Signs (VMS). The Design-Builder shall collect and maintain a current and accurate database of construction activities, to include planned and current construction activities including location, estimated duration of activity, type of work being performed, physical impacts (e.g., lane closures, narrowed lanes, commercial vehicle restrictions, etc.), and planned construction detours. The information shall be entered into the database one month before the planned activity, and the Design-Builder shall update the database as conditions change. Updates/changes shall be entered into the database within 24 hours of the information being made available to WSDOT and the Project's public web site.

2.9.5.2.2 Construction Schedule

The Design-Builder shall notify WSDOT and the public of construction schedules one month prior to the beginning of construction in any area of the Project. The Design-Builder shall provide construction updates on a weekly basis at a minimum, and more frequently if construction and traffic impacts change or if deemed necessary by WSDOT. These updates shall be delivered on a day specified by WSDOT for the following week's planned closures, detours, project status, and other information relevant to drivers and the community. Weekly update information will then go to the appropriate Project traffic staff for inclusion in WSDOT's Construction Update Report.

2.9.5.2.3 Maintenance of Traffic and Access

The Design-Builder shall provide maintenance of traffic (MOT) and access information for the entire Project to commuters, residents and businesses within a minimum of four blocks on either side of the limits of construction at least one month prior to any construction in the affected area. Notifications shall include:

- Residents and businesses affected
- Alternate routes and detours
- A contact for further information

2.9.5.2.4 Traffic Conditions

The Design-Builder shall inform WSDOT of any unusual traffic conditions (such as road obstructions, etc.) within 15 minutes of detection so this information may be forwarded to the Traffic Systems Management Center.

2.9.5.2.5 Commercial Vehicle Access and Restriction Information

Fourteen (14) calendar days prior to an activity taking place that may restrict or impede the movement of commercial vehicles due to reduced lane widths, reduced height clearances, or lower weight limits, the Design-Builder shall provide the Washington State Patrol, WSDOT's Office of Freight and Commercial Vehicle Operations, WSDOT's Office of Communications, Washington Trucking Association, King County/Metro, Community Transit, and Sound Transit with notice including:

- Description of the event
- The start of the event
- The end of the event

2.9.5.2.6 Crisis Communication Approach

The Design-Builder shall include a crisis communications approach for responding to emergencies and incidents during the Project. The Design-Builder shall coordinate this approach with the Design-Builder's overall Traffic Management Plan and Traffic Incident Management Plan (see Section 3.22), the Design-Builder's crisis communications approach shall address:

- Approaches to addressing potential emergencies
- Types of potential emergencies
- Differentiation between traffic incidents and other incidents that fall under the Design-Builder's PI staff jurisdiction
- Designated staff to respond to the emergency
- Cause of specific disruptions (i.e., whether construction-related or not)
- Actions being taken to alleviate the problem
- Notification procedures to the public
- Any corrective procedures that will be put in place as a result of the emergency
- All of the above shall be summarized in an Emergency Incident Report provided to WSDOT within 3 business days of occurrence.

2.9.5.2.7 Emergency Information Dissemination

As part of the crisis communications approach, the Design-Builder shall establish and manage an emergency response Call List. All appropriate stakeholder personnel shall be included on this Call List for immediate response in the event of an emergency. The Call List shall be divided into areas of expertise so the proper people are called for specific emergency situations. The WSDOT Project Manager, WSDOT public information staff, the Design-Builder's Construction Project Manager, the Design-Builder's Traffic Control Supervisor, and the Design-Builder's public information staff shall be included on the Call List for notification of any emergency that may surface. The Call List shall be agreed upon at the first communications meeting between WSDOT and the Design-Builder.

2.9.5.2.8 Emergency Vehicle Access

The Design-Builder shall communicate information regarding access for emergency services to the necessary parties by a schedule agreed upon by the Design-Builder and the emergency services providers. This schedule agreement shall be included in the crisis communications approach developed by the Design-Builder and communicated in writing to WSDOT in the PIP.

2.9.5.2.9 Temporary Access Changes

The Design-Builder shall inform businesses and residents of any temporary changes to access at least 14 calendar days prior to the start of any construction activities that may affect them. Information shall include the purpose of the access change, expected duration, detour options and Design-Builder contact information.

2.9.5.2.10 Bicycle, Pedestrian, Handicapped Mobility and Access

The Design-Builder shall clearly define and communicate to WSDOT accommodations for access by bicycles, pedestrians and handicapped persons, including alternate routes and detours.

2.9.5.2.11 Incident Information

The Design-Builder shall review, coordinate, train staff, provide a trained spokesperson in emergencies and provide information and assistance promptly as requested by WSDOT during an emergency.

2.9.5.2.12 Highway Advisory Radio (HAR)

The Design-Builder shall provide timely and accurate information daily or as requested by WSDOT for HAR messages. The Design-Builder shall prepare recommended messages for advance notice of traffic restrictions, and description of planned construction activities. The message content and timing shall be approved by and coordinated with WSDOT prior to the HAR broadcast.

2.9.5.2.13 Variable Message Signs (VMS)

The Design-Builder shall prepare draft messages for advance notice of traffic restrictions due to planned construction activity.

2.9.5.2.14 Project Identification Signs

The Design-Builder shall develop and install project information signs on the Project mainline at each end of the Project. These signs shall include the name of the Project, Design-Builder name, estimated completion date, the Project hotline number, "It's Your Nickel, Watch It Work," (in the specified format) and as space allows, an email contact.

2.9.5.2.15 Events

The Design-Builder shall notify WSDOT of planned events that may be affected by construction 14 calendar days before the event takes place, and submit weekly updates to the special events listing. The Design-Builder shall coordinate, communicate and provide a plan to minimize conflicts for public events held by public and private entities according to WSDOT criteria. Examples of local events include, but are not limited to, the Kirkland Arts Show; Seafair events; Memorial Day picnics and parades in corridor communities; July 4th festivities in corridor communities; Labor Day picnics and parades in corridor communities.

2.9.5.3 Utility Shut-Offs

The Design-Builder shall conduct regular communication with businesses or residents affected by utility shut-offs to mitigate the impacts of potential utility disruptions. The Design-Builder shall contact all affected businesses and residents 48 hours in advance of a utility shut-off and shall

maintain a record of each notification. Notices shall indicate the expected duration of the outage and provide information indicating how those affected by the outage can contact the Design-Builder. Such notices shall also be provided to WSDOT.

WSDOT has provided an emergency utility contact list of all utility owners' representatives with facilities within the Project site.

2.9.5.4 Transportation Demand Management: promote carpools, transit, flexible travel schedules, working at home, etc.

The Design-Builder shall collaborate with WSDOT on opportunities to work with employee transportation coordinators, businesses, transit agencies, communities, sports teams, retail centers, and others to encourage more efficient use of highways and roadways. The Design-Builder shall work with WSDOT's TDM staff on marketing plans to contact these coordinators and keep them informed of construction activities.

2.9.5.5 Outreach Methods and Tools

2.9.5.5.1 Telephone Hotline

The Design-Builder shall set-up, maintain and staff a toll-free project telephone hotline. The Design-Builder shall post the phone number on appropriate motorist signs at the Project site. The Design-Builder shall set up the telephone hotline to provide callers daily updates on current construction and traffic impacts and project progress. Callers will be provided an option to speak to someone from the Design-Build staff at all times.

The Design-Builder shall develop a process for timely and accurate updates to the message. The Design-Builder shall staff the telephone hotline 24-hours a day and respond to any public inquiries within 12 hours. The Design-Builder shall insure that all staff answering the phone is trained, friendly, responsive, and informed about construction and traffic impacts.

The Design-Builder shall compile, record, organize and summarize public questions and comments taken on the telephone hotline via electronic file; manage response review; record responses to callers; analyze and report trends; and provide a weekly report via electronic file to WSDOT.

2.9.5.5.2 Project Web Site

The Design-Builder shall update the Project web site via WSDOT's content management server (CMS) as necessary. The Design-Builder shall provide information on lane and ramp closures, detour routes, re-channelization plans, and other construction-related issues relevant to the motoring public. The information shall be updated as it becomes available.

The Design-Builder shall provide information for public education, benefits of design-build projects in general, updated project benefits, and ongoing project status.

An e-mail contact function currently exists on the I-405 website. Comments regarding the Kirkland Nickel design and construction shall be forwarded to the Design-Builder. WSDOT shall be copied on the Design-Builder's response to the original e-mail inquiry and the Design-Builder's follow-up response.

2.9.5.5.3 Correspondence and Email

The Design-Builder shall provide staff to receive and respond to correspondence, including email, letters and other forms of correspondence from the public. The Design-Builder will provide a contact name, postal address, and email address for the public. All correspondence will be answered per WSDOT standards.

2.9.5.5.4 Media

Although media relations will mainly be the responsibility of WSDOT, the Design-Builder shall participate in media interviews or other media information support activities at WSDOT's request. When participating in media inquiries and interviews, the Design-Builder will provide information that complies with WSDOT messaging and other standards, including requirements for advance project information, project progress and accountability, and timely response to media inquiries.

The Design-Builder shall inform and coordinate all media contact activity with WSDOT prior to interviews.

The Design-Builder shall conduct media tours of the project site at WSDOT's request. The Design-Builder shall provide information and materials that meet local broadcast and print media requirements and deadlines. All information released to the news media must be approved by WSDOT.

2.9.5.5.5 Weekly Progress Reports

The Design-Builder shall provide weekly project updates to WSDOT on a designated day. This information shall specify details of the upcoming week's closures, detours, general project status and other information relevant to the public. In addition, the Design-Builder shall attend WSDOT's weekly communications meeting on an every-other-week basis.

In the same report, the Design-Builder shall provide WSDOT a weekly summary of public inquiries, complaints and comments that includes general categories and trends of comments and an explanation of how the Design-Builder has responded to those comments. This summary shall be compiled from the public contact database system.

2.9.5.5.6 Open Houses, Public Meetings, and Speaking Engagements

The Design-Builder shall hold at least two public open houses per year to inform the public of the Project's status and answer key issues related to the Project.

The Design-Builder shall assist with outreach to civic and community groups, including but not limited to the surrounding cities and King County, neighborhoods, businesses, truckers, shippers, transit agencies, employee transportation coordinators, tribes, and environmental justice populations. The Design-Builder shall be available to attend public and community meetings or make presentations at WSDOT's request, as part of the Project's "speakers bureau." There will be at least 10 meetings per year for the life of the contract.

2.9.5.5.7 Photographs and Video

The Design-Builder shall document conditions during construction, public outreach, and other project-related topics using photos and video. All written audio and video materials produced by the Design-Builder's staff for public dissemination shall comply with WSDOT's standards, and are the shared property of the Design-Builder and WSDOT. All such materials shall be provided to WSDOT for review from the conceptual stage to at least seven (7) calendar days prior to scheduled distribution – the final version must be reviewed by WSDOT before release. The Design-Builder shall:

Produce and distribute photos and videos as requested

Track and file photos and video using WSDOT-approved documentation system, provide spokesperson and people for photos as needed by WSDOT

Provide or obtain needed accompanying information (use permissions, publication rights, etc) for photographs and videos.

2.9.6 Coordination with Context Sensitive Solutions Process

The I-405 Team has developed the Kirkland Advisory Committee (KAC) to review community issues such as interchange locations/designs, mainline issues, traffic, safety, and context sensitive solutions (CSS). Several KAC members also serve on a corridor-wide CSS Aesthetic Committee, focused on the "view from the corridor." WSDOT has established a memorandum of agreement with the City of Kirkland that commits to continued interaction and review by the KAC and Aesthetic Committee. The Design-Builder will be required to meet periodically with both committees as requested by WSDOT. The Design-Builder shall coordinate and acquire approval with WSDOT and the CSS Team of all the aesthetic design elements. Any changes or modifications to design standards set forth in the I-405 Urban Design Criteria shall be reviewed and approved by WSDOT and the CSS Team to compliance. Refer to Section 2.15 "Roadside Restoration Design (Landscape and Aesthetics)."

2.9.6.1 Monthly Advisory Committee Meetings

The Design-Builder shall review the schedule for Kirkland Advisory Committee meetings and plan to send a delegate or two (depending on the agenda) to each meeting or as requested. At these meetings, the Design-Builder shall be prepared to bring updated engineering drawings, aerial photos, current reports/white papers, construction schedules, and any other pertinent information as determined by the team prep meetings. There will be times when the Design-Builder will be expected to be the primary focus of the meeting, and to give a presentation to the Committee. The Design-Builder shall plan to attend prep meetings with the I-405 CSS team to strategize agendas for the Advisory Committee as requested.

2.9.6.2 CSS Aesthetic Committee Meetings

The Design-Builder shall review the schedule for the CSS Aesthetic Committee meeting and plan to send a delegate or two (depending on the agenda) to each meeting or as requested. At these meetings, the Design-Builder shall be prepared to bring updated engineering drawings, aerial photos, current reports/white papers, construction schedules, and any other pertinent information as determined by the team prep meetings. There will be times when the Design-Builder will be expected to be the primary focus of the meeting, and to give a presentation to the Committee. The Design-Builder shall plan to attend prep meetings with the I-405 CSS team to strategize agendas for the Aesthetic Committee as requested.

2.9.6.3 Coordination with the CSS Urban Design Guidelines

WSDOT's CSS team will prepare a CSS Master Plan for the I-405 Corridor in which there will be a section on the Project segment. The Design-Builder shall take time to fully understand the Urban Design Guidelines, and make every effort to comply with the guidelines set forth. The Design-Builder shall attend partnering meetings with the CSS team to review the Master Plan guidelines.

2.9.6.4 Design Changes/Modifications Review

Before any modifications are made that deviate from the guidelines set forth in the CSS Urban Design Guidelines, the Design-Builder shall review the proposed designs with WSDOT and the CSS Team. Following WSDOT and CSS Team review and approval, design modifications must be taken to the KAC, and City of Kirkland staff for an update. The review process, approval, and update must occur at least 60 calendar days prior to implementation, and include reasons for the change.

2.9.7 Quality Assurance and Quality Control

The Design-Builder shall maintain a high level of quality control for all public information tools and materials. The Design-Builder shall be bound by the Design-Builder's Quality Control and Assurance Plan for all changes/modifications to the Urban Design Criteria. WSDOT shall provide the Design-Builder with periodic feedback and suggestions for improvement on their efforts. The

Design-Builder shall be responsible for implementing changes within a time frame jointly decided with WSDOT.

2.9.8 SUBMITTALS

The Design-Builder shall prepare an approach to the Public Involvement Plan with the proposal documents.

Eight (8) hard copies and one (1) electronic copy of the Design-Builder's final Public Information Plan shall be submitted to WSDOT for approval within 30 calendar days of Contract execution. The final draft shall incorporate WSDOT's comments to the submitted PIP approach. WSDOT will respond within 14 calendar days of receipt of the plan.

Additional Project submittals:

- Construction and Maintenance of Traffic Database – established within 30 days of Contract execution.
- Project Contact Call List – submitted within 30 days of Contract execution.
- Weekly Reports – format to be established within 30 days of Contract execution; with reporting beginning immediately thereafter.

End of Section

2.10 UTILITIES

2.10.1 GENERAL

The WSDOT has made every effort possible to identify and relocate all known Permitted and Franchised utilities within the limits of this Project that appear to be in conflict with the RFP Conceptual Plan. At the publishing of this document, two utility facilities have not yet been relocated, and one to be cased in steel pipe, but are planned to be relocated and cased no later than July 30, 2005 (see Section 2.10.4.2), essentially prior to this contract NTP date. For the purpose of bidding this contract, the Design-Builder shall assume that no franchise or permit utility conflicts are present, and no utility relocations are necessary to complete the Contract Work.

Should the Design-Builder's final design or construction differ from the RFP Conceptual Plan intent, such that an identified utility becomes a conflict, or an unknown utility is discovered and is in conflict with the work, the conflict shall be addressed as described in Sections 2.10.2 through 2.10.7.

All known permitted utilities are listed and shown on the utility base map in Appendix U3. Existing permit documents are on file with WSDOT, and copies of permits can be obtained upon request. This does not relieve the Design-Builder from its responsibility to investigate potential utility conflicts throughout the duration of the Contract. All known permitted or franchised facilities within the WSDOT ROW of this Projects limits shall be protected in-place during the duration of this contract.

The WSDOT will not pay for any work to perform utility relocates of permitted/franchised facilities, including any money from this contract that are not reimbursable under CRF Title 23 Part 645. The Design Builder shall make reference to Section 1-07.17 of the General Conditions, where Utility Certification Form U1 addresses the exclusion of permitted/franchised utility work in the Contract. All agreements will be prepared to meet this requirement.

The Design-Builder shall be considered aware that utility relocations involve potentially lengthy lead times for the utilities owners to investigate, design, review, investigate joint occupation issues, inspect and complete relocations. The Design-Builder shall investigate conflicts early in design and work with the utility owner to schedule all necessary activities needed to complete relocation design and work. The Design-Builder shall plan the work to fit within the submitted project schedule. No additional contract time will be provided for delays due to coordination and completion of utility relocation work.

WSDOT highway illumination, signals and ITS facilities are not addressed in this section. See Sections 2.16, 2.17 and 2.18 respectively, for information relating to those systems.

2.10.2 UTILITY CONFLICT PROCEDURES

The Design-Builder shall investigate all potential utility conflicts of permitted/franchised utilities, as early in design as possible. Identified potential conflicts shall be presented to the utility owner and WSDOT promptly, and investigated to determine appropriate actions. When a utility facility is determined to be in conflict with the design, permitted or otherwise, the Design-Builder shall coordinate with the facility owner to determine if the resolution can be accomplished through reasonable design efforts to avoid the conflict. If during coordinating design with a utility, a conflicting facility is found to be reasonably unavoidable, the Design-Builder shall execute a WSDOT "Assignment/Delegation of Utility Permit/Franchise Rights and Obligations" document in Appendix U2 and begin working with the utility owner to develop a utility agreement that resolves the conflict by relocation or other appropriate actions.

A new or amended utility permit or franchise will need to be submitted to the WSDOT for approval.

The Utility permit or franchise document must reflect the resolution defined in the completed and signed utility agreement and fit with the Project final design. No utility work may be started until the utility permit or franchise is approved by the WSDOT.

The utility work will be considered resolved and completed once an Acceptance of Work letter is issued to the Design-Builder from the utility owner. Upon completion of any utility relocation by the Design-Builder, the Design-Builder shall submit to the WSDOT, "As-Built" plan sheets for the relocation in accordance with Section 2.10.7.2. All relocates must meet the Design-Builder's final design.

2.10.3 MANDATORY STANDARDS

2.10.3.1 General

The Design-Builder shall perform all utilities work in accordance with the mandatory standards. Mandatory standards include all standards necessary to complete the relocation work.

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications maybe required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from the WSDOT. The WSDOT's interpretation and decision shall be final.

2.10.3.2 Mandatory Standards

The Design-Builder is responsible for obtaining all mandatory standards from utility companies and other entities that affect the facilities that are to be relocated. Permit documents are mandatory, but are not listed below, See Appendix P for additional permit information.

- Utility Company Standards
- WSDOT *Utilities Manual* (M22-87)
- WSDOT *Utilities Manual for Design-Build* http://www.wsdot.wa.gov/fasc/EngineeringPublications/library.html#
- WSDOT Utilities Accommodation Policy (M22-86)
- Design-Builder's Proposal
- WSDOT RFP
- WSDOT *Local Agency Agreements Manual*
- WSDOT Standard Drawings

2.10.3.2.1 Conflicts and Priority

If there is any conflict in standards, adhere to the standard with the most stringent requirement. However, if the Design-Builder's proposal has a higher standard than any of the listed standards, the Design-Builder shall adhere to the proposal standard.

2.10.3.2.2 Ambiguity

If there is any unresolved ambiguity in standards, the Design-Builder shall obtain clarification from the WSDOT before proceeding with design or construction.

2.10.3.2.3 Version and Date

The Design-Builder shall use the most current WSDOT version of each listed standard as of date of RFP advertisement, together with the most current utility company standard as requirements and/or governmental agency regulations.

2.10.4 WSDOT Supplied Information

2.10.4.1 Limited Investigations

WSDOT has investigated the Utilities within the Project limits. Note that:

- The WSDOT has not identified service lines at the site and may not have identified all non-Service Line Utilities, or joint utilities occurrences at the site. Furthermore, the Design-Builder acknowledges that it has the rights and obligation to perform additional verification and research necessary to establish relocation work associated with this Project.
- The locations and sizes of the Utilities identified on the plans and the utility base map in Appendix U (Utility Data) are from permit documents on file and information available prior to the printing of the RFP documents. This information is in accordance with available information obtained without uncovering, measuring or other verification, and might not be accurately depicted. The Design-Builder will be responsible for verifying the accuracy of the locations of those facilities.
- All information shown in this RFP that has had a Subsurface Utility Investigation (SUE) performed is to be considered reliable information, accurate to the degree implied in the SUE. All utility information provided is for information only and should not be the sole basis for establishing relocation work.

2.10.4.2 Utilities to be Relocated Prior to NTP

Three utilities facilities were found to be in conflict with the RFP Conceptual Plans. Two are in conflict with the I-405 bridge demo and reconstruction. They are Franchise numbers 7-0940 (PSE gas main) and number 16154 (Verizon Cables). The third is an HDPE sewer pipe running under the proposed off ramp and wall, Franchise number 14555 (City of Kirkland Sewer). All are planned to be relocated and/or cased prior to July 30, 2005. The Design-Builder shall assume that the utilities have been relocated under NE 116th Street and sidewalk, where they are no longer considered in conflict with the Project Work. The Utility Companies listed in Appendix U4 (Utility Listing), have been identified as having franchise or utility permit facilities located within the project limits, and include a contact person name and mailing address for each. The listed and identified utilities have been contacted concerning the Project and provided with a copy of the existing utilities base map included in Appendix U of this document. The Design-Builder acknowledges that potential conflicts may arise from final design and construction, and that further investigation and verification may lead to identifying conflicts.

2.10.4.2.1 Utilities in NE 116th Street

Several Existing permitted utilities are located under or parallel to NE 116th Street. The contract work to remove the existing bridge structure and replace it with a new bridge will require removal of the existing bridge and columns. All utilities under the existing NE 116th Street as described in this paragraph, within the State ROW are considered to not be in conflict with the Project Work. The limits where no conflict is to be assumed include the entire paved road, curb face to curb face, and extending 2 feet behind the back of curb line on both sides of the street. This area widens to 4 feet from the face of the existing column faces underneath the existing bridge structure. This widened area extends a distance of 22 feet to the west of the bridge structure footprint, and 50 feet to the east

of the bridge footprint.

Should the Design-Builder's design or construction vary from that of the RFP Conceptual Plan shown in Appendix M1, such that any utilities in the above describe area of no conflict require relocation, all cost and schedule impacts associated with relocation of any utility shall be the responsibility of the Design-Builder.

2.10.5 PERFORMANCE REQUIREMENTS

2.10.5.1 Design-Builders Responsibility to Perform

2.10.5.1.1 General

The Design Builder shall undertake all efforts described in this Section as part of the Work. Design-Builder agrees that:

- The Contract price does not include Design-Builder work for utility relocations of permit or franchise related facilities.
- It is feasible to investigate, obtain, and/or perform all necessary relocations within the Design-Builder's Project schedule of the Contract Plan Documents. No delay costs due to performing Design-Builder's planned relocates will be allowed.
- Products to be submitted to the WSDOT under this section will have been through the Contract Quality Control and Quality Assurance process described in Section 2.28 prior to submitting them to the WSDOT.
- Non-permitted utility facilities not specifically identified and covered in this document are considered incidental and all work associated with addressing these utilities is included in the lump sum contract price.
- A good faith effort to avoid or minimize utility conflicts shall be made. Including investigating options into effective project changes which might decrease the amount of or eliminate need for utility relocation.
- The Design-Builder shall inform the WSDOT of any compensable property rights issues discovered during coordination with utility owners or investigations.
- The WSDOT retains ultimate authority to issue or deny a "delegation of utility permit/franchise rights and obligations" request.
- Electrical transformers containing oil, considered a hazardous substance under state regulations, will be handled carefully in order to avoid a release or accidental spill during relocation of transformers.

2.10.5.2 Utility Responsibility

Any Utility Owner that has not entered into a Memorandum of Agreement (MOA) shall be bound by the General Provisions of the franchise or permit for facility and any delegation of rights and obligations issued to the Design-Builder by the WSDOT.

Utility Owners that have entered into a Project MOA shall:

- Comply with the general provisions of
  - The franchise or permit,

  - The signed Utility MOA that is part of this Contract, and
  - Any signed Agreements made during this Contract for addressing utility conflicts
- Attend coordination meetings
- Cooperate in the scheduling of construction
- Provide copies of existing records if required by the Design-Builder
- Issue to the Design-Builder an "Acceptance of Work" letter immediately upon completion of the utility work.

MOA's for this contract are included in Appendix U.

2.10.5.2.1 Utility Company Cost

The Utility Companies are responsible for relocation construction costs according to CFR Title 23 Part 645 and General Conditions of their Permit or Franchise with the WSDOT. The Design-Builder will use a copy of the Agreement listed in Appendix U to prepare all utility agreements. The Agreements shall identify and include justification of the costs for the relocation work. The Utility Company is responsible for 100 percent of relocation costs of General permit and Franchise Utilities, and will pay the Design-Builder for the agreed relocation cost as indicated in the final WSDOT approved agreement.

2.10.5.2.2 Inspection

The Utility owner will be allowed to inspect construction of utility work by the Design-Builder and issue an Acceptance of Work Letter at the completion of the utility work.

2.10.5.3 WSDOT's Responsibility To Perform

The WSDOT has met with the Utility Owners that have franchised or permitted facilities within the Project limits and;

- Established an MOA that addresses a framework to the utility conflict resolution process.
- Will review and respond within 15 business days to all utility agreements submitted (actual approval and completion or processing time will vary with the complexity of the agreement).
- Will ensure executed agreements include an acceptable payment process for utility costs that are the responsibility of the Utility Owner, that are due to the Design-Builder, including provisions for the WSDOT to collect and withhold 10 percent of the amount due from the Utility to the Design-Builder. This withheld money will be issued to the Design-Builder upon receipt of the Acceptance of Work letter from the Utility Owner for the work described in the agreement.

2.10.5.3.1 WSDOT Authority

The WSDOT shall have sole authority to approve or reject new or amended general permit or franchise application from utility owners.

2.10.5.4 Utility Agreements

2.10.5.4.1 Utility Agreements General

When the Design-Builder determines a franchised/permitted facility within the Project ROW limits requires relocation under the course of the Contract, the Design-Builder shall promptly notify the WSDOT, and prepare an "Assignment/Delegation of Utility Permit/Franchise Rights and Obligations" Document (Form U5, Appendix U). The Design-Builder shall submit the completed document to the WSDOT for approval. Once the document has been approved and executed by the

WSDOT, the Design-Builder shall begin working with the identified utility. The Design-Builder shall keep the WSDOT informed and updated on the progress of relocation activities as they proceed.

The Design-Builder shall coordinate with, and provide reasonable time in the agreement schedule for the utility to perform design, review, joint use issue resolution, inspections approval and acceptance of the relocation work. The Design-Builder is responsible for determining the potential conflicts with utility facilities and assisting in determining the ultimate location of the utility facilities to be relocated. The Design-Builder shall cooperate and work with the utility, in a reasonable and prudent manner to resolve all utility conflicts using the agreement. This means the Design-Builder shall initiate contact with the specific utility at the earliest possible time and begin working with the utility to develop an agreement that provides a relocation plan that meets the Project design and schedule.

The Design-Builder shall work with the Utility owner to develop a mutually acceptable utility agreement that resolves the conflict. The Utility owner shall prepare from that agreement, a corresponding franchise or permit amendment application that matches the agreement work. The Utility owner will submit the application for a new or amended utility permit or franchise application to the WSDOT for approval. The agreement work and application shall be modified as needed to get the WSDOT approval. Once the WSDOT has approved the general permit or franchise amendment, the utility agreement work may begin on the affected facility. No Utility agreement work can begin until the approved permit or franchise has been issued.

If the Design-Builder and Utility owner cannot come to a mutual agreement, the Design-Builder shall notify the WSDOT and Utility in writing, and undertake and perform the work in accordance with the Assignment/Delegation of Utility Permit/Franchise Rights and Obligations authority granted to them by the State.

2.10.5.5 Investigations by Design Builder

2.10.5.5.1 General

The Design-Builder shall be responsible for verifying the existence, exact location, and size of all Utilities affected by the Design-Builder's proposed plan. Such actions shall include making diligent inquiry at the offices of the Utility Companies, consulting public records, and conducting field studies (such as potholing or Subsurface Utility Engineering SUE), as appropriate. If a surface inspection of the area shows, or gives cause to suspect, the existence of any previously unidentified utility, or there is cause to suspect that a previously unidentified utility exists, the Design-Builder shall undertake all appropriate investigations. If these investigations identify any utilities, excluding service lines, requiring relocation not described in the Conceptual Plans or not shown on the utility base map, or if they result in a determination that any utility is not accurately indicated therein, the Design-Builder shall notify the utility owner immediately. All costs associated with investigations is considered incidental to the work and shall be included in the lump sum contract price.

2.10.6 Design and Construction Criteria

2.10.6.1 General

The Design-Builder shall be responsible for verifying that the plans prepared, and construction performed by the Utility Company are consistent and compatible with the Design-Builder's design and construction sequence of the Project.

All design and construction work performed by the Design-Builder relating to the investigating, design and review of plans for performing relocation work shall be documented for Project records. Utility owners will be responsible for one relocate of a facility. All costs associated with an additional relocation of any given facility within the Project limits shall be the responsibility of the Design-Builder.

2.10.6.2 Maintenance and Care During Construction

During the construction of this contract, the Design-Builder shall coordinate with the Utility Companies and protect all utilities within the Projects limits from damage resulting from the contract work. Among others, these utilities include, telephone, telecommunication, power lines, sewer and water lines, drainage lines, railroad tracks and equipment; and highway lighting, signing and ITS systems. All costs required to protect utilities as provided in this section shall be at the Design-Builder's expense and included in the lump sum contract price, unless otherwise addressed herein. The Design-Builder shall contact One-Call locator service prior to performing any excavations.

2.10.6.3 Permits

2.10.6.3.1 General

The Design-Builder shall obtain and comply with all relocation permits for utility locations both within and outside the WSDOT right-of-way. A permit or franchise from the WSDOT is required for construction of a new facility or relocation of an existing facility to be placed within the ROW right-of-way. A permit or franchise is not required from the WSDOT for the abandonment or removal of an existing Utility within the ROW right-of-way.

2.10.6.3.2 Governmental Approvals

If the Design-Builder finds that the Utility Company does not have the necessary relocation permits or governmental approvals, or is in violation of either, the Design-Builder shall work with the utility to legally resolve such issues.

2.10.6.3.3 Access to Existing Permitted Utilities

Existing permitted or franchised utilities within the Project limits have provisions for access by the authorized agents of the WSDOT or the Utility Company. Authorized agents may enter the Project right-of-way to repair, rearrange, alter, connect equipment, or perform other authorized activities. The Design-Builder shall cooperate with such efforts and shall avoid creating delays or hindrances to those doing the work. As needed, the Design-Builder shall arrange to coordinate work schedules to allow this work to proceed. Any Project schedule delays due to work effort performed on existing permitted or franchised utilities shall be considered incidental to the overall Project Schedule and not entitle the Design-Builder to delay claims on the Project.

2.10.6.4 Abandonment and Protection In-Place

2.10.6.4.1 General

Unless specifically noted otherwise in the RFP Documents or directed otherwise in writing by the owning utility, the Design-Builder shall remove all underground utilities or pipes that are to be abandoned within the Project right-of-way limits. Requests to abandon utilities in-place shall be made to the WSDOT in writing. The WSDOT approval is required to abandon underground utilities and pipes in-place. Abandonment in-place shall be in accordance with the WSDOT standard plans and approved methods. Minimum pipe requirements shall be pumping of concrete slurry, sand slurry, or other material approved by the WSDOT and capping all open ends with a concrete cap for a minimum distance of 2 feet or for a distance of twice the diameter of the pipe, whichever is greater. Minimum clearances between construction equipment, permanent finished grade, and/or temporary grade and the overhead power or other overhead lines should be determined directly from the Utility Companies. This information shall be obtained prior to working in the affected areas. All costs associated with abandonment and protection in place shall be included in the contract bid price.

2.10.6.5 Damage by Design-Builder

2.10.6.5.1 General

If any Utilities are damaged by Design-Builder activities, the Design-Builder shall notify the affected Utility Company, the One-Call Locator Service utility notification center and the WSDOT immediately. The Design-Builder shall bear all costs associated with damage caused by the Design-Builder, including but not limited to utility downtime, all reconstruction, all remediation of hazards, litigation, loss of product, utility startup, and delay costs. Also see Section 1-07.14 (Responsibility For Damage). The Utility Company may choose to repair the damage themselves, billing the Design-Builder, or have the damage repaired by the Design-Builder. Repairs by the Design-Builder shall be performed to the satisfaction of the Utility Company.

2.10.6.6 Unidentified Existing Utilities

2.10.6.6.1 General

If the Design-Builder discovers any existing utility (excluding service lines) that is not shown in Appendix U (Utility Data), or elsewhere in the Contract Documents, but will be affected by the Project, the Design Builder shall notify the WSDOT in accordance with Section 1-05.15. The Design-Builder shall cooperate with the Utility Company in identifying and determining the impact of this facility. The Design-Builder may need to temporarily discontinue work immediately in the area, until the Design-Builder can develop a course of action.

Design-Builder shall be entitled to request a Change Order for additional costs and delays associated with the Unidentified Utility Work as permitted by Section 1-04.4.

2.10.6.7 Acceptance of Work

For any utility work where a utility agreement is required, the Design-Builder shall obtain written approval from the respective Utility Company for all Design-Builder relocations, protection work, abandonment work, and as-built construction plans for which the Design-Builder has responsibility. The Design-Builder shall assist the Utility with information required to submit necessary permit documents for issuance of new or revised permits, and submit the written approval documents to the WSDOT.

Submittal of an "Acceptance of Work" letter from the Utility Companies to the WSDOT will be considered actual completion of the utility work. The letter shall indicate that the utility has inspected and approved the work performed along with the date of the acceptance. An Acceptance of Work letter will effectively end the utility agreement and the assignment of rights to the Design-Builder, upon acceptance by the WSDOT.

2.10.6.8 Special Provisions

WSDOT Standard Specifications for Road, Bridge and Municipal Construction (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require the WSDOT approval prior to application during construction.

2.10.7 SUBMITTALS

2.10.7.1 General

The Design-Builder shall submit to the WSDOT the following:

- "Assignment/Delegation of Utility Permit/Franchise Rights and Obligations" Forms
- Utility owner completed "Application for Utility Permit or Franchise" Forms
- Acceptance of work documents from the Utility Companies

2.10.7.2 Utility As-Built Plans

The Design-Builder shall prepare and provide as-built plan Figures and Exhibits for the Utility Work performed in accordance with the WSDOT *Utilities Manual* requirements for Franchise and Permit work. Exhibits shall include plan views and profiles tied to the WSDOT benchmarks in State datum. The Design-Builder shall submit as-built sheets to the WSDOT to replace the Figures and Exhibits in the approved Permit or Franchise documents for the work, no later than thirty (30) calendar days from receiving the Utility owners "Acceptance of Work' letter for the specific utility work.

End of Section

2.11 HIGHWAY DESIGN AND GRADING

2.11.1 GENERAL

The Design-Builder shall conduct all work necessary to complete the design and construction of the highway and grading in coordination with all other elements of work required by the Contract. Elements of work include but are not limited to:

- Widen the roadway to accommodate one additional lane each direction from NE 85th Street to NE 124th Street
- Modify the right turn connection at the southbound off-ramp terminal at NE 85th Street to mitigate an existing HAL
- Revise northbound and southbound I-405, and the ramp connections in the vicinity of NE 116th Street to accommodate the future widening of I-405 and to accommodate the future Single Point Urban Interchange configuration.

2.11.2 MANDATORY STANDARDS

2.11.2.1 General

The following is a list of publications that shall be used to design and construct the highway and local roads. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications maybe required to complete all design and construction elements. Guides and Guidelines listed in the Mandatory Standards shall be used as design policies. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

2.11.2.2 Mandatory Standards

- WSDOT *Design Manual*, including instructional letters (DM) (M22-01), including all revisions and supplements
- WSDOT *HOV Direct Access Guide, Draft* (M22-98)
- *I-405, SR 520 to SR 522 Stage 1 (Kirkland Stage 1) Conceptual Plans and Kirkland Implementation Plan in Appendices* M
- *Project Special Provisions and Amendments to WSDOT Standard Specification for Roads, Bridge and Municipal Construction: 2004 (M41-10)*, provided in Appendix B
- WSDOT *Standard Specification for Roads, Bridge and Municipal Construction: 2004 (Standard Specifications)* (M41-10)
- WSDOT *Standard Plans for Roads, Bridge and Municipal Construction (Standard Plans)* (M21-01)
- WSDOT *Local Agency Guidelines(LAG)* (M 36-63)
- City of Kirkland *Pre-Approved Plans and Policy, (2000)*
- AASHTO *A Policy on Geometric Design of Highway and Streets*
- AASHTO *Guide for the Design of High Occupancy Vehicles and Public Transfer Facilities* (1983)
- AASHTO *Roadside Design Guide*

- ADA *American with Disabilities Act of 1990*
- *ADA Accessibility Guideline (ADAAG), US Access Board*
- WSDOT *Bicycle Transportation Planning and Design Guidelines*
- City of Kirkland *Non-Motorized Transportation Plan* (2001)
- AASHTO *Guide for the Development of Bicycle Facilities*
- OTAK *Pedestrian Facilities Guidebook, incorporating Pedestrians into Washington's Transportation System* (1997)
- WSDOT Modifications to the MUTCD (M24-01)
- *Manual on Uniform Traffic Control Devices* (MUTCD)
- WSDOT *Qualified Products List* (M46-02)
- WSDOT *Standard Item Table*
- I-405 Congestion Relief and Bus Rapid Transit Project, *CADD Standards Manual*
- WSDOT *Plans Preparation Manual* (M22-31)

2.11.3 PERFORMANCE REQUIREMENTS

The Design-Builder shall complete all work in accordance with the Design-Builder's Scope of Work, the Technical Specifications and the Design-Builder's Quality Management Plan (see Section 2.28.3). Major components of the design criteria used in developing the Conceptual Plans are identified in 2.11.4.1.

In addition to completing the design and construction of the improvements identified in the Kirkland Stage 1 Conceptual Plans (see Appendix M1), the Design-Builder shall advance the design of a single point urban interchange (SPUI) at NE 116th Street Interchange as shown in the Kirkland Stage 2 Conceptual Plan (see Appendix M1). The Design-Builder shall obtain approval for the Channelization Plan for both the full length of the Kirkland Stage 1 Project and the Stage 2 SPUI at NE 116th Street. The design of the half-diamond interchange and the SPUI shall be developed so that the roadway profile, paving and bridge constructed under Kirkland Stage 1 will not require removal or reconstruction under the Kirkland Stage 2 or the Implementation Plan. The Conceptual Kirkland Implementation Plan has been included in Appendix M3. The Design-Builder is not responsible for construction of the SPUI shown on the Kirkland Stage 2 Conceptual Plan.

The Design-Builder may propose revisions to the roadway design shown in the Kirkland Stage 1 and Kirkland Stage 2 Conceptual Plans. However, any deviation from the Conceptual Plans in Appendix M pertaining to roadway design and grading may require changes to the right-of-way, Environmental Documents and Permits that have been approved for this Project. If any such changes are proposed and revisions are required to the right-of-way, Environmental Documents or Permits, the Design-Builder shall bear the responsibility for all the cost and schedule adjustments made necessary by same. If the Design-Builder's proposed changes are approved, all the work elements described herein shall be completed for the approved changes in accordance with the Scope of Work and the Quality Management Plan.

The Design-Builder shall note that the original topographic mapping given in the appendix was completed prior to start of any work in the vicinity of the 128th Interchange or 100th Street Pedestrian Bridge. The Design-Builder shall complete supplemental survey in these areas to update the topographic survey. The supplemental survey shall be completed according to the requirements of Section 2.5, Survey, and the WSDOT *Highway Surveying Manual*.

2.11.4 Design and Construction Criteria

2.11.4.1 Design Criteria

The Design-Builder shall develop Design Parameter Tables that include all the design criteria shown on the Design Parameter Tables included in Appendix O4, and shall include at a minimum one set (Mainline, Off-ramp, On-ramp, CD road, and Local road) for each interchange. The Design-Builder shall revise the Design Parameter Tables to reflect the most current design prior to each Design Submittal. The Design Parameter Tables shall be checked according to the Quality Management Plans and shall be submitted as part of each Design Submittal for review and comment by WSDOT as described in Section 2.28.3 of the Technical Specifications.

The Design-Builder shall not increase in the impervious surface beyond that shown on the Kirkland Stage 1 Conceptual Plans, and shall develop and implement a Temporary Erosion and Sediment Control (TESC) Plan as described in Section 2.8 Environmental.

2.11.4.1.1 Mandatory Design Criteria

- I-405 mainline is an Urban Interstate, Design Class I-1, with Full Access Control.
- The Project shall be designed to meet the Full Design Level with Rolling Terrain.
- The mainline design vehicle is a WB-67, and a WB-50 shall be used for all the turning movements at all ramp intersections with local roadways.
- The Superelevation transition and Runout Length shall be based on the pavement width for the Kirkland Implementation layout.
- 16.5 ft vertical clearance shall be provided for the full Implementation Plan structure width. See Section 2.12, Bridges and Structures, for additional information.
- Normal crown is based on a -2 percent slope, and a 10 percent Maximum superelevation rate shall be used for mainline and ramps.
- The design speed for all left turning movements at the SPUI shall be 25 mph.
- NE 116th Street is an Urban Minor Arterial (P-6) with a 45 mph design speed.
- 120th Avenue NE is an Urban Low Volume Collector with a design speed of 30 mph.
- Lane width of 11 ft shall be used for all lanes on NE 116th Street, 120th Avenue NE, and NE 85th Street.
- All pedestrian improvements shall be ADA compliant.
- For Kirkland Stage 1, a 10 foot wide sidewalk with a pedestrian ramp shall be constructed on the southeast corner of the northbound off-ramp termini.
- For Kirkland Stage 1, an 8 foot wide asphalt concrete sidewalk (excluding curb width) with 4 foot gravel buffer between the curb and sidewalk shall be installed along the north side of NE 116th Street, connecting the eastern sidewalk terminus with the intersection at 120th Avenue NE.
- For Kirkland Stage 1, the existing crosswalk and pedestrian ramp on the north side of the NE 116th Street shall be reconstructed to align with the pedestrian ramp on the southwest corner of the northbound off-ramp termini.
- For Kirkland Stage 2 SPUI, an 8 foot wide cement concrete sidewalk (excluding curb width) shall be added along the north and south side of NE 116th Street, connecting the sidewalk at 120th Avenue NE to the sidewalk at 124th Avenue NE.

- For Kirkland Stage 2 SPUI, a 4.5 foot wide unpaved planter strip shall be added between the roadway and sidewalk along the north and south side of NE 116th Street from 120th Avenue NE to 124th Avenue NE.
- For Kirkland Stage 2 SPUI, a 5 ft bike lane shall be provided both eastbound and westbound on NE 116th Street.
- For Kirkland Stage 2, 5 foot sidewalks shall be provided along 120th Avenue NE.

2.11.4.1.2 Corridor Analysis

Mainline Design Speed. I-405 MP 0.00 to 30.30

The Corridor Analysis (see Appendix T4) documents considerations used in selecting the mainline design speed, and may be used to clarify design guidelines for use in the Project corridor. A study of the existing horizontal and vertical curve stopping sight distance, free-flow running speed, and accident data were used to establish a mainline design speed of 65 mph from MP 14.8 to MP 30.3 (north of SR520).

The Design-Builder shall comply with the findings of this Corridor Analysis.

2.11.4.1.3 Approved Deviations

Section 2.4 DESIGN DEVIATIONS lists the approved Design Deviations for the project. Copies of the Design Deviations are included in Appendix O2. The Design-Builder is responsible for developing and obtaining approval for all new deviations or revisions to the pre-approved deviations in accordance with Section 2.4 and WSDOT *Design Manual*.

2.11.4.1.4 Design Decision Memoranda

The following is a summary of the Design Decision Memoranda for the Project. They identify decisions made during development of the design. Copies of the Design Decision Memoranda are included in Appendix O1.

- Staging Options – I-405, SR 520 to SR 522, Stage 1 (November 1, 2004)
- Southbound I-405 Compound Horizontal Curves (November 1, 2004)
- Wetland Impact Avoidance and Minimization (October 18, 2004)
- Modified Grading – I-405, SR 520 to SR 522 (October 18, 2004)
- Environmental Impact Areas (September 24, 2004)
- Forbes Creek Fish Passage Culvert (September 13, 2004)
- Location for Noise Walls for I-405, SR 520 to SR 522 Project (August 19, 2004)
- Forbes Creek Watershed Opportunities (July 9, 2004)
- Superelevation Rates and Transitions (July 9, 2004)
- Traffic Signals at NE 116th Street SPUI Interchange (June 8, 2004)
- Crown Relocation for I-405, SR 520 to SR 522 Project (June 4, 2004)
- Sight Distance at NE 116th Street SPUI Interchange (June 2, 2004)
- Removal and Replacement of Shoulders for I-405, SR 520 to SR 522 Project (March 8, 2004)

2.11.4.1.5 Roadside Barrier Selection

Pre-cast and cast-in-place concrete barrier shall be single slope concrete barrier in accordance with WSDOT *Standard Plans*. All new median barrier, including barrier incorporated into median walls, shall utilize the single slope concrete barrier shape. All barrier shall comply with the I-405 Urban Design Criteria for Kirkland Stage 1.

Within the Project Limits and adjacent to paving modified or added in the Kirkland Stage 1 Project, existing beam guardrail shall be evaluated for need. Existing beam guardrail shall be removed where not required. Also within these limits, all existing guardrail to remain shall be removed, replaced with new beam guardrail and reset.

For all roadside barrier, existing and proposed, the Design-Builder shall submit calculations and a Design Decision providing justification for roadside barrier need or removal. The Design Decision for roadside barrier need or removal and design calculations shall be submitted for review and comment by WSDOT according to Section 2.28.3 with the 60 percent, 90 percent and Final Design submittals. The Design Decision and design calculations shall be revised based on comments received during WSDOT reviews.

The Design Decision providing justification for need or removal of roadside barrier shall include:

- Roadside hazard description including dimensions, station, offset, narrative description, and photo documentation
- Barrier length of need calculation
- Plan layout of barrier including begin and end station, offset, terminal type, and barrier type
- Narrative documenting justification for roadside barrier need or removal and terminal type selection

2.11.4.1.6 Impact Attenuators

All new impact attenuators shall be Quadguard (standard or Elite), TAU II or REACT350, and shall be designed according to the WSDOT *Design Manual*. If the Design-Builder determines none of these systems will meet the design requirements for a proposed application, the Design-Builder shall submit in writing the proposed change identifying at a minimum the location, proposed substitution and the specific design rationale why one of these systems would not be applicable. The written proposal for substitution shall be submitted for review and comment by WSDOT according to Section 2.28.3 with the 60 percent, 90 percent and Final Design submittals. The design and written justification shall be revised based on comments received during WSDOT reviews.

2.11.4.1.7 Fencing

The Design-Builder shall replace right-of-way fencing disturbed or displaced by construction of the Kirkland Stage 1 Project in accordance with Section 2.15 and 2.24 of the RFP, existing right-of-way agreements (ROW), WSDOT *Design Manual*, WSDOT *Standard Plans* and WSDOT *Standard Specifications*. Wherever right-of-way has been or will be acquired for the Project, new right-of-way fencing shall be added as specified in Sections 2.15 and 2.24 of the RFP, existing right-of-way agreements, the WSDOT *Design Manual*, WSDOT *Standard Plans* and WSDOT *Standard Specifications*. The Design-Builder shall show all fencing and gates on the 60 percent, 90 percent and Final Design submittals. The Design-Builder shall provide written notification with the 60 percent and 90 percent design submittals to WSDOT identifying locations where existing or new right-of-way fencing will be within 10 feet of a noise wall or retaining wall. All gates shall meet the material requirements of and shall be installed according to the Project Special Provisions, *Amendments to the Standard Specifications*, the Technical Specifications and as specified in WSDOT *Standard Plans*

and WSDOT *Standard Specifications*.

Fall protection fencing shall be provided in accordance with WSDOT *Design Manual*.

2.11.4.1.8 Roadway Approaches

Within right-of-way limits as depicted on the approved right-of-way plans, (see Appendix R), use WSDOT *Design Manual* for roadway approach design and classification. Beyond WSDOT right-of-way, use City of Kirkland *Pre-approved Plans and Policies*.

2.11.4.1.9 Side-slope Table

WSDOT standard slope table shall be applied. Modifications used shall be summarized in a side slope table on the construction drawings identifying baseline, station range, and side slope applied. Grading modifications used in developing the Conceptual Plans are summarized in the Modified Grading Design Decision included in Appendix O1.

2.11.4.1.10 Maintenance Access

The Design-Builder shall identify on the design drawings the location, width, intersection angle with the intersecting roadway, and the facility served for the existing maintenance access roads in the Project limits within the I-405 right-of-way.

The Design-Builder shall design and construct the access roads to the ponds, vaults and Forbes Creek structures listed in the table below to accommodate the design vehicles listed. The access road and road approach to the highway shall be designed according to WSDOT *Design Manual*. At a minimum, the 60 percent Design plans shall show the location, width, intersection angle and corner radii of all access roads.

Location	Design Vehicle	Access Requirement
Detention Pond B4	SU and WB-40	Vactor to clean outfall structure. self propelled crane with clam bucket to clean pond (this is a 4 axle with 2 steering axles on the front and 2 rear driving axles on the rear)
Detention Pond C1.1	SU with trailer	Vactor to clean structures, dump truck, trailer and backhoe to clean pond
Forbes Creek fish passage headwater and tailwater structures	SU with trailer	Backhoe to clean weirs. Truck and trailer would stage on the shoulder
Detention Vault C1.2	SU with trailer	Vactor to clean control structure for vault. Small front-end loaders to clean vault
Detention Pond DI	SU and WB-40	Self propelled crane with clam bucket to clean pond. Dump trucks will haul spoils.

The Design-Builder shall design and construct drainage structures, (manholes, catch basins, etc.) and landscaped areas inside WSDOT right-of-way to be accessible directly from roadway shoulders. The drainage structures and landscape areas shall not require ladder or lift bucket to gain maintenance access to the access cover/lid for drainage structures. If maintenance direct from the roadway shoulder can not be provided, the Design-Builder shall design and construct an alternate access route that meets the requirements of WSDOT *Design Manual.*

Where new noise walls are not within five (5) feet of the right-of-way, the Design-Builder shall design and construct access through new noise walls to allow maintenance of all drainage structures, survey monuments, utilities, and fire hydrants within WSDOT right-of-way.

At all ITS cabinet and pole installations the Design-Builder shall design and construct shoulder widening or off-shoulder access to accommodate a maintenance vehicle with outriggers extended. The shoulder widening or off-shoulder access shall provide a minimum 2 foot clear zone from edge of the nearest travel lane to the edge of the vehicle and outriggers, and the parking surface shall be HMA to match the adjacent roadway and shall not have a slope greater than 6 percent in any direction. The Design-Builder shall design and construct a 3 foot level work zone clear of obstacles on all sides of the ITS cabinet installations and poles.

2.11.4.1.11 City of Kirkland Agreement

The Design-Builder shall incorporate into the design all elements described in the Memorandum of Agreement between WSDOT and the City of Kirkland, included in Appendix O5.

2.11.4.2 Construction Criteria

2.11.4.2.1 Special Provisions

WSDOT *Standard Specifications for Road, Bridge and Municipal Construction (2004)* are supplemented and modified by the Amendments provided in Appendix B2, the Project Special

Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design-Builder require WSDOT approval prior to application during construction.

2.11.4.2.2 Type R Bridge Rail Salvage

Existing Type R Bridge Rail shall be removed and retained on-site for inspection by WSDOT. Elements inspected and selected for salvage by WSDOT shall become the property of WSDOT and shall be delivered by the Design-Builder to a location designated by WSDOT. Type R Bridge Rail rejected by WSDOT shall become the property of the Design-Builder and shall be removed from the Project.

2.11.4.2.3 Disposal of Surplus Material

Section 2-03.3(7)C of the Standard Specifications is supplemented with the following:

> All surplus excavation or other materials shall be disposed of or reused in a manner that does not degrade sensitive resources such as wellhead protection zones, surface water bodies, parks, and child-use areas. Disposing of soils of any kind directly to a topsoil manufacturer is prohibited.

Additionally, surplus material or other material shall not be disposed of or reused in Environmentally Sensitive Areas (ESAs) shown on the Conceptual Plans (Appendix M) or any areas determined by WSDOT to be ESAs.

2.11.5 Submittals

2.11.5.1 Plans

The Design-Builder shall prepare plan sheets in accordance with Section 2.12, Plans Preparation and Project Documentation, *the I-405 Congestion Relief and Bus Rapid Transit Project, CADD Standards Manual*, WSDOT *Plans Preparation Manual* and WSDOT *Bridge Design Manual*. All submittals addressed herein shall include a complete electronic copy of the Microstation files for the plans submitted.

2.11.5.2 Additional Design Summary Plans

2.11.5.2.1 Channelization Plans for Approval Package

The Design-Builder shall develop and obtain WSDOT approval for Channelization Plan for Approval Packages for both the full Kirkland Stage 1 (MP 18.10 to MP 20.08) and the Kirkland Stage 2 SPUI at NE 116th Street. The packages shall be developed and reviewed to meet the requirements of Section 2.28.3 and the Quality Management Plan. The Channelization Plan for Approval Package for the Kirkland Stage 2 SPUI at NE 116th shall cover from MP 19.1 to 20.0, and all of the improvements along NE 116th Street including intersection modifications. The Approved Packages will be utilized by WSDOT for their Project Documentation. The Channelization Plan for Approval Package shall include the following:

- Package Cover with signature blocks
- Channelization Plan Design Summary
- Alignment/Right-of-Way Plans
- Roadway Sections
- Pavement Marking Plans (with Raised Island Sketches)

The Channelization Plan for Approval Package shall be submitted for review and comment by WSDOT at the following levels of development with the related Design Development Package.

- Draft Package shall be submitted at 60 percent Design Development
- Revised Package at 90 percent Design Development
- Final Package with Final Design Submittal Package

The Kirkland Stage 1 Channelization Plan for Approval Package shall be revised and resubmitted for approval for any revisions made during final design and construction. The Channelization Plans for Approval Package shall show entire roadway width to the following horizontal limits. On State highways, where new channelization matches with existing highway sections, show no less than 300 feet of the existing highway section beyond the match line(s) with all elements listed below. On intersecting roads and commercial and multi-residential driveways, show no less than 100 feet of the existing section beyond the match line(s) with all elements listed below.

All Channelization Plan for Approval Package plan sheet submittals shall be one full size (22 inches x 34 inches, horizontal scale 1 inch = 50 feet) and two half size (11 inches x 17 inches, horizontal scale 1 inch = 100 feet) white paper copies of the Alignment Plans, Roadway Sections and Pavement Marking Plans. The final submittal for Approval shall also include full size paper copies bearing the stamp/seal and original signature of the PE.

2.11.5.2.1.1 ***Package Cover***

The Channelization Plan for Approval package shall include a cover sheet that shall includes the following:

- Complete Project Title
- Begin and End Mile post for Segment of Roadway
- Signature block for WSDOT approval.
- Washington State PE stamp / seal of supervising/design engineer (to be signed and dated prior to WSDOT approval).

2.11.5.2.1.2 ***Channelization Plan Design Summary***

The Channelization Plan for Approval package shall include a Channelization Plan Design Summary that shall include the following:

- Posted Speed, Design Speed, and Design Vehicle
- Highway Classification and Design Matrix used
- Channelization-related Design Deviations, Evaluate Upgrades and Design Exceptions callouts/notes. Channelization Plan Package cannot be approved until these deviations and/or EU's are approved.

2.11.5.2.1.3 ***Alignment/Right of Way Plans, Roadway Sections and Pavement Marking Plans***

The Alignment/Right-of-Way Plans, Roadway Sections and Pavement Marking Plans shall be prepared in accordance with the *I-405 Congestion Relief and Bus Rapid Transit Project. CADD Standards Manual* and WSDOT *Plans Preparation Manual*, and the following elements shall be included:

- Project Title w/ State Route Number, Begin / End Mileposts, County, Date and Page

Number in Title block

- North arrow, section, township, and range
- Street and highway names
- Right-of-way lines (WSDOT, County, and/or City)
- Construction centerline bearing and 100 foot stations
- Curve data for each curve (curve radius, superelevation rate, curve and tangent lengths, delta angle, PC station, PI station, & PT station)
- All lane lines and edge of pavement lines
- Intersecting roadways and driveways - at least 100 feet and identify business name and description.
- Angles between intersections and or bearings of all centerlines at intersections
- Widths of through lanes, turn lanes, and shoulders
- Begin and end stations of right and left turn storage lanes. (Indicate recommended storage lengths in Traffic Analysis)
- Begin and end stations with offsets for all channelization tapers and stripes
- Left and right turn radii for intersections and commercial and multi-residential driveways
- Typical roadway sections showing all channelization features with dimensions (i.e. travel lanes, turn lanes, medians, shoulders, curb and gutter, bike lane, sidewalk etc.)
- Existing and proposed raised curbing
- Raised and painted islands. Separate sketch showing detail of islands including offsets of key locations from reference lines. Also indicate square footage of islands.

2.11.5.2.2 Kirkland Stage 2 SPUI at NE 116th Street – Roadway Profiles, Sections and Deviations

In addition to the Channelization Plans for Approval Package, the Design-Builder shall provide for review and comment, the roadway profiles, roadway sections and Design Deviations for the Kirkland Stage 2 SPUI at NE 116th Street. Roadway profiles and typical sections shall be supplied for NB and SB I-405 (MP 19.1 to MP 20.0), all the SPUI ramps, NE 116th Street and all local roads shown on the Kirkland Stage 2 Pavement Marking Plan (See Appendix M1). The Design Deviations shall be prepared as described for Additional Deviations in Section 2.4 of the Technical Specifications. The Kirkland Stage 2 roadway profiles, roadway typical sections and Design Deviations shall be submitted at the 60 percent, 90 percent and Final Design submittal with the Channelization Plan for Approval Package for WSDOT's review and comment as described in Section 2.28.3 of the Technical Specifications and the Quality Management Plan. The Design Deviations for the Kirkland Stage 2 SPUI must be approved by WSDOT for the Kirkland Stage 2 Channelization Plan for Approval Package to be approved. The Roadway profiles and sections for the Kirkland Stage 2 SPUI package shall be submitted on 11-inches x 17-inches, white bond paper. The profiles and sections shall be prepared in accordance with WSDOT *Plans Preparation Manual*.

2.11.5.3 Reports and Summaries

2.11.5.3.1 Clear Zone Inventory

The Design-Builder shall develop and furnish a Clear Zone Inventory in accordance with the requirements of Section 700 of WSDOT *Design Manual*. All objects within the clear zone shall be

addressed as described in the *Design Manual*. The Design-Builder shall make revisions requested by WSDOT. This Design Document will be utilized by WSDOT for their Design Summary Documentation.

2.11.5.3.2 Design Decision Memorandum

The Design-Builder shall develop and furnish, at a minimum, Design Decision Memorandums to document decisions made during completion of the design regarding components not covered by Mandatory Standards.

2.11.5.3.3 Calculations

The Design-Builder shall prepare calculations in support of the design and the Quality Control and Quality Assurance Plan. Complete sets of the calculations to support all designs shall also be included with each design review submittal. The original signature, date of signature, original seal, license number, and date of expiration of a Professional Engineer licensed in the State of Washington shall appear on the cover of all calculations. The cover page shall include the contract number, contract title, and sequential index to calculation page numbers. The calculations shall include but are not be limited to the following:

- Horizontal and Vertical Stopping Sight Distance
- Superelevation transition runout
- Profile tie-in calculation at point of beginning and end of alignments
- Channelization taper rate calculations
- Intersection entering sight distance
- Calculations establishing horizontal and vertical curve stationing, curve delta, radius, tangent and curve length, northing and easting coordinates at all curve points shall be provided unless alignments are created using Certified Civil Engineering software such as Inroads or equivalent
- Barrier length of need calculations
- Vertical clearance
- Barrier flare rate calculation and determination.

All geometric calculations shall be revised and updated prior to Substantial Completion to reflect the as-constructed geometry.

2.11.5.4 Design Summary Documentation

The Design-Builder shall develop and furnish the following Design Summary Documentation according to WSDOT *Design Manual* and Section 2.12 of the Technical Specifications. The Design Summary Documentation shall include, but will not be limited to:

- New Deviations not included in this RFP, and Deviations modified by Design-Builder
- Barrier and impact attenuator justification memoranda
- Design Decision Summaries
- Completed Design Parameter Tables – At a minimum one set (Mainline, Off-ramp/On-ramp, CD, and Local Road) must be completed for each interchange included in the Design-Build contract.

End of Section

2.12 PLANS PREPARATION AND PROJECT DOCUMENTATION

2.12.1 GENERAL

The Design-Builder shall conduct all Work necessary to complete the design and construction documentation in coordination with all other elements of Work required by the Contract.

2.12.2 MANDATORY STANDARDS

The following is a list of mandatory standards that shall be used in preparation of the plans and project documentation. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a complete list, and other applicable publications may be required to complete all the elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. WSDOT's interpretation and decision shall be final.

2.12.2.1 Mandatory Standards

- WSDOT *Design Manual*, including instructional letters (DM) (M22-01)
- WSDOT *Bridge Design Manual* (M23-50)
- WSDOT *Highway Runoff Manual* (HRM) (M31-16)
- WSDOT *Environmental Procedures Manual* (EPM) (M31-11)
- Project Design Documentation Package Checklist (Design Document Checklist), included in Appendix O3
- WSDOT Project Delivery Memorandum, #04-04 – High Visibility Construction Fencing
- *I-405 Congestion Relief and Bus Rapid Transit Project*, CADD *Standards Manual* (I-405 CADD Standards)
- WSDOT *Plans Preparation Manual (PPM)* (M22-31)
- WSDOT *Standard Plans*
- City of Kirkland *Pre-Approved Plans and Policy*, City of Kirkland (2000)
- WSDOT *Standard Item Table*
- WSDOT *Qualified Products* List (QPL) (M46-02)

2.12.3 PERFORMANCE REQUIREMENTS

The Design-Builder shall prepare Design Documentation as described in Section 1-11.8 and according to the Quality Management Plan. The Design-Builder shall prepare all design and construction documentation necessary to complete and get approval of the Design Document Package (DDP) and the Project File (PF) in accordance with WSDOT *Design Manual*. The plans and documentation shall be submitted for review in accordance with the Quality Management Plan.
The Design-Builder shall prepare all plans in accordance with the *I-405 Congestion Relief and Bus Rapid Transit Project, CADD Standards Manual*, WSDOT *Plans Preparation Manual*, and WSDOT *Bridge Design Manual*, except as required in the individual sections of the RFP. Drawings shall be submitted on 11-inch x 17-inch white paper. All plan view drawings, except the Vicinity Map and Bridge Plans, shall use a drawing scale of 1 inch equals 100 ft., except as required by other sections of the RFP. The Bridge Plan shall use a drawings scale defined in Section 1110 of WSDOT *Design Manual*. The vicinity map shall use the most appropriate scale according to Section 460.03 of

WSDOT *Plans Preparation Manual.* Details and supplemental drawings shall use an architectural or engineering scale between 3/8 inch equals 1 ft. and 1 inch equals 100 ft. The Design-Builder shall prepare plans that are similar in appearance and content to the "Contract Plan Examples" in WSDOT *Plans Preparation Manual.* Variations are anticipated as a result of design-build delivery, and the Design-Builder shall meet with WSDOT to identify variations in plan content and format. The Design-Builder shall produce plans and specifications in a format that aids and facilitates review by WSDOT.

2.12.3.1 Released For Construction Documents

Released for Construction Documents shall constitute the documents issued for the purposes of construction as stated in Section 1-05.3 and prepared in compliance with the Quality Management Plan and submitted according to 2.28.6.3.3. The Design-Builder shall indicate the submittal dates of the Released for Construction Documents in the Project schedule. The Design-Builder shall submit all special provisions, test plans, monitoring plans, shop drawings, etc. that are necessary to construct the Work as Released for Construction Documents.

2.12.3.2 As-Built Documents

The As-Built Documents shall be submitted according to 2.28.6.3.4 and shall include:

- RFC Plans revised to show as-constructed conditions
- Shop drawings
- Design calculations
- Reports/Project documentation
- Special provisions
- As-Built Documents shall include all base mapping (topography), design plans (including shop drawings), design calculations, design reports, specifications, electronic CADD data.
- The Design-Builder shall ensure that all title blocks of calculation sheets include the calculation title, file number, page number, initials of the designer and the checker, and dates of design and checking.
- The Design-Builder shall ensure that all calculations indicate the design requirement, the assumptions made, the methods used, the source of the information, and the cross-reference for the applicable design drawings.
- The Design-Builder shall ensure that all Structure calculations and Bridge rating calculations performed using software are independently checked by a Professional Engineer licensed in the State of Washington. The Design-Builder shall ensure that hand calculations are verified.
- The Design-Builder shall ensure that all calculations are readily accessible, clear, understandable, concise, complete, and accurate.
- The Design-Builder shall ensure that all calculations are bound and numbered with a table of contents.
- The Design-Builder shall ensure that all calculations identify the code or standard utilized and indicate the specific section referenced in the right hand column.
- The Design-Builder shall reference in the calculations the computer programs used.
- The Design-Builder shall ensure that all manual calculations are printed, neatly and legibly, on 8 ½ inch x 11 inch or 11 inch x 17 inch standard computation sheets.

- The Design-Builder shall ensure that the As-Built Documents reflect the actual condition of the constructed Work.

2.12.3.3 Shop Drawing Submittals

The Design-Builder shall submit shop drawings in accordance with RFP Sections 2.28 for review and comment by WSDOT. The following information shall be included in the shop drawings (if applicable).

- Material specifications (ASTM specifications, class, type, coatings, etc.)
- Copies of manufacturer's literature, including manufacturers installation, handling and maintenance recommendations
- Sizes
- Pipe bedding and jointing methods. Pipe loading and stress calculations. Drain and culvert camber calculations with final bedding profiles. Any pipe jacking/boring installations will require specific pipe material and installation methodology submittals to be prepared in full detail along with the necessary geotechnical investigations/recommendations
- Structure types (pre-cast or cast-in-place)
- Structure forming and rebar details, along with supporting calculations
- Complete material submittals for approval if material is not on the approved material list
- Installation procedure.

Shop Plans shall be marked by WSDOT with one of two categories in lower right corner. Shop Plans marked Approved-As-Noted by WSDOT shall clearly note the corrections.

- APP'D (Approved, No Corrections required)
- AAN (Approved as noted- minor corrections only. Do not place written questions on an approved as noted sheet).

2.12.3.4 Design Revisions During Construction

Calculations for design revisions made during construction shall be incorporated into the design/check calculation file when construction is completed.

Whenever new plan sheets are required as part of a construction revision, the information in the title blocks of these sheets must be identical to the title blocks of the contract they are for.

Every revision will be assigned a number. The revision number shall be assigned sequentially, with each change in a document or plan sheet identified by the revision number. The assigned number shall be located both at the location of the change on the sheet and in the revision block of the plan sheet along with an explanation of the change.

The Design-Builder shall prepare all new and revised plan sheets in accordance with the *I-405 Congestion Relief and Bus Rapid Transit Projects CADD Standards Manual* and the WSDOT *Plans Preparation Manual*, Section 440 through 460, and Division 5 and 6. Plans shall be submitted with a copy in pdf electronic format on a CDROM.

Any proposed design changes requiring permit modifications or additional regulatory/resource agency approvals shall first be submitted for review by WDOT. WSDOT will work with the Design-Builder and the appropriate regulatory/resource agencies should an approved design change require a permit modification or additional approvals.

2.12.4 Not Used

2.12.5 Submittals

2.12.5.1 Plans

The Design-Builder shall prepare Released for Construction (RFC) Plans in accordance with the requirements of the Technical Specifications, the *I-405 Congestion Relief and Bus Rapid Transit Project CADD Standards Manual*, Section 440 through 460, and Division 5 and 6 of WSDOT *Plans Preparation Manual*, the WSDOT *Bridge Design Manual* and the Quality Management Plan. The following table identifies which drawing elements shall be submitted at each of the Design Reviews specified in Section 2.28.3 of this RFP.

Drawing Set	30%	60%	90%	Final (RFC)
Index Sheet(s)	X	X	X	X
Vicinity Map		X	X	X
Roadway Sections	X	X	X	X
Roadway Details (shoulder, barrier, fencing, and misc. details)		X	X	X
Alignment/Right-of-Way Plans	X	X	X	X
Site Preparation Plans		X	X	X
Site Preparation Details			X	X
Roadway Profiles	X	X	X	X
Temporary Erosion and Sediment Control		X	X	X

Drawing Set	30%	60%	90%	Final (RFC)
(TESC) Plans (shall include all stages of construction)				
Temporary Erosion and Sediment Control (TESC) Details		X	X	X
Drainage Plans	X	X	X	X
Drainage Profiles		X	X	X
Drainage Details			X	X
Irrigation Plans (1)		X	X	X
Irrigation Details (1)			X	X
Landscape Plans and Details			X	X
Contour Grading Plans (contours may be included on Drainage Plans if drainage sheets remain legible		X	X	X
Paving Plans		X	X	X
Paving Details			X	X
Pavement Marking Plans and Details	X	X	X	X
Minor Structures (retaining walls, etc.) Details		X	X	X
Illumination Plans		X	X	X
Illumination Details		X	X	X
Traffic Signal Plans		X	X	X
Traffic Signal Details			X	X
Intelligent Transportation System Plans		X	X	X
Intelligent Transportation System Details		X	X	X
Sign Specification Sheet			X	X
Signing Plans		X	X	X
Signing Details			X	X
Bridge General Layout Plan	X	X	X	X
Bridge Plans, Details and Bar List		X	X	X

(1) As required by the Technical Specifications.

Additional sheets shall be included to detail shoulder rounding, roadside barrier placement, ditch sections, and other site specific features or items that are incorporated into the design but are not included in WSDOT *Standard Plans*.

2.12.5.2 Not Used

2.12.5.3 Reports and Summaries

2.12.5.3.1 Design Decision Reports

The Design-Builder shall develop and furnish Design Decision Reports to document decisions made during completion of the design regarding components not covered by Mandatory Standards.

2.12.5.3.2 Calculations

The Design-Builder shall prepare calculations required by individual Technical Specification Sections to support the quality needs of the Quality Management Plan. All calculations shall be revised and updated to reflect the as-constructed condition.

2.12.5.4 Design Documentation Package

The Design-Builder shall develop and furnish the Design Document Package (DDP) including all of the elements identified in the DDP Checklist included in Appendix O3. The elements in the DDP Checklist shall be developed in accordance with the Technical Specifications, WSDOT *Design Manual* and the Quality Management Plan. The Design-Builder shall submit a draft version of the DDP Checklist identifying how each item will be submitted (e.g. report, plan sheet element, Design Parameter element, etc.) for review and comment at the levels of development specified for construction documents in Section 2.28.3.2. Each submittal shall address any previous comments and shall provide the development status of each DDP item (e.g. complete, in progress, or not started). The Final Design submittal shall include all the DDP items, completed, with a DDP Checklist that identifies how each item is included. The DDP Checklist, included in Appendix O3, indicates that some of the DDP items have components that were started by WSDOT, but will require the Design-Builder to complete or update the item. It is the Design-Builder's responsibility to obtain copies of the information from WSDOT in completing the DDP items. The Design-Builder shall provide updates to the DDP items as any changes are implemented after the Final Design submittal and during construction. The DDP must be approved by WSDOT before Final Acceptance.

End of Section

2.13 BRIDGES AND STRUCTURES

2.13.1 GENERAL

The Design-Builder shall conduct all Work necessary to meet the requirements of permanent and temporary structures, including, but not limited to the bridges carrying I-405 over NE 116th Street, the I-405 crossing of Forbes Creek, the removal and replacement of the overlay on the bridges carrying I-405 over the BNSF Railway (WSDOT Bridge No. 405/56E and WSDOT Bridge No. 405/56W), retaining walls, noise walls, barriers, box culverts, pipes, precast concrete arches, sign structures, lighting structures, stormwater vaults, and structure renovations. Bridges and other structures shall be designed and constructed to provide a complete and functional system that provides functionality, durability, ease of maintenance, safety, and a pleasing aesthetic theme.

2.13.2 MANDATORY STANDARDS

The following is a list of publications that shall be used for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list and other applicable publications may be required to complete all design. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

- WSDOT *Design Manual* (M22-01); including all revisions and supplements
- WSDOT *Bridge Design Manual* (WSDOT BDM) (M23-50) *
- WSDOT *Geotechnical Design Manual* (WSDOT GDM) *
- WSDOT *Maintenance Manual* (M51-01)
- AASHTO *LRFD Bridge Design Specifications*, U.S. Units, Third Edition, 2004
- *I-405 Congestion Relief and Bus Transit Project, CADD Standards Manual*
- WSDOT *Plans Preparation Manual* (WSDOT PPM) (M22-31)
- WSDOT *Construction Manual* (M41-01)
- AASHTO *LRFD Bridge Construction Specifications*, U.S. Units, First Edition, with 1999, 2000, 2001, 2002, and 2003 interim revisions
- WSDOT *Materials Manual* (M46-01)
- Special Provisions to WSDOT *Standard Specifications for Roads, Bridge and Municipal Construction* (See Appendix B1 of this RFP)
- Amendments to WSDOT *Standard Specifications for Roads, Bridge and Municipal Construction* (see Appendix B2 of this RFP)
- WSDOT *Standard Specifications for Roads, Bridge and Municipal Construction* (M41-10)*
- WSDOT *Standard Plans for Road, Bridge, and Municipal Construction* (M21-01) English
- WSDOT *Qualified Products List* (M46-02)
- AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals, Fourth Edition with 2002 and 2003 interim revision*
- AASHTO *Guide Specification for Structural Design of Sound Barriers, 1989 with 1992 and 2002 interim revisions.*

- Bridge Welding Code: *AASHTO/AWS D1.5M-D1.5: 2002, An American National Standard with 2003 interim revisions*
- AASHTO *Manual for Condition Evaluation of Bridges, Second Edition with 2001 and 2003 interim revisions.*

*Document modified for Design-Build

2.13.3 PERFORMANCE REQUIREMENTS

2.13.3.1 General

The Design-Builder shall obtain all necessary permits for demolition and excavation in accordance with Section 2.8 Environmental prior to the start of any demolition and excavation activities.

The Design-Builder may propose revisions of the bridge and structures design shown in the Kirkland Stage 1 and Kirkland Stage 2 Conceptual Plans. However, any deviation from the Conceptual Plans in Appendix M1 may require changes to the right-of-way, Environmental Documents, and Permits that have been approved for this Project. If any such changes are proposed and revisions are required to the right-of-way, Environmental Documents, or permits, the Design-Builder shall bear the responsibility for all the cost and schedule adjustments made necessary by the same. If the Design-Builder's proposed changes are approved, all the work elements described herein shall be completed for the approved changes in accordance with the Scope of Work and the Quality Control and Quality Assurance Plan.

2.13.3.2 I-405 Over NE 116th Street

The Design-Builder shall comply with the bridge geometrics shown in Table 13.1.

Table 13.1
New Bridge Geometrics

Bridge No.	Location	No. of Lanes	Lane Width (ft)	No. of Shoulders	Shoulder Width (ft)	Minimum Vert. Clearance (ft)
405/55W	I-405 SB over NE 116th Street	5	12.00	2	10.00 Lt 10.00 Rt	16.5
405/55E	I-405 NB over NE 116th Street	5	12.00	2	10.00 Lt 10.00 Rt	16.5

The overall bridge length, span lengths, vertical clearance, and other pertinent geometrics of both WSDOT Bridge Nos. 405/55W and 405/55E shall each be set to accommodate a Stage 2 sixth lane and HOV buffer (16-foot total widening) and the future single point urban interchange (SPUI) at NE 116th Street as shown on the conceptual bridge sheets included in this RFP. The Stage 2 superstructure widening (bridge deck and girders) will be accomplished by others in the future unless constructed by the Design-Builder for construction staging. No bridge supports shall be placed within the footprint of the future single point urban interchange for the proposed or widened structure. Bridge supports shall be located to provide adequate sight distance per Section 2.11.4.1.1 for the widened structure.

The minimum required vertical clearance over NE 116th Street is 16.5 feet for all bridges and construction elements. The proposed bridge shall provide a minimum vertical clearance of 16.5 feet in the Stage 2 widened condition, assuming the future superstructure depth matches the proposed superstructure depth.

The Design-Builder shall accommodate the proposed Stage 2 sixth lane (16-foot widening) of I-405 in both the northbound and the southbound direction when setting the final location of the retaining walls.

The retaining walls and substructure shall extend between WSDOT Bridge No. 405/55W and WSDOT Bridge No. 405/55E to provide for the Stage 2 widening and shall retain the fill between the bridges. The Design-Builder may construct the superstructure widening (bridge deck and girders) if needed for construction staging. The Design-Builder shall construct the abutments to their full width required for the Stage 2 widened condition. A temporary concrete barrier shall be anchored to the bridge slab, at the end of the Stage 1 construction, to separate traffic from the Stage 2 widening area if the superstructure Stage 2 is built by the Design-Builder.

2.13.3.3 I-405 Over the BNSF Railway

The Design-Builder shall remove and replace the bridge deck overlay on existing WSDOT Bridge No. 405/56E and No. 405/56W in its entirety. This work will consist of removing the existing overlays, scarifying the bridge decks, preparing and repairing the bridge deck surfaces, and placing, finishing, and curing the deck overlays. For these overlays, the Design-Builder shall use a Modified Concrete Overlay, a Rapid Set Latex Modified Concrete Overlay, or a Polyester Concrete Overlay as defined in the Standard Specifications and modified by the Project Special Provisions and Amendments. Polymer Overlays shall not be permitted.

A Witness Point shall be provided for the identification of all bridge deck areas requiring repair. A Hold Point shall be provided upon completion of the deck repairs and prior to the placement of the new bridge deck overlay.

For the purpose of receiving a common proposal from all proposers, the Design-Builder shall include in the bid, a volume of "Further Deck Preparation" equal to 10 percent of the area of the bridge decks times 2-inches of depth. If, in the opinion of WSDOT, the quantity of "Further Deck Preparation" exceeds this volume, additional compensation will be by force account in accordance with Section 1-09.6 of the Standard Specifications.

All reinforcing steel damaged due to the Design-Builder's operations shall be repaired by the Design-Builder. Damage to existing reinforcing steel shall be repaired and paid for in accordance with Section 1-09.6 of the Standard Specifications if the existing concrete cover is one-half inch or less. All other reinforcing steel damaged due to the Design-Builder's operations shall be repaired by the Design-Builder at no additional expense to WSDOT in accordance with Section 6-09.3(5)F of the Standard Specifications.

2.13.4 Design and Construction Criteria

2.13.4.1 Personnel Requirements

The Design-Builder shall provide a Structural Lead Engineer with a minimum of ten (10) years of experience in the design and construction of bridges, retaining walls, and other highway-related structures. This individual shall be a Structural Engineer licensed in the State of Washington and shall be in responsible charge of the structural design elements of the Project.

2.13.4.2 Design Criteria

All new permanent bridges shall be designed using Load-and-Resistance Factor Design (LRFD) as

defined in the WSDOT *BDM* and the AASHTO *LRFD Bridge Design Specifications*.

All retaining wall foundations shall be designed in accordance with Section 2.6 Geotechnical Design.

All structures shall be designed for a peak ground acceleration of 0.30 and a Type II soil profile response spectrum with a site coefficient of 1.2.

The Design-Builder shall utilize the Mandatory Standards with the Design Criteria listed below in developing the design of the Project. If any of the Design Criteria are deemed not achievable, the Design-Builder shall submit to WSDOT clear documentation of what cannot be achieved and a proposed alternative for review.

All designs shall conform to the latest Americans with Disabilities Act Accessibility Guidelines Title I and II.

A minimum vertical clearance of 16.5 feet shall be maintained over all roadways at all times during construction except for locations where the existing clearance is less than 16.5 feet in which case the existing clearances must be maintained.

Creosote treated wood shall not be used for any temporary or permanent instream structures.

2.13.4.2.1 Bridge Design Criteria

Bridge types allowed are as follows:

- Prestressed concrete girders
- Spliced prestressed concrete girders
- Steel plate girders
- Steel box girders
- Cast-in-place concrete slab spans
- Post-tensioned concrete slab spans
- Reinforced concrete box girders
- Post-tensioned concrete box girders
- Prestressed concrete tub girders.

The Design-Builder shall not use rolled steel beams, deck bulb-tee girders (including thin flange deck bulb tee girders), Tri-beam sections, double tee girders, or precast slabs for permanent structures. The Design-Builder shall not use masonry, timber, aluminum (with the exception of pedestrian rail), or lightweight concrete as materials for permanent bridge superstructures or substructures.

The Design-Builder shall not design bridges with intermediate hinges. A minimum of three girders shall be used to provide redundant load path structures. The superstructure shall not be fracture critical.

Girders shall be designed to carry the weight of the fluid concrete deck as well as their own weight without shoring.

The criteria for deflection listed in AASHTO *LRFD Bridge Design Specifications*, Section 2.5.2.6.2 shall not be considered optional and shall be met for all permanent structures.

All bridges carrying I-405 shall be classified as essential bridges as defined in Section 3.10.3 of the AASHTO *LRFD Bridge Design Specifications*.

2.13.4.2.2 Temporary Bridge Design Criteria

"Temporary bridge" refers to any bridge or portion of bridge that will not remain upon completion of the contract.

All temporary bridges carrying I-405 shall be designed for an HL-93 live load.

All temporary bridges shall be designed to have live load deflection less than L/800 as defined by AASHTO.

The following components will be allowed for temporary bridge construction:

- The Design-Builder may use abutments supported on or adjacent to MSE walls. The Design-Builder may use steel sheet piling walls or timber lagging between piling for abutments.
- The Design-Builder may use timber piles at abutment foundations for temporary bridges.
- The Design-Builder may use glue-laminated or nail-laminated timber deck panels or precast concrete deck panels for construction of the deck. Previously used deck panels can only be used with the acceptance of WSDOT. No transverse cracks and only minor defects to the surface of the members will be allowed.
- The Design-Builder shall overlay deck panels with a minimum of 2-inch-thick HMA wearing course. The minimum cross-slope of the HMA wearing course shall be 0.01 ft./ft.
- The Design-Builder shall use either steel or concrete beams in the superstructure.
- The Design-Builder may use salvaged structural members meeting the following conditions:
    - The Design-Builder shall provide documentation showing that the structural members meet all appropriate material properties for their intended function, such as: dimensions, yield strength, tensile strength, ductility, toughness, chemical composition, weldability, and corrosion resistance. Material testing of the structural members may be required in order to provide assurance that the appropriate requirements of material properties have been met.
    - Salvaged steel beams shall have no areas of detrimental section loss due to corrosion.
    - All holes in structural members shall be less than 1-inch in diameter and shall be round.
    - All shop and/or field splices shall be bolted.
    - Salvaged prestressed concrete beams shall have no exposed strands and no defects, spalls, or cracks deeper than 1-inch. Beam design sheets shall be provided indicating concrete strength, strand type and pattern, shear reinforcement, and other pertinent information.
- The Design-Builder will be allowed to use deck bulb-tee girders, double tee girders, tri-beam sections, or precast slabs for temporary bridges only.
- The Design-Builder shall use temporary barriers meeting WSDOT *Design Manual* Section 710 and WSDOT BDM.
- The Design-Builder shall design temporary bridges in accordance with applicable sections of the AASHTO *Guide Design Specifications for Bridge Temporary Works*. The Design-Builder shall follow the required geometric, lateral clearance and vertical clearance requirements except as modified herein.

- Portions of temporary bridge structures to be incorporated into the permanent structures shall be designed by the Design-Builder to permanent structure standards.
- The Design-Builder may temporarily widen existing bridge structures when required. The temporary widened portion shall meet the requirements for temporary bridge construction.
- The erected temporary bridge shall be reviewed in the field by the Design-Builder's Engineer responsible for design for compliance with the Released for Construction plans. Any variation between design assumptions and actual details of the erected bridge shall be brought to the attention of WSDOT. The Design-Builder's Structural Lead Engineer responsible for design shall review and approve the variations.
- Maintenance of temporary bridges shall be the Design-Builder's responsibility.

2.13.4.2.3 Demolition

The Design-Builder shall determine if asbestos-containing materials or lead-based paint are present in structures prior to demolition activities. The Design-Builder shall follow applicable federal, state, and local regulations and guidelines pertaining to the handling and disposal of these materials if any of the structures to be demolished are found to contain these substances.

2.13.4.2.4 Retaining Wall Design Criteria

Wall type selection and design by the Design-Builder shall meet all applicable requirements including, but not limited to, those related to Visual Quality Management, Utilities, Lighting, Signage, Geotechnical Engineering and Landscaping.

For reinforced concrete retaining walls, geosynthetic retaining walls, and gabion walls, the Design-Builder shall use standard walls as shown in WSDOT *Standard Plans for Road, Bridge, and Municipal Construction*. The retaining wall standard plans can be modified by the Design-Builder, as necessary, to meet visual quality requirements for the Project. Visual quality requirements shall not adversely affect the strength and safety requirements of the retaining walls.

Refer to the Appendix L, *I-405 Urban Design Criteria for Kirkland Stage 1* and Section 2.15 Roadside Restoration Design (Landscaping and Aesthetics) for additional requirements.

The Design-Builder shall meet the settlement criteria and minimum factors of safety for retaining wall design as outlined in WSDOT *GDM*.

Fall protection, such as safety cable railing, shall be provided at the top of all retaining walls and retaining wall terraces greater than 10 feet in height. Fall protection shall have a minimum height of 42-inches above the top of the retaining walls and retaining wall terraces and shall meet the requirements of WAC 296-155-24510.

2.13.4.2.5 Temporary Retaining Wall Design Criteria

"Temporary retaining wall" refers to any wall or portion of wall that will not remain upon completion of the contract.

The Design-Builder shall design temporary retaining walls in accordance with applicable sections of the AASHTO *Guide Design Specifications for Bridge Temporary Works*. Structural components of temporary retaining walls may be reused as part of permanent retaining wall systems, provided all of the structural support elements and materials of the temporary retaining walls meet the requirements of permanent structure standards. Timber piles are allowed as foundations for temporary retaining walls. Maintenance of temporary wall structure shall be the Design-Builder's responsibility.

Temporary retaining walls constructed of materials not approved for permanent walls may be

abandoned and left in place by the Design-Builder, on the condition that the temporary walls are no longer required for ground support or accepted permanent retaining walls are constructed to replace them. Temporary retaining walls left in place shall be completely covered by soil or construction material in accordance with Section 2-02 of the Standard Specifications, except that temporary retaining wall structures constructed of treated timber shall not be buried but shall be removed entirely.

2.13.4.2.6 Noise Wall Design Criteria

Noise wall type selection and design by the Design-Builder shall meet all applicable requirements including those related to Environmental Compliance, Visual Quality Management, Utilities, Lighting, Signage, CSS, and Landscaping. The Design-Builder shall use standard noise walls as shown in the Standard Plans when the site foundation conditions meet minimum allowable bearing pressures for spread footings or minimum strength requirements for shaft foundations. For noise walls falling outside the limits of the Standard Plans, the Design-Builder shall design the noise walls to the Mandatory Standards. The noise wall standard plans shall be modified by the Design-Builder, as necessary, to meet visual quality requirements for the Project. (See Section 2.15.4.5). Visual quality requirements shall not adversely affect the strength and safety requirements of the noise walls. Refer to the Appendix L, *I-405 Urban Design Criteria for Kirkland Stage 1* for required aesthetics for noise walls. Noise walls (including doors and vehicular accesses) shall be Type A (wind speed of 80 mph and Exposure B1) as designated in WSDOT *Design Manual*. Location of noise walls is shown in conceptual plans in Appendix M1.

The Design-Builder shall provide fire hydrant access openings adjacent to fire hydrant locations as authorized by WSDOT and each responsible local fire marshal having jurisdiction. Openings shall be provided as specified in the Standard Plans and locations shall be readily accessible to both emergency vehicles and water supply service lines. Fire hydrant signs shall be attached to access doors as required by the local fire marshal having jurisdiction.

Final alignment tolerances shall be within 1/2 inch in 10 feet.

For maintenance of the surface of noise walls greater than 10 feet in height, harness tie-offs for the fall protection shall be provided and shall meet the requirements of WAC 296-155-24510.

Grading and drainage shall be constructed to prevent the collection of water runoff on either side of noise walls.

2.13.4.2.7 Culverts and Precast Concrete Arches

For structural plate culverts, the Design-Builder shall use the standard structural plate culvert interior, headwall, and end sections included in the Standard Plans. The Design-Builder shall not use corrugated steel structures with a span greater then 26 feet.

The Design-Builder may use precast or cast-in-place concrete interior, headwall, and end sections in accordance with the requirements stated in WSDOT *BDM*. Timber piles shall not be used as foundations for culverts or precast concrete arches.

2.13.4.2.8 Bridge Inspection Access

All bridge superstructures, joints, and bearings shall be made accessible by the Design-Builder for inspection and maintenance. These elements shall be designed and detailed by the Design-Builder to allow for replacement of joints and bearings. Jacking loads shall be 200 percent of the calculated lifting load.

Open-framed superstructures shall be accessible by ladder or a "Snooper" (under-bridge inspection) truck.

Box girders with an inside depth of 4 feet or more shall be made accessible for interior inspection during and after construction. Access doors shall be lockable, shall swing into the box girders, and shall be placed at locations that do not impact traffic under bridges. Lock box hatches shall be installed on all access doors accessible from ground level. All box girders requiring interior access shall include florescent inspection lighting and outlets within the interior of the box girder. Light switches shall be located inside the box girders at each access door. Outlets shall be 120 volts plus 20 amps. Box girder access doors shall prevent access of vermin.

Box girders containing utilities shall be made accessible for interior inspection and maintenance.

The Design-Builder shall strip and remove all falsework and formwork from bridges including the interior of box girder cells with the exception of interior of concrete box girders with an inside depth less than 4 feet and not containing utilities.

2.13.4.2.9 Bridge Load Ratings

The Design-Builder shall load rate all new, widened, and rehabilitated vehicular bridges and all storm water vaults with vehicular loads. A load rating report as described in Section 14.4 of WSDOT *BDM* shall be completed and submitted to WSDOT before the bridge is opened to vehicular traffic.

The Design-Builder shall provide the load rating in BRIDG software format, using system input. If BRIDG is not suitable for a specific bridge type rating, then another commercially available bridge rating software acceptable to WSDOT may be used.

2.13.4.2.10 Aesthetics

The Design-Builder shall design and construct all Work in compliance with the I-*405 Urban Design Criteria for Kirkland Stage 1*. Refer to Section 2.15 Roadside Restoration Design (Landscaping and Aesthetics) for other requirements.

*2.13.4.2.11*Prestressed and Post-Tensioned Concrete Girders

Prestressed concrete I-beams shall be Washington standard prestressed girder sections as shown in WSDOT *BDM* and the *Standard Plans*.

Continuity reinforcement at intermediate piers shall be provided in the bridge deck to resist negative moments due to live load and superimposed dead loads.

Prestressed concrete girders shall be designed by the Design-Builder to have the same depth in all spans. Prestressed concrete girders without post-tensioning shall be designed as simply supported girders (with no continuity). Under service limit state, the tensile stresses in the precompressed tensile zone shall be limited to zero.

Match cast joints shall be bonded with an epoxy bonding agent. Dry cast joints are not acceptable. Drain holes shall be provided in the post-tensioning ducts at all low points along the tendon. Vent points shall be provided in the post-tensioning ducts at all high points along the tendon.

2.13.4.2.12 Steel Plate and Steel Box Girders

AASHTO M 270, Gr. 36W, Gr. 50W or Gr. 70W shall be used for steel plate and steel box girders. All structural steel shall be painted. Refer to the Appendix L, *I-405 Urban Design Criteria for Kirkland Stage 1* for selected color.

Steel girder superstructures shall not be fracture critical. The main longitudinal load carrying girders shall be welded plate or box girders cambered during fabrication. Heat cambered rolled girders shall not be used except as secondary members or temporary girders. Steel girder superstructures shall have a cast-in-place reinforced concrete roadway deck designed to be composite for live loads.

Safety cables along the girder webs will not be required for future maintenance and inspection needs.

Drip plates shall be provided on the bottom flanges on the exterior side of the exterior steel plate girders to keep water runoff from bearings and bridge seats. (See Chapter 6 of WSDOT *BDM* for drip plate details).

2.13.4.2.13 Approach Slabs

The Design-Builder shall provide a reinforced concrete approach slab with bridge approach slab anchors at the ends of each vehicular bridge as specified in the Standard Plans and WSDOT *BDM*. The approach slab shall extend from barrier face to barrier face. The Design-Builder shall provide an underdrain system beneath all approach slabs to reduce water in embankment fills at bridge abutments. The minimum pavement seat length at the back of the abutments shall be 10 inches. Refer to Section 2.7.4.1 for additional approach slab requirements.

2.13.4.2.14 Bridge Foundations

The Design-Builder shall not use timber piles, auger cast piles, or unfilled unreinforced steel pipe piles as foundations for permanent structures.

All bridge foundations shall be designed using the LRFD Specifications, as described in WSDOT *GDM*, WSDOT *BDM*, and the AASHTO *LRFD Bridge Design Specification*.

The Design-Builder shall provide a type of abutment that meets the requirements of the bridge system and the Appendix L, *I-405 Urban Design Criteria for Kirkland Stage 1* developed for the Project. With the exception of properly designed cast-in-place concrete cantilever or counterfort/buttress wall types, retaining walls shall not serve as abutments for freestanding bridges. Properly designed cast-in-place concrete cantilever or counterfort/buttress retaining walls may be used in lieu of wingwalls at abutments.

The Design-Builder shall provide a type of pier (if needed) that meets the requirements of the bridge system and the Appendix L, *I-405 Urban Design Criteria for Kirkland Stage 1* developed for the Project. Drop caps or non-redundant, fracture critical pier caps will not be allowed.

2.13.4.2.15 Bridge Decks and Expansion Joints

Minimum deck thickness shall be 7.5 inches. The Design-Builder shall design all decks using cast-in-place concrete. Stay-in-place forms will not be allowed. On new structures, decks shall be System 1 bridge deck protective system (2.5 inch concrete cover with epoxy-coated reinforcing steel) as defined in WSDOT *BDM*. New deck portions on widened structures shall be as defined in WSDOT *BDM*. The Design-Builder shall not use bituminous or bituminous with membrane overlays for permanent bridge deck construction on new bridges.

Expansion joints for steel structures shall be designed for a 0 to 120 degree Fahrenheit temperature range. Expansion joints for concrete structures shall be designed for a 0 to 100 degree Fahrenheit temperature range. Steel finger joints shall not be used. All expansion joints shall be watertight. Expansion joints shall not be placed in-span nor at intermediate supports. Longitudinal expansion joints shall not be used.

Longitudinal joints in overlays on existing bridges shall be placed along permanent lane lines where possible as needed for construction staging.

2.13.4.2.16 Drainage Systems

Deck drains shall not be located on the I-405 over NE 116th Street structures. Approach drains shall be placed to prevent stormwater from running from the approach onto the structure. If downspouts are used, all downspout parts shall be accessible for maintenance and cleaning and downspout elbows shall be 45 degrees or less. Drainpipe shall not be installed within bridge substructure units and shall be accessible for maintenance.

2.13.4.2.17 Slope Protection

Slope protection shall be consistent with the *I-405 Urban Design Guidelines for Kirkland Stage 1* developed for the Project, reduce or eliminate the need for maintenance, lessen or eliminate negative visual impacts associated with soil erosion, weed growth, trash accumulation, and vandalism, and conform to details contained in the Standard Plans.

Refer to Section 2.6 Geotechnical Design and Section 2.8 Environmental for additional information.

2.13.4.2.18 Bridge and Retaining Wall Railings

The Design-Builder shall use 34-inch minimum height single slope barrier as specified in the standard railing details provided in Standard Plans and meeting the requirements of the *I-405 Urban Design Criteria for Kirkland Stage 1*. The railing standard plans can be modified by the Design-Builder, as necessary, to meet visual quality requirements for the Project. Visual quality requirements per the *I-405 Urban Design Criteria for Kirkland Stage 1* shall not adversely affect the strength and safety requirements of the barriers.

Precast concrete barriers shall not be used for permanent applications on bridges or approach slabs. Concrete barrier shall be installed in permanent locations where possible.

A minimum of two 2-inch conduit pipes shall be cast into all new bridge barriers for the full length of the barrier. Each conduit pipe shall terminate at separate Type 1 junction boxes off the ends of the bridge.

Pedestrian railing shall be aluminum.

2.13.4.2.19 Sign Structures, Camera Structures and Overhead Lighting

For sign bridge, camera structures and cantilever sign structures and their foundations, the Design-Builder shall use standard details provided in the Standard Plans and in WSDOT *Bridge Design Manual*. The Design-Builder shall design all overhead cantilevered sign structures for the fatigue design loads, including galloping, natural wind gust, and truck-induced gust. The Design-Builder shall design all high-level lighting structures, if any, for the fatigue design loads, including vortex shedding and natural wind gust. Bridge elements shall be designed by the Design-Builder to accommodate the forces and moments resulting from loads (dead, wind, ice, etc) applied to the signs, lighting, signals, and utilities. ITS standards shall be designed per Chapter 10.1 of WSDOT BDM.

For Variable Message Sign (VMS) structure, the Design-Builder shall obtain information on the type of VMS sign being procured by WSDOT and design the VMS support structure and foundation accordingly. See Section 2.18 for general requirements on the VMS support structures. VMS standards shall be designed per Chapter 10.1 of WSDOT BDM.

The Design-Builder shall design retaining walls and foundations to account for the placement of any major sign supports (such as cantilevered signs or sign bridges), overhead lighting supports, ITS facility supports, or VMS facility supports on or behind the retaining walls.

The Design-Builder shall not mount major sign supports (such as cantilevered signs or sign bridges) on bridges.

For overhead lighting to be placed on bridges, the Design-Builder shall locate the overhead lighting at bridge supports.

Fatigue design of sign structures and overhead lighting structures shall conform to AASHTO Section 11. Cantilever sign structures shall be designed for Fatigue Category 1. High-mast luminaries, if any, shall be designed for Fatigue Category 2. Signal standards with mast arms shall be designed for Fatigue Category 3. Refer to Section 2.19 Signing for additional information in sign structures.

Refer to the Appendix L, *I-405 Urban Design Criteria for Kirkland Stage 1* for sign structure and lighting aesthetics. Refer to Section 2.16 Illumination for additional information on lighting.

2.13.4.2.20 Storm Water Vaults

Vaults shall be designed in accordance with Section 8.5 of WSDOT BDM. Vaults within the traveled way of I-405 and other roadways, (including access hatches and other appurtenances), shall be designed to accommodate a HS-25 loading.

2.13.4.3 Construction Criteria

2.13.4.3.1 Amendments and General Special Provisions

See Appendices B2 and B1, Amendments to the Standard Specifications for Road, Bridge and Municipal Construction and the Project Special Provisions.

2.13.5 SUBMITTALS

2.13.5.1 Review Submittals

2.13.5.1.1 Plans

The Design-Builder shall prepare Construction Plans and Released for Construction (RFC) Plans in accordance with the QMP, Section 2.12 Plans Preparation and Project Documentation, Section 2.28 Design-Build Quality Control and Quality Assurance Plans Manual Requirements, WSDOT BDM, the I-405 *Congestion Relief and Bus Rapid Transit Project*, CADD *Standards Manual* and WSDOT *Plans Preparation Manual*.

The Design-Builder shall submit Construction Documents on WSDOT standard sheets for the bridges (including temporary bridges), retaining walls (including temporary retaining walls), sign structures, lighting structures, and other minor structures. The plan set for bridges shall include stage construction plans.

A Professional Engineer licensed in the State of Washington as a Structural Engineer shall affix his/her signature, date of signature, engineering seal, license number, and date of expiration to all final design documents prior to submittal.

2.13.5.1.2 Calculations

The Design-Builder shall prepare all the calculations in support of the design and in accordance with the QMP and Section 2.28 Design-Build and Quality Control and Assurance Plan Manual Requirements. Complete sets of calculations to support all designs shall be included with each design review submittal (including temporary bridges, temporary retaining walls, falsework, and other temporary works.

A Professional Engineer licensed in the State of Washington as a Structural Engineer shall affix his/her signature, date of signature, engineering seal, license number, and date of expiration to all final design calculations prior to submittal.

The calculations shall meet the following requirements:

- Index Sheets - Number all calculation sheets and submit an index by subject with the corresponding sheet numbers. List the name of the Project, SR Number, designer/checker initials, date (month, day and year), and supervisor's initials.
- Design Calculations - These shall include design criteria, loadings, and structural analysis, one set of moment and shear diagrams and pertinent computer input and output data (reduced to 8.5-inch x 11-inch sheet size).

- Special Design Features – Provide a brief narrative of major design decisions or revisions and the reason for them.
- List approved deviations applicable to the calculations
- Include Design Decision Summaries.
- Design Completed Checklist (Form 230 035). (See Appendix 1.3-A3 in WSDOT BDM).

2.13.5.2 Shop Drawing Submittal

The design-builder shall submit approved shop plans for all steel bridge elements and precast elements in bridges, arches, storm water vaults, and box culverts. The following information shall be included in the shop drawings, (if applicable):

- Material specifications (ASTM specifications, hardness, alloy and temper, etc.)
- Size of member and fasteners
- Length dimensions if shown on the Contract Plan
- Finish (surface finish, galvanizing, anodizing, painting, etc.)
- Weld size and type and welding procedures if required
- Strand or rebar placement, jacking procedure, stress calculations, elongations, etc.
- Fabrication-reaming, drilling and assembly procedures
- Erection procedure.

Shop Plans shall be marked with one of the two categories in lower right corner. Shop Plans marked "Approved-As-Noted" shall clearly note the suggested correction.

- APP'D (Approved, No Corrections required)
- AAN (Approved as noted- minor corrections only. Do not place written questions on an approved as noted sheet). Shop Plans marked Approved-As-Noted shall clearly note the suggested correction.

2.13.5.3 Project Submittals during Construction

Construction Problems or Revisions (As They Develop) - Calculations for revisions made during construction shall be incorporated into the design/check calculation file when construction is completed. Calculations for revisions made during construction shall meet the requirements of Section 2.13.5.1.2.

End of Section

2.14 DRAINAGE

2.14.1 GENERAL

The Design-Builder shall conduct all Work necessary to meet the requirement described in the Mandatory Standards and as required for the Project Permits in accordance with the Scope of Work and these Technical Specifications. Elements of work include but are not limited to:

- Design and construction of a pavement drainage system of inlets, ditches and storm drains for both the permanent Project facilities and the temporary construction conditions for efficient removal of water from the pavement surfaces for vehicle safety.
- Design and construction of permanent Project pavement area runoff water quality treatment facilities and the associated conveyance systems.
- Design and construction of Project pavement area runoff flow control facilities and the associated conveyance systems (This includes the design and construction of the flow control facility and associated conveyance and runoff water quality treatment system beyond the Project limits at approximate MP 20.15 as shown on the RFP Conceptual Plans in Appendix M1).
- The innovative incorporation of low impact development and infiltration type best management practices in the design and construction of pavement runoff water quality treatment and flow control facilities.
- Maintenance of existing off-site flows where passing through the Project area by designing and constructing new or by extending, replacing and/or protecting existing ditches, culverts, storm drains and outfalls.
- Design and construction of temporary flow diversions during construction.
- Design and install new and/or maintain existing subsurface drainage systems.
- Design and install the temporary erosion and sediment control best management practices to avoid and minimize erosion and sedimentation during construction.
- Prepare and implement a spill prevention plan during construction.
- Prepare a Project Final Hydraulic Report.
- Provide permanent Fish Passage facilities at Forbes Creek culvert under I-405.
- Design and conduct work in a manner that protects existing sensitive natural resources and improves habitat conditions, especially for endangered and threatened species.
- Design and install permanent and disturbed area restoration plantings to increase infiltration and reduce Project area runoff.
- Design and install permanent and disturbed area restoration within stream buffer and stream channel below ordinary high water mark.

2.14.2 MANDATORY STANDARDS

The following is a list of mandatory standards and computer programs that shall be used in design and construction of the drainage elements listed above. It is the Design-Builder's responsibility to use the most current version of each Mandatory Standard at the time of the proposal submittal. The Mandatory Standards are listed in a hierarchical order, with the highest order at the beginning of the list. (Permit requirements will take precedence over all other design and construction Mandatory

Standards). It is the Design-Builder's responsibility to obtain clarification of any unresolved ambiguity in the Mandatory Standards prior to proceeding with design or construction.

The Computer Programs are listed as the primary WSDOT accepted design aids. Use of other computer programs by the Design-Builder may require additional submittal details, coordination and program conformance acceptance during the WSDOT reviews.

2.14.2.1 Mandatory Standards

- WSDOT *Highway Runoff Manual* (M 31-16)
- WSDOT *Hydraulics Manual* (M 23-03)
- *Aquatic Habitat Guidelines, Design of Road Culverts for Fish Passage, Washington State Department of Fish and Wildlife*, 2003
- *Aquatic Habitat Guidelines, Draft Fishway Guidelines for Washington State, Washington State Department of Fish and Wildlife*, 2000
- WSDOT *Design Manual*, including instructional letters (M22-01)
- WSDOT *Amendments to the Standard Specifications and General Special Provisions* (Appendix B2) (M41-10)
- WSDOT *Standard Plans for Road, Bridge, and Municipal Construction* (M21-01) English
- WSDOT *Maintenance Manual* (M51-01)
- I-405 *Congestion Relief and Bus Rapid Transit Project* CADD *Standards Manual*
- WSDOT *Plans Preparation Manual* (M22-31)
- WSDOT *Construction Manual* (M41-01)
- WSDOT *Materials Manual* (M46-01)
- WSDOT *Qualified Products List* (M46.02)
- WSDOT Preliminary Hydraulic Report, *I-405 Corridor Congestion Relief and Bus Rapid Transit Projects, Kirkland Nickel Project, I-405, SR 520 to SR 522, Stage 1 and 2*, dated November, 2004
- WSDOT *Environmental Procedures Manual* (M31-11).
- Washington State Department of Ecology, *Stormwater Management Manual for Western Washington*, August 2001
- King County, Washington, *Surface Water Design Manual* and published updates
- Implementing Agreement between the Washington State Department of Ecology and the Washington State Department of Transportation Regarding Compliance with the State of Washington *Surface Water Quality Standards*, February 13, 1998
- Memorandum of Understanding between the Washington State Department of Fisheries, Wildlife, and Transportation Concerning Compliance with the Hydraulic Code. (RCW 77.55.100 and WAC 220-11) (Draft, January 22, 2001)
- Signatory WSDOT Committee Agreement to Integrate Aquatic Resource Permit Requirements into the National Environmental Policy Act and State Environmental Policy Act Processes in the State of Washington, September 17, 2002

- State of Washington Alternative Mitigation Policy Guidance for Aquatic Permitting Requirements from the Departments of Ecology and Fish and Wildlife. February 10, 2000
- Memorandum of Agreement between Washington State Department of Fish and Wildlife and Washington State Department of Transportation Concerning Construction of Projects in State Waters, June 2002
- Integrated Streambank Protection Guidelines, Washington State Aquatic Habitat Guidelines Program, 2003
- Memorandum of Understanding between the City of Kirkland and the WSDOT dated April 15, 2004.
- Kirkland Municipal Code, Ordinance 3908
- Washington State Department of Ecology Non-point Source Pollution Assessment Project, October 1989, Publication #88-17
- Washington State Water Quality Assessment: Year 2002 Section 305(b) Report, Publication #02-03-026
- 1998 Washington State Water Quality Assessment, Section 305(b) Report, Ecology
- National Resource Conservation Service, Soil Survey of King County Area Washington, compiled 1972
- FAA, Federal Aviation Administration's *Advisory Circular* 150/5200-33, FAA 1997
- Aquatic Habitat Guidelines, Stream Habitat Restoration Guidelines, Washington Department of Fish and Wildlife, 2004
- Aquatic Habitat Guidelines, Fish Protection Screen Guidelines for Washington State, Washington Department of Fish and Wildlife, AMAD removes Salmonoid Passage Facility Guidelines and Criteria, National Marine Fisheries Service, 2004.
- WAC 220-110 – Hydraulic Code Rules
- RCW 77.55 – Construction Projects in State Waters

2.14.2.2 Computer Programs

- Mandatory Software
  - MGSFlood continuous simulation hydrologic model.
- Approved Software
  - WSDOT spreadsheet for pavement runoff spread calculations.
  - HEC-1, Flood Hydrograph Package
  - HEC-11, Design of Riprap Revetment
  - HEC-12, Drainage of Highway Pavements
  - HEC-13, Hydraulic Design of Improved Inlets for Culverts
  - HEC-14, Hydraulic Design of Energy Dissipaters for Culverts and Channels
  - HEC-15, Design of Roadside Channels with Flexible Linings
  - HEC-18, Evaluating Scour at Bridges
  - U.S. Corps of Engineers Water Surface Modeling Program, HEC-RAS

- StormShed2G by Engenious Systems
- WSPRO Backwater/Surface Water Computation
- PondPack FlowMaster, StormCAD and CulvertMaster by Haestead Methods.

2.14.3 Performance Requirements

The Design-Builder shall provide a stormwater drainage system consisting of runoff collection systems, quality and quantity treatment facilities and outfalls for the Project's new impervious and pollution generating surface areas that meet the requirements of the Mandatory Standards and the Project Permits. The Design-Builder shall also maintain and provide facilities for handling other on-site runoff from non-pollution generating surfaces, off-site originating flows and cross-drainage as required in the Mandatory Standards, and the Permits. These facilities shall be sized according to the methods described in the Mandatory Standards.

The Project Preliminary Hydraulic Report provides one solution that illustrates the basis of estimate, permits and land acquisition, but the Design-Builder is encouraged to seek more cost effective solutions that provide equal or greater environmental benefit. Cost effective solution development shall consider the innovative use of water quality treatment and flow control techniques, low impact development type best management practices, reduction or conversion of existing impervious surfaces, and incorporating design features which lead to the increased infiltration of stormwater where practical and feasible.

The Project Preliminary Hydraulic Report describes a preliminary concept for the Project stormwater system. The Project permits and right-of-way were obtained assuming that this preliminary concept would be constructed. It is expected that the Design-Builder will utilize the Preliminary Hydraulic Report concepts as a basis for the drainage design, refining and detailing the system as necessary to ensure the design meets all permit conditions and fulfills the environmental commitments listed in RFP Section 2.8. The Design-Builder shall be responsible for permit or right-of-way modifications that may result from utilizing other concepts.

The Project Preliminary Hydraulic Report is written for the overall Kirkland Nickel Section. The drainage design concepts shown in the report utilize a basin-by-basin, Threshold Discharge Area (TDA) approach. The Design-Builder shall design the drainage for this Project's area utilizing this same basin approach, to accommodate highway corridor and off-site runoff that discharges to, or flows through or within the Project limits. In particular, the Design-Builder's drainage design shall accommodate all of the basin flows at the Project limit. This may include providing for the flow control, treatment and outfalls for runoff from the adjacent future or on-going adjacent highway and roadway projects. The Design-Builder shall provide design and facilities to accommodate all flows, which may include such items as pipe stubs and ditch grading for connection by future or on-going adjacent projects. Proposals and designs for future and on-going projects will be provided by the WSDOT as appropriate. The Design-Builder shall also assist with the design and construction coordination of drainage for adjacent projects that share a common TDA with this Contract as may be required by the WSDOT.

The Design-Builder shall design and construct all drainage facilities to avoid impacting environmentally sensitive areas as defined in RFP Section 2.8. Permanent impact limits adjacent to sensitive areas are shown as "impact lines" on the RFP Configuration Plans. The permanent project impacts identified in the Project permit applications are based on this limit. Any designs with permanent impacts beyond the shown limits will require the WSDOT's approval.

The Design-Builder shall design and construct the Forbes Creek culvert as a fish passage culvert. The design and construction work shall meet the fish passage criteria per the Mandatory Standards and requirements as stated within Sections 2.8 and 2.14.

2.14.3.1 Runoff Flow Control

The Design-Builder shall provide runoff flow control meeting the requirements of the WSDOT *Highway Runoff Manual* and all applicable permit conditions. Facilities shall be constructed within existing the WSDOT right-of-way using one of the following options, unless discharging to water bodies exempted from flow control requirements (as listed in the WSDOT *Highway Runoff Manual*):

- Infiltration trenches, galleries, ponds or vaults
- Detention ponds or open top vaults
- Combined detention/infiltration ponds or vaults, and other treatment facilities combined with infiltration
- Combined Stormwater Treatment Wetland/Detention Ponds
- Natural and engineered dispersion
- Buried vaults
- Other innovative use of low impact development type best management practices combined with hydraulic routed storage techniques.

2.14.3.2 Runoff Quality Treatment

The Design-Builder shall provide sufficient water quality runoff treatment facilities to meet the requirements of the WSDOT *Highway Runoff Manual* and all applicable permit conditions. Facilities shall be constructed within existing WSDOT right-of-way, using approved enhanced water quality BMPs per one of the following options:

- Discharge the water quality design storm through treatment facilities then to infiltration basins or vaults
- Natural or engineered dispersion
- Ecology embankments
- Compost-amended vegetated filter strips
- Constructed stormwater treatment wetland
- Sand filter vault or basin (see restrictions in the WSDOT *Highway Runoff Manual*, Section 5-3.1.5, and to be used only where other options are not feasible)
- Other innovative low impact development type best management practices as may be approved by the WSDOT and/or included in future the WSDOT *Highway Runoff Manual* updates. The best management practice selection shall include comparisons for and consider low cost and/or low maintenance features.

2.14.3.3 Fish Passage

The Design-Builder shall provide fish passage at Forbes Creek to achieve the criteria described in WAC 220-11-070 and supported in the *Design of Road Culverts for Fish Passage* using one of the following options:

- Hydraulic Design Option
- Stream Simulation Design Option
- Bridge with restoration of creek channel.

The Forbes Creek fish passage under I-405 shall consist of a culvert and fishway. The completed facility shall eliminate existing passage barriers identified by WDFW and meet the requirements of the appropriate Project permits.

The Forbes Creek Culvert and Fishway drawings provide one solution that illustrates the basis of estimate, permits and land acquisition, but the Design-Builder is encouraged to seek more cost effective solutions including maintenance and operation costs that provide equal or greater environmental benefit. The fish passage design concepts shown in the drawings and supported in the RFP documents, included in Appendix E of the Preliminary Hydraulic Report, are based upon the WDFW Hydraulic Design Option provided in *Design of Road Culverts for Fish Passage*. Permits of this design option are based upon the understanding that trenchless technology construction practices will be used for installation of the culvert. If construction of fish passage facilities at Forbes Creek utilizes construction practices other than trenchless technologies, the fish passage culvert shall be redesigned to meet WDFW's Stream Simulation Design Option provided in *Design of Road Culverts for Fish Passage* and re-permitted.

2.14.4 Design and Construction Criteria

2.14.4.1 Design Criteria

The Design-Builder shall utilize the Mandatory Standards with the Design Criteria listed below in developing the design of the Project. If any of the Design Criteria are not achievable, the Design-Builder shall submit to the WSDOT, clear documentation of what can not be achieved and a proposed alternative for review. All designs shall conform to Mandatory Standards and applicable Project permits.

2.14.4.1.1 Runoff Quality Treatment and Flow Control

Permanent highway runoff quantity and quality treatment facilities shall be located outside of stream, steep slope, and wetland buffer areas, and designed in accordance with the WSDOT *Highway Runoff Manual* (M31-16) with the exceptions contained in the I-405 Design Decision Papers as listed below:

- Forested vs. Existing Pre-Development condition, Kirkland Nickel Project, June 14, 2004: Summarizes exception from design criteria in the WSDOT *Highway Runoff Manual* that the pre-developed land cover condition shall be 100 percent forested for flow control calculations.
- Treatment of Runoff From New Impervious Surfaces, Kirkland Nickel Project, July 23, 2004: Clarifies that "New impervious surface" is defined as new pavement that will cover existing pervious area, widened outside of the existing edge of shoulder (new impervious surfaces are also those gravel surfaces that are upgraded to HMA or PCCP); "replaced impervious surface" is defined as existing pavement removed to subgrade (removal of the upper pavement and underlying aggregate base courses) and replaced with a new pavement section (the replacement of existing shoulders with full depth pavement by this Contract is considered replaced pavement, however grinding and repaving operations are not considered replaced pavement); and "effective impervious surface" is defined as the same area as the new pavement for this Contract (if the new pavement were to exceed 50 percent of existing pavement, then replaced, impervious surfaces would also be effective impervious surface). These definitions are for purposes of determining the WSDOT *Highway Runoff Manual* Minimum Requirements.
- Infiltration Investigations, I-405 Nickel Projects, August 1, 2004: Defines approach that the Design-Builder shall use with regard to investigations for and design of the drainage infiltration facilities.

Copies of the Design Decision Papers are included in the Project Preliminary Hydraulic Report (see Appendix H1).

2.14.4.1.2 Hydraulic Structures

The design of the highway collection and conveyance structures shall be in accordance with the WSDOT *Hydraulics Manual* (M23-03).

It is intended that the Design-Builder utilize as much of the existing storm drainage system as possible to minimize disturbance of the existing pavement that is to remain in the pavement widening areas. For project areas where the existing pavement is being replaced, then new drainage elements shall be incorporated as necessary. The capacity of all proposed and existing-to-remain inlets, storm drains, ditches, outfalls and other conveyance structures within the Project limits shall be sized and/or checked for capacity and included in the calculations and Hydraulic Report. Capacity calculations shall compare required capacity to actual capacity.

2.14.4.1.3 Wall Drains

Retaining walls shall be designed to avoid surface water running over the face of the wall. Typically this is done by directing runoff away from the wall, by selected grading or by collecting the surface runoff prior to it reaching the wall, or by installing a lined channel or ditch at the top of the wall (sealed so that surface flows do not flow down behind the wall thereby avoiding saturation of the backfill or wall underdrain system) with flows collected by inlets and storm drains to the roadway storm drain system. Avoid placing surface drainage structures and pipelines in the reinforcement zone of reinforced earth and soil nail/tie back type walls, or otherwise align the pipes/structures to minimize conflict with the wall's reinforcement straps and anchors. Wall surface drainage facilities shall be designed to be esthetically compatible with the wall design, or otherwise located at low visibility locations. Wall surface drainage systems shall be designed for ease of maintenance, providing low clogging minimal maintenance type structures and/or removable clean-out covers and ports as necessary.

The internal wall drainage system (perforated pipe underdrain system) shall be connected wherever possible directly to the highway collection and conveyance system (pipes connected directly to inlets or manholes or daylighted with appropriate erosion protection splash pad into ditches). Placement of open "weep holes" through the exposed wall face acting as underdrain outlets will not be allowed unless specifically approved by the WSDOT during the regular design submittals in low visibility locations. Subdrain outlet ends shall be fitted with flap type anti-rodent entry fittings. Maintenance clean-out ports shall be provided where subdrain pipes are combined with surface drainage pipes having angled fittings not inside a structure.

2.14.4.1.4 Forbes Creek Fishway

The design of the fishway shall be in accordance with the Project Permits Mandatory Standards and RFP Section 2.8. The Design-Builder shall prepare final construction plans and install the fishway. The Design-Builder shall provide passage of fish past the existing fish barrier at I-405 and Forbes Creek. The fishway is to function in conjunction with the proposed fish passage culvert at I-405 and Forbes Creek.

The minimum design criteria for fishway requirements are provided in the following table and shall be incorporated into the design.

Criteria	Minimum Requirement
Minimum fish passage flow	0 cfs
Maximum fish passage flow	18 cfs
Inside Pool dimensions	8 ft in length, 8 ft in width, and 3.40 ft in depth
Vertical drop	0.75 ft
energy dissipation factor	4 ft-lb/s/ft^3
maximum differential head	0.75 ft
Free board on exterior walls	3 ft in height above the high flow water surface elevation
Elevation of 1st active weir (Weir #1)	Match water surface elevation up to maximum fish passage flow
Maintenance	Minimize necessary maintenance and for ease of maintenance, with access to be provided to work areas outside of the highway traffic and shoulder area. Install knife gate control or equivalent in each pool to allow drainage of water.
Flood flow capacity and debris loading	Flood flow capacity and debris loading shall be considered and quantification of bed load debris shall be calculated. Bed load debris shall not exceed top of weir #1.

Design and construction of the fishway shall include all necessary upstream and downstream work, including temporary diversions and protection facilities, stream regrading to avoid sudden transition between the fish passage facilities and the stream channel, hydraulic control and erosion protection structures, vegetated stream and soil stabilization measures, habitat improvements, and restoration.

The Design-Builder shall be responsible for including and implementing all necessary measures to minimize impacts to riparian zones surrounding I-405 crosses Forbes Creek. Such measures shall include all measures identified in Section 2.14.4.1.5 Cross-Drains and Culverts, Section 2.14.4.1.6 Forbes Creek Culvert, and temporary erosion and sediment control measures identified in Section 2.8. In addition, all efforts shall be made to extend attraction flows from fishway entrance 5-feet to 10-feet downstream beyond the influence of the culvert overflow-stream.

The Design-Builder shall be responsible for design and installation of a permanent access road for monitoring, inspection and maintenance. Access road shall be no steeper than 15 percent and at least 12 feet wide.

The fishway shall be installed in the dry or in isolation from the stream flow by the installation of a bypass flume or culvert, or by pumping the stream around the Work area.

2.14.4.1.5 Cross-Drains and Culverts

It is the intent that the existing cross-drains and culverts shall be retained and extended (or ends protected with headwalls where necessary) to match revised roadway sections, except where specifically noted on the RFP Conceptual Plans and in the Project Preliminary Hydraulic Report to be

replaced for fish passage.

All cross-drainage widenings or new cross-drains identified as stream crossings shall be designed in accordance with the WSDOT *Hydraulics Manual* (M23-03) for flow passage and the Washington Department of Fish and Wildlife's (WDFW) Design of Road Culverts for Fish Passage (2003). Compensatory storage requirements for filling of the floodway (volume of fill or structures below the ordinary high water elevations or if a regulated floodplain below the FEMA mapped 100-year flood level) shall also be met. The design and construction plans and specifications shall be prepared in conjunction with biologists to reduce impacts on the natural streambed and, when appropriate to the given Project, impacts shall be mitigated by placing gravel in the culverts, planting riparian trees, and using other natural features such as log weirs, boulders, and other types of woody debris. Construction shall be done during low flow periods that are least likely to harm fish and other wildlife in accordance with WDFW requirements.

The Design-Builder shall be responsible to protect and include measures to minimize impacts to riparian zones where the highway crosses streams. These locations are identified in the Project Preliminary Hydraulic Report for existing cross-drains and culverts. Such measures shall require roadway designs that avoid the placement of fill into the riparian zone by using walls or culvert headwalls instead of culvert extensions, and construction staging that limits equipment disturbance within the protected sensitive area.

Cross-drains operated and maintained by others (i.e. city and county storm drain systems) shall be protected, kept separate from the Project drainage system and maintained at its existing capacity and function unless noted otherwise in the Project Preliminary Hydraulic Report.

All existing and proposed cross-drains and culverts in the Project area shall be sized and/or checked for capacity and results included in the Design-Builder's design calculations and Final Hydraulic Report. All culvert designs and capacity checks shall be done in accordance with the WSDOT *Hydraulics Manual* (M23-03). Capacity calculations shall compare required capacity to actual capacity. The capacity calculations shall use "future conditions" to determine land cover types when modeling runoff flows from a watershed if the appropriate land-cover information is defined in a regional land use or watershed planning study. Otherwise, the existing land cover condition shall be used for watershed runoff calculations.

Culvert ends within the clear zone shall be beveled and subject to further reinforcement protection as required in the WSDOT *Hydraulics Manual* and requirements noted on the applicable WSDOT *Standard Plans for Road, Bridge and Municipal Construction.*

For structural plate culverts, the Design-Builder shall use the standard structural plate culvert interior, headwall, and end sections included in the Standard Plans. The Design-Builder shall not use corrugated steel structures with a span greater then 26 feet. See RFP Section 2.13 for additional culvert structural criteria.

2.14.4.1.6 Forbes Creek Culvert

The Design-Builder shall prepare final construction plans and install the fish passable culvert in accordance with the Project Permits, Mandatory Standards and RFP Section 2.8. The Design-Builder shall provide passage of fish past the existing fish barrier at I-405 and Forbes Creek. The fish passage culvert is to function in conjunction with the fishway at I-405 and Forbes Creek.

Design and construction of the fish passage culvert shall include all necessary upstream and downstream work, including temporary diversions and protection facilities, stream regrading to avoid sudden transition between the fish passage facilities and the stream channel, hydraulic control and erosion protection structures, vegetated stream and soil stabilization measures, habitat improvements, and habit improvements. The existing culvert at Forbes Creek shall be retained to help convey higher

flows.

The proposed Forbes Creek Culvert shall be designed to minimize necessary maintenance and to facilitate ease of maintenance, with access provided to work areas outside of the highway traffic and shoulder area.

The minimum design criteria for fish passage culvert requirements are provided in the following table and shall be incorporated into the design.

Criteria	Minimum Requirement	
Species of Concern	Cutthroat Trout	
Contributing watershed area	1.43 sq miles	
Mean annual precipitation	42 inches	
2-Year 24-Hour Precipitation	0.20 inches	
Stream Hydrology	Existing Condition (cfs)	Future Conditions - basin buildout (cfs)
Q7L2	0	0
Q fish passage		18
Q2	21	103
Q100	86	305
Maximum velocity	2 ft/sec	
Minimum water depth	0.8 feet	
Maximum hydraulic drop	0.8 feet	
Channel backwater depth	Match 2, 25, and 100-year, 24 hour event water surface elevations	
Maintenance	Minimize necessary maintenance and optimize ease of maintenance. Provide permanent maintenance access	
Flood flow and bed load capacity	Flood flow capacity and debris loading shall be considered and bed load debris shall be quantified. Bed load debris shall not exceed top of weir #1.	

The Design-Builder shall be responsible to protect and include measures to minimize impacts to riparian zones where the highway crosses Forbes Creek. Such measures shall include all measures identified in Section 2.14.4.1.4 Forbes Creek Fishway, temporary erosion and sediment control measures identified in Section 2.8. In addition, the following measures shall be included:

- Any device used for diverting water from a fish-bearing stream shall be equipped with a fish guard to prevent passage of fish into the diversion device according to Fish Protection Screen Guidelines for Washington State.
- Extreme care shall be taken to ensure that no petroleum products, hydraulic fluid, drilling lubricants, slurry, uncured concrete or grout, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into the stream, adjacent wetlands, or adjacent uplands within 300 feet of the OHM.

- The culvert shall be installed in the dry or in isolation from the stream flow by the installation of a bypass flume or culvert, or by pumping the stream flow around the work area.

2.14.4.1.7 Infiltration

Infiltration best management practices shall be used to the maximum extent feasible. The design of infiltration facilities shall be in accordance with the WSDOT *Highway Runoff Manual* (M31-16). The runoff treatment concepts identified in the Project Preliminary Hydraulic Report assumed that no infiltration was feasible within the Project area, thus yielding conservative values for sizing the conceptual treatment facilities. Soil investigations were done to help verify the Project Preliminary Hydraulic Report assumptions. Details of these soil investigations, including locations, borehole and test pit logs and test results are included in the RFP Appendix G1, G2, G3 and G4. Piezometers have also been installed along the Project and ground water monitoring results are available upon request for data collected to-date.

The Design-Builder shall evaluate the adequacy of the existing geotechnical investigations and piezometer locations and perform supplemental investigations as necessary for the design of the runoff treatment infiltration systems as necessary to meet the requirements of the Mandatory Standards. The Design-Builder's design of infiltration systems including the locations, best management practice types and design infiltration rates shall be based on the recommendations of the Design-Builder's Geotechnical Engineer in accordance with the existing and supplemental geotechnical investigations and piezometer records. The Design-Builder shall continue the recording of the existing piezometers as needed for design purposes after the start of the Project.

To mitigate the potential decrease in groundwater recharge in critical aquifer recharge areas (CARAs) and other potential recharge areas during construction, stormwater that might have been collected and conveyed to areas outside the CARAs can be re-infiltrated. In this scenario, the mitigation measures will include some form of treatment to ensure that groundwater quality is not adversely affected, such as the use of bioswales or infiltration ponds. Infiltration areas may be provided in proximate locations where large areas of impervious surfaces are unavoidable; in other words, interspersing pervious areas among the impervious areas to allow recharge via infiltration of rainwater.

2.14.4.1.8 Runoff Treatment and Flow Control

The use of enclosed vaults or galleries for runoff flow control or quality treatment shall be minimized. Vaults or galleries will only be accepted where it is demonstrated that other treatment BMPs are not feasible due to hydraulic limitations and right-of-way constraints. Where vaults or galleries are required, the sizes should be minimized by incorporating with other best management practices as much as possible.

The Design-Builder shall design vaults and ponds in such a manner that they can be expanded or accommodate adjacent additional vaults for runoff flow control requirements on future I-405 improvements. Information on any future improvement designs will be provided by the WSDOT.

Stormwater vaults and ponds shall be designed in accordance with the WSDOT *Highway Runoff Manual.*

Ponds and enclosed vaults or galleries shall be designed for ease of maintenance access, with paved access and work areas outside of the highway traffic and shoulder area. The maintenance access and staging area shall be paved and suitable for heavy equipment and loading of dump trucks. Ponds and vaults shall be equipped with necessary hydraulic controls for ease of dewatering. Bypass piping and control valves shall be incorporated to route flows around the structure during cleaning operations.

Vaults shall have the floor sloped to the access end. Smaller vaults and galleries, up to 10 feet wide, shall be designed and constructed suitable for cleaning with high-pressure rodding and vactor trucks.

The vaults shall include a sump in the lower elevation end, under an access cover to assist with the pump out. Larger vaults greater than 10 feet in width shall have ramp access suitable for motorized sediment removal equipment (i.e. small front-end loaders such as bobcats or skid steers). Secondary access shall be also provided suitable for easy personnel entry during inspections. The vaults shall meet OSHA confined space requirements for entry (maximum 50 feet between access points and ladder fall restraints, ventilation, provisions for lighting in large vaults, etc.) be vented and have locking covers, or be otherwise fenced to protect against unauthorized entry.

Where access lids or covers have to be placed within the pavement, within vehicle travel areas such as shoulders, curb gutters and parking areas, they shall be designed for a minimum of H20 vehicle live (repeated dynamic impacts) type vehicle loading. Preferred cover and frame types for live loadings are bolt-down ductile iron type. See Section 2.13 for additional vault structural requirements.

Maintenance access designs shall be submitted for review and acceptance by the WSDOT Maintenance Department.

2.14.4.1.9 Downstream Analysis

The Design-Builder shall perform downstream analysis for individual stormwater facilities, which shall include a review of the regional (usually city or county) stormwater pipes receiving runoff, thus factoring this information into the highway runoff design. Project improvements shall not increase the potential for flooding downstream of the Project. Where downstream conveyance structures have insufficient capacity to handle the Project design criteria off-site cross-drain and/or Project area discharge flows, then alternate proposals shall be prepared to resolve the problem using alternative discharge locations or hydraulic detention routing type solutions. The Design-Builder shall advise the WSDOT and provide supporting calculations prior to beginning work on any drainage work within that same drainage basin boundary, for any locations where improvements are required to existing downstream drainage conveyance systems outside of the limits of construction.

Downstream Analysis shall include development of a map of flow routes downstream of the Project for at least ½ mile to serve as a quick reference for the erosion control lead. There should be adequate detail to allow quick identification of an-site erosion or spill locations based on where a downstream complaint is made.

*2.14.4.1.10*Drainage Design Personnel

The Design-Builder shall provide a Drainage Design Lead Engineer with a minimum of ten (10) years of experience in the design and construction of highway-related drainage elements. This lead engineer shall have specific highway drainage design experience in Western Washington within the last two (2) years. This individual shall be a Professional Engineer licensed in the State of Washington and shall be in responsible charge of the drainage design elements, including the temporary erosion and sediment control (TESC) and spill prevention control and countermeasures (SPCC) of the Project. This same engineer shall also be responsible for any drainage design revisions made during construction.

The Design Lead Engineer-Drainage (or engineer working under the design lead engineer's direction) shall have direct design experience and latest state-of-the-art knowledge on designing and implementing low impact development (LID or space efficient and environmentally effective practices) type stormwater treatment techniques to supplement traditional stormwater treatment best management practices.

*2.14.4.1.11*Fish Passage Design Personnel

The Design-Builder shall also provide a Water Resources Engineer with a minimum of five (5) years

of experience in the design and construction of fish passage elements. This engineer shall have specific fishway design experience in Western Washington within the last two (2) years. This individual shall be a Professional Engineer licensed in the State of Washington and shall be in responsible charge of the fish passage design elements. This same engineer shall also be responsible for any fish passage design revisions made during construction.

2.14.4.1.12 Maintenance Access

All new stormwater structures shall be situated and/or provided with separate access such that routine maintenance and inspections can be easily made. Catchbasins, inlets and manholes on storm drains shall be located at the outer edges of shoulders, or in medians or verge areas where access by vactor high pressure rodding and suction trucks can be easily done without requiring traffic lane closures. Manholes, hydraulic control and sedimentation structures located outside of the paved shoulder area in grass medians or shoulder areas shall be provided with a maintenance access road.

Stormwater treatment facilities, such as ponds, vaults, constructed wetlands and filtration swales, shall have maintenance access as required by the WSDOT *Hydraulics Manual* and RFP Section 2.14.4.1.8. Hydraulic control structures such as weirs, orifices, valves and gates that are used for the operation, monitoring and maintenance of vaults, ponds and other treatment or flow control facilities, shall be provided with a maintenance access road. Maintenance access adjacent to the sedimentation pools of ponds and vaults shall include a paved working area suitable for the loading and maneuvering of sediment disposal equipment and trucks.

Where ecology embankments are located outside of the shoulder or median area, or where isolated by barriers, walls or berms, maintenance access shall be provided for such routine work as inspections, mowing and filter media changing.

Fish passage facilities shall be provided with maintenance access as required in RFP Sections 2.14.4.1.4 and 2.14.4.1.6. Fish passage culverts shall be provided with a maintenance access road to the upstream end. The Forbes Creek fishway shall have a maintenance access road and paved working area pad adjacent to the fishway structure. The working area pad adjacent to the fishway shall be a minimum of 20 feet wide.

Maintenance access roads shall be designed to be compatible with typical maintenance equipment turning movement geometry for safe movements on and off the highway shoulders. Maintenance access roads shall be a maximum of 12 feet wide with longitudinal slopes not to exceed 15 percent. Maintenance roads shall be paved with pervious paving materials that meet the frequency of use and equipment requirements respective to each location. A minimal light use access road shall consist of a prepared subgrade per Section 2-06 of the WSDOT *Standard Specifications*, sloped and shaped and/or provided with underdrains for proper drainage, a layer of construction geotextile and six inch minimum thickness of crushed surfacing. Where maintenance requires the use of heavier equipment and loaded trucks, the maintenance access road shall use a pervious type hot asphalt mix pavement over an aggregate base course. The design of the pervious asphalt and aggregate base section shall meet the loading requirements of the proposed equipment with the pervious asphalt mix as approved by the WSDOT. Maintenance access roads in landscape areas shall be designed and constructed to fit with the landscaping theme, using alternative surfacing reinforcement such as soil grids and grow-through paver blocks.

2.14.4.2 Construction Criteria

2.14.4.2.1 Protection and Restoration of Sensitive Resource Areas

The Design-Builder shall take all necessary action to protect existing environmentally sensitive natural resource areas. The Design-Builders design shall include the location of high visibility construction fencing around sensitive areas. The construction fencing shall be installed prior to the

start of construction. The location of the fencing shall not exceed the limit identified as the "Temporary Impact Area" line.

Unless shown otherwise on the RFP Conceptual Plans, the Temporary Impact Area line is generally a ten foot (10') parallel offset to the Impact Area Line shown on the Conceptual Plans along the currently identified and mapped sensitive areas. The Design-Builder may work in this area, but must restore the area to pre-project conditions. No permanent grading will be allowed within the temporary impact area.

All Design-Builders staff shall have environmental training as required in RFP Section 2.8, and in particular shall be aware that no no-access or impacts are permitted beyond the high visibility construction fencing. Where proposed drainage pipe or ditch outlets extend beyond the typical impact area line and beyond the stream or wetland riparian zone or below the ordinary high water level areas, the Temporary Impact Area is modified to be a temporary working area fifteen feet (15') each side of the structure centerline. Where possible, pipe outfalls to natural waterways shall be done using infiltration trenches with over-topping level spreader designs for a more natural dispersion type discharge. Direct pipe discharge shall be armored against erosion using bio-engineering techniques as much as possible.

Where identified on the RFP Conceptual Plans or in the Project Preliminary Hydraulic Report, there is no temporary impact area in the riparian zone beyond the end of the existing cross-drain culverts on streams. The Design-Builder shall design and construct project solutions that do not extend the ends of the existing culverts on streams, thus maintaining a no-disturbance area around the existing stream riparian zones. Temporary Impact Areas shall be restored after construction is finished in accordance with the requirements of RFP Sections 2.8 and 2.15.

2.14.4.2.2 Temporary Erosion and Sediment/Pollution Control

Temporary erosion and sediment control (TESC) and spill prevention control and countermeasures (SPCC) plans and narratives shall be prepared and implemented in accordance with RFP Section 2.8, the WSDOT *Highway Runoff Manual* Chapter 6, the WSDOT *Standard Specifications* Section 1-07.15 and Division 8, and the Project permits. Runoff from construction areas shall be collected and treated and/or discharged consistent with the WSDOT *Highway Runoff Manual* and Project Permits.

The TESC design shall be prepared by a certified Construction Site Erosion Control individual who has attended the Construction Site and Erosion and Sediment Control Certification Course (SCESC Certification Course). The Design-Builder may obtain information for classes provided by AGC at the following websites: http://www.wsdot.wa.gov/environment/hazmat/haz_training.htm; http://www.agcwa.com/public/edPrograms.asp and http://www.agcwa.com/public education_foundation/env_reg/soil_sched.asp
Re-certification is every three years. The design of the TESC hydraulic elements, including the hydrology, hydraulic structures, quality treatment and flow control systems, shall be prepared under the direction of and signed and sealed by a Professional Engineer licensed in the State of Washington.

2.14.5 Submittals

2.14.5.1 Proposal Submittals

The Design-Builder shall demonstrate their understanding of the permit requirements for temporary erosion and sedimentation control (TESC) by submitting a set of basic plans and a general description of the intended runoff treatment and flow control procedures for construction area runoff for each stage of the Design-Builder's proposed staging plan, included in the Design-Builder's Proposal submittal (see RFP Section 2.8).

2.14.5.2 Initial Design Submittals

The Design-Builder shall prepare quantity takeoffs, tabulations, and backup calculations to support items requiring a statistical acceptance/performance basis as required by the Design-Build Quality Control and Quality Assurance Plan.

Prior to starting construction on a given portion of the drainage system, the Design-Builder shall inventory, survey and inspect all existing drainage pipe systems and associated structures that are to remain in the Project limits, including storm drains, cross-drains and culverts. The survey shall identify each system by highway milepost and project stationing and show the pipe end and structure coordinates, sizes, structure types, invert levels at ends and structures, skews and upstream and downstream channel profile and cross sections within the construction limits. The channel cross-sections shall be taken at no longer than 50 foot spacing, to include the cross-section at the culvert end and at edge of construction limit. The inspections shall be done using video sewer inspection techniques. The Design-Builder shall prepare a Drainage Existing Condition Report on the condition of the pipe systems to remain, including summaries of the inventory survey, pipe types, general condition of pipe and structures for each system, with photo and plan exhibits that illustrate the general condition and specific problems of each pipe run. The report shall identify specific failures, blockages, fish barriers and suggested repair methods. The Design-Builder shall also provide recommendations on life expectancy and required actions (i.e. replace, specific or urgent repairs, and longer term maintenance/repair). The Design-Builder shall submit the draft Drainage Existing Condition Report for the WSDOT's review in accordance with RFP Section 2.28 along with or prior to the draft 30 percent Hydraulic Report submittal. The final Drainage Existing Condition Report shall be submitted to include revisions incorporating the WSDOT review comments and the inspection videos and electronic format survey data, along with or prior to the Final Hydraulic Report submittal.

The Design-Builder shall submit a draft 30 percent Hydraulic Report prior to the start of construction. See RFP Section 2.14.5.3.3 for further details.

2.14.5.3 Review and Final Design Submittals

2.14.5.3.1 Design Plans

The Design-Builder shall prepare drainage and fish passage plan sheets in accordance with the I-405 Congestion Relief and Bus Rapid Transit *CADD Standards Manual* and the WSDOT *Plans Preparation Manual*, Section 440 through 460, and Division 5 and 6. The Design-Builder shall prepare Construction Documents on the WSDOT standard sheets for the drainage. Plans shall be submitted for the WSDOT review at the 30 percent, 60 percent, 90 percent and final design stages in accordance with RFP Section 2.12.5. An original signature, date of signature, original seal, registration number, and date of expiration by a Professional Engineer licensed in the State of Washington shall appear on the plan and detail sheets. The Engineer-of-Record shall be the Project's Lead Design Engineer-Drainage being a Professional Engineer licensed in the State of Washington.

In addition to the items listed in the WSDOT *Plans Preparation Manual*, all sensitive areas (including wetlands, streams, riparian zones, and their buffer boundaries), stream and wetland ordinary high water elevation contours, and FEMA flood level contours shall be shown on the grading and drainage plan sheets. The grading plans shall also show the placement locations and type requirements for the high visibility sensitive area protective fencing.

2.14.5.3.2 Design Calculations

The Design-Builder is responsible for completing all calculations necessary for the designs covered by the Scope of Work. The Design-Builder shall prepare calculations in accordance with the WSDOT *Plans Preparation Manual*, the WSDOT *Hydraulics Manual* and the WSDOT *Highway*

Runoff Manual to support the design shown on the plans and details. Fish passage facility design calculations shall be prepared in accordance with WAC 220-110 and Design of Road Culverts for Fish Passage. The associated set of design calculations shall be submitted with each set up drainage design plans submitted per review as required in RFP Sections 2.14.5.3.1 and 2.28. An original signature, date of signature, original seal, registration number, and date of expiration by a Professional Engineer licensed in the State of Washington shall appear on the cover of all calculation packages. The Engineer-of-Record shall be Project's Lead Design Engineer-Drainage registered as a Professional Engineer licensed in the State of Washington.

The calculations shall be in a white paper type summary format with narrative that describes the approach and order of the calculations including sections on the methodologies used (include appropriateness and accuracy requirements), design decisions made and resultant summaries. The calculations shall have copies of the supporting computer programs input and output printouts, spreadsheets, hand calculations, exhibits and sketches attached. The calculations shall include but are not limited to the following items:

- Index Sheets - Number all calculation sheets and prepare an index by subject with the correspondence sheet numbers. List the name and number of the Project, SR Number, designer/checker initials, date (month, day and year), and supervisor's initials.
- Design Calculations - These shall include design criteria, hydrology and hydraulics calculations and pertinent computer input and output data (reduced to 8.5-inch by 11-inch sheet size). The calculations shall include a narrative of approach taken, final conclusions and summaries of the calculation results in both narrative and table format. The calculations shall be in logical order, technically clear, and cross-referenced to correspond directly with drainage structure and basin numbering on the drainage plans, maps and exhibits for ease of reference.
- Special Design Features - Brief narrative of major design decisions or revisions and the reason for them.
- New Deviations not included in this RFP and Deviations modified by Design-Builder.
- Design Decision Summaries.
- Any special provisions necessary as construction specifications.
- Drainage maps showing the hydrologic features, drainage basins, sub-basins, threshold discharge areas, existing and final conveyance and cross-drain structures, flow direction arrows, fish passage facilities, numbering system and any other features necessary to support and clarify the design calculations. The drainage maps shall also show all geotechnical and environmental sensitive areas, streams and wetlands with buffer boundaries, riparian zones, the ordinary high water and FEMA flood level contours, aquifer and well head protection zones, sanitary drain fields and major utilities that will effect the drainage design. The drainage maps shall be on 11-inch x 17-inch bond paper.
- Other exhibits as necessary to provide details necessary to clarify and support the calculations.

2.14.5.3.3 Hydraulic Report

The Design-Builder shall prepare a Hydraulic Report in accordance with the WSDOT *Hydraulics Manual* and the WSDOT *Highway Runoff Manual*. The Hydraulic Report shall follow the guidance, outline and format as shown in the WSDOT *Hydraulics Manual* Section 1-3 and *Hydraulics Manual*, Appendix 1-3.

A 30 percent draft of the Hydraulic Report shall be submitted for the WSDOT's review prior to the start of drainage construction. The draft Hydraulic Report submittal shall show the Design-Builder's overall Project runoff flow control, quality treatment, fish passage and storm drainage concept for the Project. In particular it shall show the overall basin layout, locations of outfalls, major conveyance system layout, and concepts to be used at specific locations for quality and quantity treatment of Project runoff.

The Hydraulic Report shall be submitted for the WSDOT's review at the 30 percent, 60 percent, 90 percent and final design stages per the requirements of RFP Section 2.28. If the drainage design layout or runoff treatment concepts change significantly between the drainage plan 30 percent and 60 percent submittals or between the 60 percent and 90 percent submittals, then the associated 60 percent or 90 percent Hydraulic Report shall be submitted prior to or with the 60 percent and 90 percent drainage plan submittals. In any case, the Hydraulic Report final submittal shall be made prior to or with the drainage plans final submittal. The WSDOT reserves the right to reject the Hydraulic Report and/or the design plans and calculation submittals at any stage of the process if it appears that the Design-Builder is not providing a design that meets the intent of the RFP Mandatory Standards and Project Permits. Work will be halted until the design problems are resolved to the satisfaction of the WSDOT.

Six (6) originals of the Hydraulic Report shall incorporate the final set of calculations, as required in RFP Section 2.14.5.3.2, as well as records of decision, associated design criteria, a set of drainage maps, drainage plans, fish passage plans and details.

The Hydraulic Report shall be submitted in an 8.5-inch x 11-inch format except that exhibits may be 11-inch x 17-inch. The report shall be submitted bound on bond paper and in electronic pdf format on a CDROM.

The Hydraulic Report shall be updated, by the Design-Builder to reflect changes in the original design during construction (Drainage design changes shall not lead to increased environmental impacts, i.e., wetland or wetland buffer impacts, beyond those permitted). Updating shall be done by the Design-Builder providing supplemental attachments to the Hydraulic Report. The supplements should reference the Preliminary Hydraulic Report and be specific as to the changes, but be easily readable as a stand-alone type document as to why the revision was made, how it effected the design and include the revised drawings and exhibits, supporting calculations, and revised summaries and tables. Each supplement shall be submitted as part of the drainage design revision reviews and approval process for major modifications, and as a record of as-built changes for minor changes grouped together as convenient, but at frequency not to exceed five revisions at any one time. The combined Hydraulic Report and supplemental updates should reflect the design and as-built condition of the drainage system at the end of construction. Each supplement to the Hydraulic Report shall be submitted in draft form for the WSDOT review. The final submittal of each supplement to the Hydraulic Report shall incorporate the WSDOT review comments. Six (6) originals of each supplement shall be submitted in bound form on 8.5-inch x 11-inch format bond paper except that exhibits may be on 11-inch x 17-inch paper. Each submittal shall include the supplemental Hydraulic Report in electronic form on a CDROM.

An original signature, date of signature, original seal, registration number, and date of expiration by a Professional Engineer licensed in the State of Washington shall appear on the Hydraulic Report and all supplemental attachments. The Engineer-of-Record shall be the Design-Builder's Lead Design Engineer for the drainage design.

2.14.5.3.4 Specifications

The Design-Builder is responsible for completing all specifications necessary for the construction of design elements covered by the Scope of Work. The Design-Builder shall prepare Project

construction specifications (special provisions) for all items of construction that are not otherwise covered by the Mandatory Standards, or as needed to clarify specific items of work. Project Specifications shall be submitted for the WSDOT review in accordance with RFP Section 2.28. An original signature, date of signature, original seal, registration number, and date of expiration by a Professional Engineer licensed in the State of Washington shall appear on the cover of all Project construction specifications.

2.14.5.3.5 TESC and SPCC Submittals

The Design-Builder shall submit updates to the approved TESC and SPCC plans for approval, prior to starting construction on any particular portion or stage of the work that have changed site conditions from the previously approved TESC and SPCC plan. The submittals shall meet the requirements listed in RFP Sections 2.8 and 2.28.

2.14.5.3.6 Shop Drawing Submittals

The Design-Builder shall submit shop drawings in accordance with RFP Sections 2.28 for all drainage structure, fish passage structures and pipe elements. The following information shall be included in the shop drawings, (if applicable):

- Material specifications (ASTM specifications, class, type, coatings, etc.).
- Copies of manufacturer's literature, including manufactures installation, handling and maintenance recommendations.
- Sizes.
- Pipe bedding and jointing methods. Pipe loading and stress calculations. Drain and culvert camber calculations with final bedding profiles. Any pipe jacking/boring installations will require specific pipe material and installation methodology submittals to be prepared in full detail along with the necessary geotechnical investigations/recommendations.
- Structure types (pre-cast or cast-in-place).
- Structure forming and rebar details, along with supporting calculations.
- Complete material submittals for approval if material is not on the approved material list.
- Installation procedure.

Shop Plans shall be marked with of two categories in lower right corner. Shop Plans marked Approved-As-Noted shall clearly note the suggested correction.

- APP'D (Approved, No Corrections required).
- AAN (Approved as noted- minor corrections only. Do not place written questions on an approved as noted sheet).

2.14.5.3.7 Design Revisions During Construction

Calculations for revisions made during construction shall be incorporated into the design/check calculation file when construction is completed.

Whenever new plan sheets are required as part of a construction revision, the information in the title blocks of these sheets must be identical to the title blocks of the contract they are for.

Every revision will be assigned a number. The revision number shall be assigned sequentially, with each change in a document or plan sheet identified by the revision number. The assigned number shall be located both at the location of the change on the sheet and in the revision block of the plan

sheet along with an explanation of the change.

The Design-Builder shall prepare all new and revised plan sheets in accordance with the *I-405 Congestion Relief and Bus Rapid Transit Projects CADD Standards Manual* and the WSDOT *Plans Preparation Manual*, Section 440 through 460, and Division 5 and 6. An original signature, date of signature, original seal, registration number, and date of expiration by a Professional Engineer licensed in the State of Washington shall appear on the all new and revised plan sheets. The Engineer-of-Record shall be licensed as a Professional Engineer in the State of Washington. Plans shall be submitted on 11-inch x 17-inch white bond paper and in pdf electronic format on a CDROM.

Any proposed design changes requiring permit modifications or additional regulatory/resource agency approvals shall first be submitted for review by the WSDOT. The WSDOT will work with the Design-Builder and the appropriate regulatory/resource agencies should an approved design change require a permit modification or additional approvals.

2.14.5.3.8 Maintenance Manual

The Design-Builder shall prepare a WSDOT *Drainage Maintenance Manual* that describes the "what" and "when" maintenance procedures for all drainage facilities, including the maintenance requirements for the runoff flow control and runoff water quality treatment and fish passage facilities. The WSDOT *Maintenance Manual* shall be complete with a description of the best management practices used on the Project, how they function and what areas contribute to them. The WSDOT *Maintenance Manual* shall be prepared in an 8.5-inch x 11-inch bond paper format, bound, except that exhibits may be on 11-inch x 17-inch sized paper. The Design-Builder shall submit the WSDOT *Maintenance Manual* for the WSDOT review in accordance with submittal sequence defined in RFP Section 12.5. The Design-Builder shall provide six (6) bound copies of the WSDOT *Drainage Maintenance Manual* incorporating the WSDOT review comments. The final submittal shall include an electronic version in PDF format on a CDROM.

End of Section

2.15 ROADSIDE RESTORATION DESIGN (LANDSCAPING AND AESTHETICS)

2.15.1 GENERAL

It is the intent of the Washington Department of Transportation to integrate community values into the design of the Project Corridor. To accomplish this important goal, principles of Context Sensitive Solutions (CSS) shall be employed. WSDOT and the Context Sensitive Solutions (CSS) Team have reviewed the physical context of the corridor with a particular emphasis on physical elements, both natural andman-made. The urban design enhancements are documented in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage I.

The Design-Builder shall reference the Appendix L, I-405 Urban Design Criteria (UDC) for Kirkland Stage I for detailed aesthetic enhancements. The UDC is used for preliminary engineering, landscaping, and aesthetics of the highway corridor. It is the primary standard guideline needed to produce the intended form, function and appearance of each highway feature and element. These criteria shall then be further developed into final engineering and site specific design documents.

These guidelines are to be used by Design-Builder in preparing design and construction documents, as well as in construction of the Work. The overall design shall include the aesthetic elements and landscape treatments specific to the Project as found in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage I.

2.15.2 PERFORMANCE REQUIREMENTS

The aesthetics principles and strategies established by WSDOT for the Project are as follows:

- The Project shall minimize impact on the existing natural environment to the greatest extent possible
- The Project shall emphasize and enhance the existing natural context and landscape to the greatest extent possible
- Simple geometric forms, color and texture for all structures shall be used for continuity along the entire length of the Project, and to establish a cohesive identity for the Project
- Existing trees and rock outcroppings shall be preserved to the greatest extent possible
- Landscape elements shall be fully integrated with the overall aesthetics design
- There shall be consistency of the visual quality of the landscape along the entire length of the Project; and
- Native and/or naturalized plant materials that exhibit good drought tolerance shall be used to the greatest extent possible.

2.15.3 MANDATORY STANDARDS AND REFERENCE DOCUMENTS

The following is a list of design references and publications that shall be used wherever elements are listed "as per WSDOT Standards" in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1. It is the Design-Builder's responsibility to obtain clarification of any unresolved ambiguity prior to proceeding with design or construction. The Personnel Resources shall be used to supplement the Mandatory Standards and Publications.

2.15.3.1 Mandatory Standards

- WSDOT *Design Manual*
- WSDOT *Standard Plans for Road, Bridge, and Municipal Construction*
- WSDOT *Roadside Manual*
- WSDOT *Roadside Classification Plan*
- WSDOT *Traffic Manual*
- WSDOT *Local Agency Guidelines*
- FHWA *Flexibility in Highway Design*
- AASHTO Publications as applies
- WSDOT *Roadside Vegetation Management Manual*
- WSDOT *Herbicide Operations Manual*
- American Standard for Nursery Stock, ANSI Z60.1

2.15.3.2 Reference Documents

- Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1

2.15.3.3 Personnel Resources

- State Bridge and Structures Architect, WSDOT Bridge and Structures Office
- NW Region's Landscape Architect, WSDOT NW Regional Office

2.15.4 Design and Construction Criteria

2.15.4.1 Design Criteria

The Design-Builder shall utilize the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1 along with the Design Criteria listed below in developing the aesthetic treatment of the Project. The aesthetics designed for the I-405 corridor has been approved by WSDOT, the CSS Team and the I-405 Technical committee to ensure that the aesthetic criterion shall not decrease the structural integrity of the elements. If any of the Design Criteria are not achievable, the Design-Builder shall submit to WSDOT clear documentation of what can not be achieved and a proposed alternative for review. All designs shall conform to the latest Americans with Disabilities Act Accessibility Guidelines Title I and II.

2.15.4.1.1 Personnel Requirements

The Design-Builder shall coordinate with the WSDOT for any clarifications of the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1.

2.15.4.1.2 Bridge Aesthetics

Bridges, barriers, railings and paved slopes shall be of a type typically used in this area and shall employ the following guidelines:

- Refer to the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1 for the aesthetic treatments of the details for all bridges in accordance with the Project's aesthetics theme. Any deviations from the aesthetics theme will require WSDOT approval
- Minimize the superstructure depth

- Maintain superstructure depths constant, where possible, throughout the bridge length, with necessary variations gradually and gracefully proportioned
- Locate columns under parallel bridges along a common line at each bent.

2.15.4.1.3 Retaining Wall Aesthetics

The Design-Builder shall incorporate the aesthetic treatment for the retaining wall design as dictated in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1. Refer to Section 2.13, Bridges and Structures, for other requirements.

- The Design-Builder shall minimize the visual impacts of all walls in the Work by:
  - Utilizing wall profiles and alignments that blend with the natural terrain; and
  - Customizing the grading to reduce the need for walls.
- All walls for the Work (including those at bridge abutments) shall fit into one of the following categories:
  - Cast-in-place construction.
  - MSE retaining wall system.
  - Refer to Section 2.13, Bridge and Structures, for other approved wall systems.
- Wall types and aesthetic treatments shall be reviewed and approved as part of each Submittal prior to the Final Submittal.
- The design approval process for MSE walls shall be in accordance with the current WSDOT Policy for Proprietary Wall Systems. MSE walls with cast-in-place coping are the preferred choice.
- Prior to commencement of actual wall construction, the Design-Builder shall provide WSDOT with three (3) 4 foot x 4 foot samples of wall finishes for review and approval.

2.15.4.1.4 Noise Wall Design Criteria

Design-Builder shall incorporate the aesthetic treatment for the noise wall design as dictated in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage I. Refer to Section 2.13 Bridges and Structures and 2.11 Roadway Design and Grading for specific wall design criteria and other requirements.

- The Design-Builder shall avoid placing new noise/sound walls on bridges, traffic barriers or any other type of wall construction and shall separate noise/sound walls away from the roadway or other walls. Final locations for new noise/sound walls shall be approved by WSDOT and shall comply to the clear zone requirements found in Section 2.11, Roadway Design and Grading. .
- Refer to Section 2.13, Bridges and Structures, for requirements to replacement of existing noise/sound walls.
- Prior to commencement of actual wall construction, Design-Builder shall provide WSDOT with three (3) 4 foot x 4 foot samples of wall finishes for review and approval.

2.15.4.1.5 Bridge and Retaining Wall Railings

The Design-Builder shall refer to the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1 for the aesthetic treatment for the bridge and retaining wall railings.

2.15.4.1.6 Sign Structures

Design-Builder shall incorporate the aesthetic treatment for the sign structures and overhead lighting as dictated in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1. Refer to Section 2.13, Bridges and Structures, and Signage Sections for other requirements. The following guidelines shall be followed by the Design-Builder in developing the signage plan:

- The Design-Builder shall use monotube supports wherever possible
- The Design-Builder shall refer to the Signage Section for Sign Structure Locations
- The Design-Builder shall not mount major sign (such as cantilevered signs or sign bridges) on bridges.

2.15.4.1.7 Security (Right-of-Way) and Fall Protection Fencing

Aesthetic treatment of security and fall protection fencing are found in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage I. The following guidelines shall be followed by Design-Builder in developing the security and fall protection fencing plans:

- In locations where pedestrian gates are required, the Design-Builder shall provide lock or entry mechanisms consistent with WSDOT security requirements
- All fencing shall have a consistent color throughout and shall be complementary with the aesthetic theme. Refer to the Appendix L, I-405 Urban Design Criteria for Kirkland Stage I for the selected color
- All fencing shall be galvanized and powder-coated in the Duplex System standard. Refer to the American Galvanizers Association and the Powder Coating Institute for Technical Specifications.
- Refer to WSDOT *Design Manual* for additional fall protection fencing requirements.

2.15.4.1.8 Temporary Pedestrian Sidewalks

The Design-Builder shall refer to the WSDOT *Design Manual*. Refer to Appendix M1 for location and layout for all temporary pedestrian sidewalks.

2.15.4.1.9 Pedestrian and Overhead (Mainline) Lighting

Recommended pedestrian and overhead lighting selections are found in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage I. The following guidelines shall be followed by the Design-Builder in developing the roadway lighting plan:

- The Design-Builder shall incorporate lighting into the roadway plans at interchanges, ramps and below bridge structures.
- Refer to Section 2.16 for illumination design for light levels. Light levels shall minimize effects on residential property through house-side shielding or appropriate method to satisfy the requirements in the lighting section.
- Where lighting is located on bridges, the Design-Builder shall locate the poles above bridge bents to the extent practical.
- Landscape lighting effects may be employed at the interchange areas as requested and funded by the local municipalities. If lighting is used to accent features, the Design-Builder shall design the lighting levels to avoid glare, distraction, impairment of night vision, or other factors that may compromise a safe driving environment.

*2.15.4.1.10*Landscape Planting

The overall landscape design, including plant material type, sizes, density, and location, shall meet the requirement as set forth in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage. Refer to Environmental Section 2.8 and Drainage Section 2.14 for additional landscape requirements. The following are additional information on landscape planting principles to be applied on the Project:

- Plant material selection shall consider the soil conditions, slopes, growth habits, visibility issues with sight lines, signage and closed circuit television (CCTV), and watering requirements if otherwise not stated in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1.
- The Design-Builder shall utilize plant species native to or naturalized in the Project region. Plants shall be selected to meet the needs and requirements and to blend with the context of each of the various planting areas. Consider plant material long term sustainability and maintenance requirements, including watering, fertilizing, and pruning requirements of individual species; frequency of maintenance; and access by and safety of maintenance personnel.
- The Design-Builder shall consider full growth habit of plant material so that it does not cause a visibility issue sight lines and visibility of signage including viewing by closed circuit television (CCTV).
- The landscape design shall also consider travel speeds, sight distance, drainage needs, signage, maintainability and other elements that impact the safety and views of the motorists entering and leaving the Project.
- At grade separations with major roads and/or existing roadways, the landscape design shall consider visual distances from intersecting roadways.
- The requirements for each plant material type are as follows:
    - The Design-Builder shall install trees in mass plantings, either within a shrub bed or in groupings, using similar types of trees.
    - The Design-Builder shall not plant trees within the prescribed clear zone. Refer to the Tree Preservation Plan – Kirkland Stage 1 as indicated in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1.
    - The Design-Builder shall select grasses for planning adjacent to the paved roadway based upon desired height for safe viewing from vehicles, soil compatibility, reduced mowing requirements and erosion control capabilities.
    - The Design-Builder may use turf seed at interchange areas only where it can be temporarily irrigated and actively maintained but not as a dominant element throughout other parts of the Project.
- If construction activities impact vegetation outside the permanent Final ROW of the Ultimate Design, impacts must only be temporary, and the Design-Builder shall properly and promptly restore the landscape to its previous state. Refer to the Tree Preservation Plan – Kirkland Stage 1 as indicated in Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1.
- All trees, shrubs, deciduous vines and perennials shall comply with the applicable requirements of ANSI Z60. I American Standard, for Nursery Stock and current WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* as appropriate.

- The landscaping plan shall indicate the quantity, size, spacing, quality, location, and variety of all plantings. The plan shall also include a maintenance schedule insuring a neat, healthy, and orderly green space, an irrigation plan, and methods of planting on the plan.
- Landscape plans should indicate all natural features such as watercourses, bodies of water, stands of trees and individual trees having a caliper of four (4) inches or larger in diameter. The Design-Builder shall attempt to preserve and enhance these features when designing the site.
- The landscape plan shall consider existing landscape contained within adjacent Right-of-Way and properties. Although WSDOT encourages diverse and hardy plantings, a measure of connectivity to current conditions should exist to maintain corridor continuity.

Prohibited and Recommended Species – Refer to the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1 for WSDOT listing of prohibited and recommended planting species for use within the ROW.

*2.15.4.1.11*Irrigation

Wherever necessary, a temporary irrigation or watering system/method or proper soil amendment as approved by WSDOT shall be installed to keep all plantings and grass, sufficiently watered to sustain life. Temporary watering shall employ manual or mechanical methods and be reviewed and approved by WSDOT. WSDOT policy is to plant at the optimal times of year with native plant materials to avoid irrigation installation costs and future water bills.

A permanent irrigation system will only be used in areas where it is necessary for long-term health and vigor of plants (such as planting areas enclosed by retaining walls or curbs, raised beds, etc.)

*2.15.4.1.12*Grading and Drainage Aesthetics

The Design-Builder's grading plans shall comply with the following guidelines:

- Slopes flatter than 4:1 outside the clear zone are desirable, and the Design-Builder shall use them where they contribute to the quality of the existing topography, such as by "day lighting" small cut areas.
- The Design-Builder shall adjust grading in order to minimize disturbance to the existing native vegetation. Refer to Tree Preservation Plans – Kirkland Stage 1 as indicated in Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1 for minimum vegetation to be preserved.
- The Design-Builder shall incorporate rock outcroppings into the design wherever feasible. Where rock must be excavated, the Design-Builder shall preserve the remaining rock outcropping outside of the roadway safety clear zone. The Design-Builder shall determine the final shape of rock outcroppings in the field by taking into account visual and geotechnical considerations.
- Where possible, Design-Builder shall design grass side slopes and embankments to avoid the use of metal guardrails and fall restraint measures.
- The Design-Builder's drainage plans shall conform to the State requirements regarding stormwater detention and filtration. The Design-Builder is encouraged to build stormwater detention basins that are natural appearing in character, use natural stone and plantings on side slopes and meet all WSDOT requirements for highway drainage and detention.

*2.15.4.1.13*Gravel, Rock, Boulders and Inert Mulches

The Design-Builder shall incorporate rock, boulders and mulches in the landscape, particularly at the

interchange areas as dictated in the Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1. The Design-Builder shall utilize these materials in combination with plant materials and grasses to minimize the overall water demands of the Project.

- The gravel, rock and boulders used shall be typical of the area and placed in a manner that promotes the look of the existing natural environment. The inert mulches used shall also be typical of the area and creatively placed to create visual interest with WSDOT's approval.
- The Design-Builder may use inert mulches for tree and shrub planting beds. The minimum depth of mulch shall be three (3) inches. The mulch limits around shrub beds shall extend one foot beyond the expected spread of shrub growth over a five (5) year period.

2.15.4.1.14 Other Aesthetics Items

There may be opportunities for the local municipalities to add landscape and architectural enhancements to the Work, including community-sponsored and supported enhancements. The Design-Builder shall coordinate its activities and design with the CSS Team and the Kirkland Advisory Committee with WSDOT approval when developing concepts for aesthetics and landscape design treatments at the interchange areas for the Project.

2.15.4.2 Construction Criteria

2.15.4.2.1 Maintenance and Establishment Period

The Design-Builder shall care for all plants installed as a part of the Work, in accordance with the requirements of the WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* for a period of three (3) years after the date of Final Acceptance.

- During the maintenance and establishment period, the Design-Builder shall replace the plant materials when they are no longer in a healthy condition as determined by WSDOT. The Design-Builder shall make replacement plantings in the planting season, except as otherwise approved in writing by WSDOT.
- The Design-Builder shall remove dead plants within ten (10) business days of discovery, and the Design-Builder shall replace such plants during the next planting season. Replacements shall be of the same species and variety of the originally specified material, unless otherwise approved in writing by WSDOT.
- Replacement plants shall match the size of the plants immediately adjacent to it and may not necessarily be the size of the original planting. If a replaced plant requires another replacement during the maintenance and establishment period, the new replacement shall also be covered for the maintenance and establishment period.
- After Final Acceptance, WSDOT shall review the completed landscape installation with the Design-Builder's representative on a quarterly basis during the Roadside Planting and Establishment period. Plant material health, mulching, erosion controls and other maintenance concerns shall be specifically noted. Replacement needs shall be noted and directed to the Design-Builder during the Roadside Planting and Establishment period.
- The Design-Builder shall perform, at a minimum, the maintenance practices listed below for a period of three (3) years after Final Acceptance. In addition, the Design-Builder shall use as a guideline the current WSDOT *Roadside Vegetation Management Manual*.
    - Watering - A temporary watering system/method shall be installed that will keep all plantings and grass, sufficiently watered to sustain life. Temporary watering shall employ manual or mechanical methods and be reviewed and approved by WSDOT.

- Weed Control - Monitor and control weeds. Apply herbicide to isolated pockets of taller, weedy plant species, if present, in accordance with procedures contained within WSDOT *Herbicide Operations Manual.*
- Pruning - Prune damaged branches on trees and shrubs to prevent injury or disease.
- Insect and Pest Control - Monitor plant materials for any insect or pest problems that shall damage the material and mitigate the problem in a manner approved by the WSDOT.
- Erosion Control - Replace mulch around trees and shrubs to the required depth and limits. Repair eroded areas and replace as required to prevent continued erosion.
- Plant Material Replacements - Replace plant materials as required by the current WSDOT *Standard Specifications for Road, Bridge and Municipal Construction.*
- Remove noxious/nuisance species of shrub, tree and plants as dictated in the Tree Mitigation section of this document and Section 3.29.
- If grassed areas develop major weed or erosion problems, the Design-Builder shall correct the problems. The Design-Builder shall monitor and control weeds where necessary.
- The Design-Builder shall monitor the appearance of the aesthetic treatments on any walls or bridges for any defects, flaws, or vandalism during the construction period and up to Final Acceptance. The defects, flaws, or vandalism shall be noted and brought promptly to WSDOT's attention. The Design-Builder shall remedy vandalism until Final Acceptance.

2.15.5 SUBMITTALS

2.15.5.1 Initial Project Submittals

The Design-Builder shall prepare quantity takeoffs, tabulations, and backup calculations in accordance with WSDOT *I-405 CADD Manual* and WSDOT *Plans Preparation Manual* to support the quantity needs of the Quality Control and Quality Assurance Plan.

2.15.5.2 Review Submittals

2.15.5.2.1 Plans

The Design-Builder shall prepare plan sheets in accordance with WSDOT *Plans Preparation Manual*, Section 440 through 460, and Division 5 and 6. The Design-Builder shall prepare Construction Documents on WSDOT standard sheets for the bridges, retaining and noise walls, sign structures, lighting structures, other minor structures, and landscape. Refer to Section 2.12.

2.15.5.2.2 Calculations

The Design-Builder shall prepare calculations in accordance with WSDOT *Plans Preparation Manual* to support items listed in the Schedule of Values and quality needs of the QC/QA Plan.

2.15.5.3 Final Design Submittal

2.15.5.3.1 Plans

The Design-Builder shall prepare plan sheets in accordance with the Plans Preparation Manual, Section 440 through 460, and Division 5 and 6. The Design-Builder shall prepare Construction Documents on WSDOT standard sheets for the bridges, retaining and noise walls, sign structures, lighting structures, other minor structures, and landscape. A Landscape Architect licensed in the

State of Washington shall affix his/her seal, signature, date of signature, license number and date of expiration to each applicable sheet. All sheets shall be sealed and signed by a Professional Engineer licensed in the State of Washington. The plan set for bridges shall include stage construction plans. Refer to Section 2.12.

2.15.5.3.2 Calculations

The Design-Builder is responsible for completing all the calculation necessary for the design covered by the Scope of Work. The Design Builder shall prepare calculations in accordance with WSDOT *Plans Preparation Manual* to support items listed in the Schedule of Values and quality needs of the QC/QA Plan. A Professional Engineer's original signature, date of signature, original seal, registration number, and date of expiration shall appear on the cover of all calculations. The engineer-of-record shall be registered as a professional civil engineer in the State of Washington. The calculations shall include but are not limited to the following items:

- Index Sheets – Number all calculation sheets and prepare an index by subject with the correspondence sheet numbers. List the name of the project, SR Number, designer/checker initials, date (month, day and year), and supervisor's initials.
- Design Calculations – These shall include design criteria, loadings, and structural analysis, one set of moment and shear diagrams and pertinent computer input and output data. Refer to Section 2.12.
- Special Design Features – Brief narrative of major design decisions or revisions and the reason for them.
- New Deviations not included in this Request for Proposal, and Deviations modified by Design-Builder.
- Design Decision Summaries.
- Design Completed Checklist (Form 230-035). (See Appendix 1.3-A3 in WSDOT *LRFD Bridge Design Manual*).

2.15.5.3.3 Shop Drawing Submittal

The Design-Builder shall submit approved shop plans for all steel elements such as fencing, railing and light poles. The following information shall be included in the shop drawings, (if applicable):

- Material specifications (ASTM specifications, hardness, alloy and temper, etc.)
- Size of member and fasteners
- Finish (surface finish, galvanizing, anodizing, painting, etc.)
- Weld size and type and welding procedures if required
- Fabrication - reaming, drilling and assembly procedures
- Erection procedure
- Manufacturer's Cut Sheet.

Shop Plans shall be marked in the lower right corner with one of the two following categories. Shop Plans marked Approved-As-Noted shall clearly note the suggested correction.

- APP'D (Approved, No Corrections required)
- AAN (Approved As Noted – minor corrections only. Do not place written questions on an approved as noted sheet).

2.15.5.4 Project Submittals During Construction

Construction Problems or Revisions (As They Develop) – Calculations for revisions made during construction shall be incorporated into the design/check calculation file when construction is completed.

Whenever new plan sheets are required as part of a contract revision, the information in the title blocks of these sheets must be identical to the title blocks of the contract they are for.

Every revision shall be assigned a number which shall be enclosed inside a triangle. The assigned number shall be located both at the location of the change on the sheet and in the revision block of the plan sheet along with an explanation of the change.

The Design-Builder shall prepare all new and revised plan sheets in accordance with WSDOT *Plans Preparation Manual*, Section 440 through 460 and Division 5 and 6. A Professional Engineer licensed in the State of Washington shall seal and sign all new and revised plan sheets. The Engineer-of-Record shall be licensed in the State of Washington as a professional civil engineer. Refer to Section 2.12.

End of Section

2.16 ILLUMINATION

2.16.1 GENERAL

The Design-Builder shall conduct all Work to meet the requirements for permanent lighting for the Project. At a minimum, this shall include the required illumination specified in Section 840.04 of WSDOT *Design Manual*. The Design-Builder shall also design and install lighting on NE 116th Street from 120th Avenue NE to the NB I-405 off-ramp. The Design-Builder shall also design and install illumination for all mainline overhead sign panels. Refer to Section 2.22.4.4.6 for temporary lighting requirements.

2.16.2 MANDATORY STANDARDS

2.16.2.1 General

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications may be required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

2.16.2.2 Mandatory Standards

- WAC *296-46B-040* Traffic Management Systems
- *Project Special Provisions – Appendix B1*
- *Amendments to the Standard Specifications – Appendix B2*
- WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction*
- *Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1*
- WSDOT *Northwest Region Current Practices in Electrical Design*
- WSDOT *Traffic Manual*
- WSDOT *Design Manual*, including instructional letters
- WSDOT *Standard Plans for Road, Bridge, and Municipal Construction*
- WSDOT *Northwest Region Illumination and Signal Details* – Appendix T5
- WSDOT *Construction Manual*
- WSDOT *Plans Preparation Manual*
- WSDOT *Maintenance Manual*
- WSDOT *Bridge Design Manual*
- NFPA (National Fire Protection Association), *National Electric Code (NEC)*
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*
- AASHTO *Roadside Design Guide*

- EIA (Electronics Industries Alliance) Standards
- IES-RP-8 *American National Standard Practice for Roadway Lighting*
- IESNA *Lighting Handbook*
- AASHTO *An Information Guide for Roadway Lighting*
- AASHTO *Guide for Selecting, Locating and Designing Traffic Barriers*
- ITE *Traffic Control Devices Handbook*
- FHWA *Traffic Control Systems Handbook*
- ITE *Transportation and Traffic Engineering Handbook*

2.16.3 Performance Requirements

2.16.3.1 Software

The Design-Builder shall decide between various lighting software packages available for analyzing light distributions for different lighting configurations and obtain WSDOT concurrence. The software shall use data files in Illuminating Engineering Society (IES) standard format for the luminaires. Lighting analysis shall be submitted in hard copy of CDROM.

2.16.3.2 Meetings

It is recommended that the Design-Builder establish a Traffic Design Team in consultation with WSDOT to oversee and provide input on the traffic design and construction to discuss traffic-related design items including signing, pavement marking, signalization, and lighting. The Design-Builder shall schedule and chair the Traffic Design Team meetings every other week during the design stage and then monthly or as needed during construction stages until Substantial Completion. The Design-Builder shall prepare the agenda, meeting minutes, exhibits and design plans necessary for the meeting. Traffic Design Team meetings shall include representatives from the City of Kirkland and adjacent projects as required.

2.16.4 Design and Construction Requirements

2.16.4.1 Permanent Lighting Design Requirements

The Design-Builder shall provide illumination at all locations identified in Section 840.04, Required Illumination, of WSDOT *Design Manual*. On the interchanges and on the ramp terminals, the Design-Builder shall use the Light Levels and Uniformity Ratios presented in WSDOT *Design Manual* using the appropriate area classification. The Design-Builder shall remove all existing luminaire poles, cabinets, lamps and luminaires within the Project limits and replace with new lighting equipment.

The Design-Builder should consider future Stage 2 and implementation construction projects in the design of Stage 1 to minimize the need for relocating light poles and conduit.

2.16.4.1.1 Photometric Analysis

The Design-Builder shall complete a Photometric Analysis for the design that includes the following:

- Lighting intensities and uniformity, light pole locations and heights, luminaire types, wattage and brightness, and quantities of each
- Lighting calculations accounting for the anticipated loss of light due to Lamp Lumen Depreciation (LLD) and Lamp Dirt Depreciation (LDD)

- Consideration of roadway safety, ease and cost of maintenance, consistency with adjacent roadway lighting designs, annual energy costs, and provision for future lighting needs and local planning policies;
- Lighting distances from the light source at the following lighting levels: 1.0 foot-candle, 0.5 foot-candle, and 0.2 foot-candle for all edges of pavements, shoulder lines, lane lines, right-of-way, and 150 feet outside of right-of-way.

The Design-Builder shall consider the three dimensional aspects of the roadway with respect to the positioning of the illumination assemblies (i.e. roadways, ramps, overpasses, etc., are typically at varying vertical and horizontal distances from the luminaires being used to light the roadways). The analysis may be presented using two-dimensional calculations.

2.16.4.1.2 Lighting Under Structures

The Design-Builder shall provide and install suitable under deck cutoff fixtures as specified in the Project Special Provisions, Appendix B1, to satisfy lighting design criteria and standards.

Lighting under the I-405 northbound and southbound bridge structures over NE 116th Street shall be designed to provide illumination levels as required for the future Stage 2 signalized intersection and account for the future roadway width. At a minimum, the average maintained horizontal illumination levels for NE 116th Street shall satisfy the criteria as presented in Figure 4-4 of the WSDOT *Traffic Design Manual* using an Arterial highway classification and Intermediate area classification. In addition, the open area under the bridge structure outside of the roadway shall be illuminated to levels required for walkways in accordance with Appendix 2, the I-405 Urban Design Criteria for Kirkland Stage 1. The Design-Builder shall provide and install an operational lighting system satisfying these design criteria.

2.16.4.1.3 Spillover Light

When adjacent to residential areas, the maximum spillover lighting allowed shall be 0.2 foot-candles at ground level at the edge of residential properties. When cobra head fixtures are used, the Design-Builder shall install shallow glass medium semi-cut-off fixtures to limit spillover lighting outside of WSDOT right-of-way. The Design-Builder shall use shielding or adjust aiming to limit spillover light.

2.16.4.1.4 Specific Requirements

The Design-Builder shall not use high mast lighting with an H1 distance greater than 50 feet.

When encountering a retaining wall during placement of the lighting poles, the Design-Builder may mount the pole on the retaining wall if structurally sound and shall adjust the length of the pole to maintain the appropriate mounting height.

The Design-Builder shall design all new permanent lighting systems to be 240/480 volts.

The Design-Builder shall provide illumination when required in accordance with light levels and uniformity ratios provided in WSDOT *Design Manual*.

The Design-Builder shall ensure the placement of light poles and the associated conduit system do not interfere with nearby guardrail, noise walls, retaining walls, utilities, and overhead power lines when placing light poles. All conduits shall be a minimum of three feet clear of guardrail.

The Design-Builder shall provide breakaway or crash-protected permanent lighting units within the clear zone.

The Design-Builder shall provide illumination for all overhead signs.

Additional requirements for this Project:

- Full (continuous) lighting will not be required for Kirkland Stage 1. Future full lighting may be required on this segment for the Kirkland Stage 2 Project. The Design-Builder shall provide stub-outs and other provisions to accommodate future lighting requirements.
- Cabinet SUA 935 is being replaced by the Totem Lake Freeway Station/NE 128th Street Project. The Design-Builder shall replace all conductors and associated equipment connected to Cabinet SUA 935 when replacing lights within the Project limits connected to the cabinet.
- All lighting cabinets, light poles, luminaires, and conductors within the Project Limits shall be replaced.
- Along NE 116th Street, intersection level lighting shall be provided at a minimum for the length of the sag vertical curve to mitigate the stopping sight distance deficiency.

All lighting conductors shall be installed using conduits containing only lighting electrical conductors. The conduit and pull box system shall be separated from traffic signal conduits and ITS conduits, although a shared trench, shared power service and shared cabinet foundations may be used.

2.16.4.1.5 Material Requirements

The Design-Builder shall furnish and install all materials required for complete installation and operation of temporary and permanent illumination systems with the exception of electrical service cabinets, transformer cabinets and lighting control cabinets, which will be supplied by WSDOT.

The Design-Builder shall notify WSDOT a minimum of thirty (30) business days prior to requiring WSDOT supplied cabinets for installation.

The Design-Builder shall make arrangements to pick up the cabinets within five business days of notification by WSDOT that the cabinets are available. WSDOT-supplied materials will be available for pick up, dimensional or bolt pattern verification during normal working hours from the Northwest Region Signal Maintenance Office located at 3700 9th Avenue South, Seattle, WA 98134. Except for anchor bolts, the Design-Builder shall install WSDOT-supplied materials only after foundations for the equipment have cured.

Any damage by the Design-Builder to the existing illumination system must be repaired to maintain the existing illumination system in operating condition at all times.

2.16.4.1.6 Aesthetics

The Design-Builder shall design and construct all Work in compliance with the *Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1* and the requirements presented in Section 2.15.

2.16.4.1.7 Design Documentation

The Design-Builder shall provide all documents and information required for the Design Documentation Package as specified in Section 2.12.

2.16.4.2 Permanent Lighting Construction Requirements

The Design-Builder shall use approved materials as required by Section 2.25.3.

Existing illumination systems shall remain operational until new illumination systems are installed, accepted and in operation. The Design-Builder shall obtain WSDOT's approval to remove existing illumination systems or disrupt power to any illumination system.

Where temporary illumination is required, the existing illumination system shall not be removed until the temporary illumination system is operational. Only lighting equipment no longer needed for illumination of roadway as determined by WSDOT shall be removed.

The Design-Builder shall provide maintenance for permanent lighting installations within the Project Limits under the Contract until Final Acceptance by WSDOT. Refer to the Maintenance of Traffic section for additional temporary lighting requirements. The Design-Builder shall not remove existing or temporary illumination systems until approval is obtained from WSDOT.

The Design-Builder shall perform the required testing in accordance with the provisions of Section 8-20.3(11) of the Standard Specifications. WSDOT will perform the final electrical inspection and acceptance of illumination systems as required in accordance with WAC 296-46B-040.

2.16.4.2.1 Electrical Service

The Design-Builder shall coordinate with WSDOT, per Section 2.10 Utilities and Third Party Agreements, and submit the necessary design information for new and modified electrical services. WSDOT will obtain any Service Agreements from the public utility company. The Design-Builder shall pay all costs charged by the electric power companies for providing power connections. The Design-Builder shall pay the monthly electric bills starting on the day Work begins for the existing lighting and lighting installed under the Contract until Final Acceptance of the Project.

2.16.4.2.2 Salvage

The Design-Builder shall not reuse any of the materials currently in place within the Project corridor. The Design-Builder shall disconnect, dismantle and salvage all luminaire poles, cabinets, lamps and luminaires to WSDOT in accordance with Appendix B1, Project Special Provisions, "Delivery of Removed Items" subsection.

2.16.4.2.3 Conduit Installation

The Design-Builder shall not sawcut or open trench:

- Concrete pavement to be overlaid
- Asphalt after final lift of wearing course is placed
- Pavement that is to remain.

The Design-Builder shall install new conduit for the illumination system with the following exceptions:

- Existing conduit in the median for future lighting may remain in place provided it is not disturbed or impacted by the construction of this Project.
- Conduit under pavement may remain provided the conduit is free of debris and in good repair.

The Design-Builder shall install a spare 2-inch conduit associated with every conduit crossing under pavement.

All junction boxes shall be load bearing.

2.16.4.3 Special Provisions

WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1 and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require WSDOT's approval prior to application during construction.

2.16.5 SUBMITTALS

The Design-Builder shall submit a Photometric Analysis for review and obtain approval from WSDOT prior to preparing Illumination Plans. The Design-Builder shall submit Draft Illumination Plans for review by WSDOT and prepare Final Permanent Illumination Plans prior to Release For Construction plans being issued. All submittals shall follow the requirements in the Design-Build Quality Management Plan as specified in Section 2.28. All plans shall be prepared in accordance with the requirements of Section 2.12.

2.16.5.1 Photometric Analysis (30 Percent Submittal)

Photometric analysis shall be performed for all required illumination areas as described in Section 840.04 of WSDOT *Design Manual*. The analysis shall identify the mounting height, pole height, offset, spacing and lighting fixture data. Photometric data files in IES standard format for the luminaires shall be submitted to WSDOT. The Design-Builder shall provide the following analysis data for the design areas as required by Section 840.06(2) of WSDOT *Design Manual*:

- Minimum light level
- Minimum average light level
- Uniformity ratio
- Maximum veiling luminance ratio

The Design-Builder shall submit the Photometric Analysis to WSDOT with the 30 percent submittal package for review and approval.

2.16.5.2 Permanent Illumination Plans (60 Percent Submittal)

The Permanent Lighting Plans shall be prepared in accordance with NW Region Current Practices, the Photometric Analysis, and the *Plan Preparation Manual*. The plans shall include, but not be limited to, the following items:

- WSDOT-approved lighting fixtures and lamps
- Lighting poles as specified, including foundation bases and anchorages
- Service cabinet types as required, including photocells
- All wire, cable, and terminations that are needed for the complete operation of the lighting system
- Conduit, handholes, and junction boxes required for the installation
- Illumination for overhead signs
- Streetlight grounding

The Design-Builder shall submit the Draft Permanent Illumination Plans to WSDOT for review as part of the 60 percent submittal package.

2.16.5.3 Final Permanent Illumination Plans (90 Percent Submittal)

Refer to Sections 2.12 and 2.28 for submittal and review requirements.

2.16.5.4 Released for Construction (RFC) Illumination Plans

Refer to Sections 2.12 and 2.28 for submittal and review requirements.

2.16.5.5 Shop Drawings

Shop drawings and product data shall, at a minimum, include the following:

- Poles and mast arms, for each type and size
- Luminaires and lamps
- Wiring diagrams

2.16.5.6 As-Built Documentation

The Design-Builder shall submit as part of the As-Built survey base-map file data in .Cor format with x, y and z coordinates for all newly installed light standards/bases, underpass lights, handholes, and cabinets, refer to Section 2.5. Refer to Section 2.12 for additional requirements.

End of Section

2.17 TRAFFIC SIGNALS

2.17.1 GENERAL

The Design-Builder shall conduct all Work to meet the requirements for permanent signalization. This includes preparing the future traffic signal design for the SPUI to be constructed in Kirkland Stage 2 and constructing those components required to be installed in this Project, Kirkland Stage 1. Refer to the Maintenance of Traffic section for additional temporary signalization requirements.

2.17.2 MANDATORY STANDARDS

2.17.2.1 General

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list and other applicable publications may be required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

2.17.2.2 Mandatory Standards

- WAC 296-46B-040 Traffic Management Systems
- *Project Special Provisions* – Appendix B1
- *Amendments to the Standard Specifications – Appendix B2*
- WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction*
- WSDOT *Washington State Modifications to the MUTCD*
- WSDOT *Materials Manual*
- WSDOT *Northwest Region Traffic Operations RedBook* – Appendix T1 and T2
- WSDOT *Northwest Region Current Practices in Electrical Design*
- WSDOT *Traffic Manual*
- WSDOT Design Manual, including instructional letters
- WSDOT *Standard Plans for Road, Bridge, and Municipal Construction*
- WSDOT *Northwest Region Illumination and Signal Details* – Appendix T5
- WSDOT *Construction Manual*
- WSDOT *Plans Preparation Manual*
- WSDOT *Maintenance Manual*
- WSDOT *HOV Design Guide for the Northwest Region*
- FHWA *Manual on Uniform Traffic Control Devices (MUTCD)*
- NFPA (National Fire Protection Association), *National Electric Code* (NEC)
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*

- AASHTO *Roadside Design Guide*
- NEMA *National Electrical Manufacturers Association Standards*
- EIA *Electronics Industries Alliance Standards*
- TIA *Telecommunications Industries Association Standards*
- IES-RP-8 *American National Standard Practice for Roadway Lighting*
- *IESNA Lighting Handbook*
- TRB *Highway Capacity Manual*
- AASHTO *Guide for Selecting, Locating and Designing Traffic Barriers*
- AASHTO *Guidelines for Traffic Data Programs*
- ITE *Traffic Control Devices Handbook*
- FHWA *Traffic Control Systems Handbook*
- FHWA *Traffic Monitoring Guide*
- ITE *Transportation and Traffic Engineering Handbook*
- AASHTO *An Information Guide for Roadway Lighting*
- ITE *Manual of Traffic Engineering Studies*
- FHWA *Traffic Detector Handbook*

2.17.3 Performance Requirements

2.17.3.1 Software

Refer to Section 2.21 for traffic operations software requirements.

2.17.3.2 Meetings

It is recommended the Design-Builder establish a Traffic Design Team in consultation with WSDOT to oversee and provide input on the traffic design and construction to discuss traffic-related design items including signing, pavement marking, signalization, and lighting. The Design-Builder shall schedule and chair the Traffic Design Team meetings every other week during the design stage and then monthly or as needed during construction stages until Substantial Completion. The Design-Builder shall prepare the agenda, meeting minutes, exhibits and design plans necessary for the meeting. Traffic Design Team meetings shall include representatives from the City of Kirkland and adjacent projects as required.

2.17.4 Design and Construction Requirements

Modifications to the existing traffic signal system to accommodate construction of new sidewalk ramps will be required. The Design-Builder shall install new pedestrian push buttons in accordance with ADA requirements.

The Single Point Urban Interchange (SPUI) at I-405 and NE 116th Street will be constructed in two stages. Construction of the new I-405 mainline bridge structures over NE 116th Street shall be constructed in Kirkland Stage 1 which will allow for the future widening of NE 116th Street and the ramps in Kirkland Stage 2.

The existing traffic signal at the NB I-405 off-ramp to NE 116th Street is expected to remain in place and operational in Kirkland Stage 1. The new traffic signal for the SPUI will not be operational until Kirkland Stage 2. However, some items for the new SPUI traffic signal must be installed during

Kirkland Stage 1. The Design-Builder shall advance the design of the SPUI traffic signal to an adequate level of detail to identify those items required to be installed in Kirkland Stage 1 and their location.

2.17.4.1 Future Traffic Signal Design Requirements

The Design-Builder shall design a new fully-actuated traffic signal system at NE 116th Street and I-405 ramp terminals. The design shall accommodate the proposed SPUI to be constructed in Kirkland Stage 2 and include all necessary signal equipment including but not limited to the following elements:

- Location of controller cabinet
- Location of signal poles, mast arms, pedestrian push buttons and posts
- Placement and mounting details of LED signal indications including:
  - Louvered metal background shields
  - Pedestrian signal heads
- Intersection lighting
- Emergency preemption detection system
- Type 3 (round) induction loop detectors
- Conduit system including:
  - Conduit required on bridge structure
  - Conduit for interconnect between signal systems
  - Junction boxes
- Signing associated with traffic signal
- Electrical service connections and wiring
- Proposed traffic signal phasing diagrams

All traffic signal conductors shall be installed using conduits only containing traffic signal conductors. The conduit and pull box system shall be separated from lighting conduits and ITS conduit, although a shared trench, shared power service and shared cabinet foundations may be used.

Consideration of vehicle clearance must be given for placement of any traffic signal heads or other equipment under the bridge structure.

The Design-Builder shall identify components that must be designed to City of Kirkland standards and construct those elements accordingly.

The signal systems shall include LED signals for all vehicle and pedestrian signal indications. The Design-Builder shall evaluate the need for optically programmed signal heads. The location of optically programmed signal heads shall be shown on the Plans where recommended.

Components of the new signal system that must be built into the I-405 bridge structures over NE 116th Street shall be furnished, installed and constructed by the Design-Builder. The design plans shall indicate the items that will be installed by the Design-Builder and the items that are to be installed when the SPUI is completed in Kirkland Stage 2. Items to be installed by the Design-Builder in Kirkland Stage 1 shall include but not be limited to:

- Bridge Conduit System (including junction boxes and pull ropes)

- Conduit under completed ramps or other new pavement
- Traffic Signal Mounting Brackets
- Sign Mounting Brackets
- Emergency Vehicle Pre-Emption Mounting Brackets

Conduit stub-outs shall be provided and marked for identification for use in construction of the final traffic signal in Kirkland Stage 2.

The design shall account for the Kirkland Stage 2 and implementation configurations including bridge widening, and minimize the need for future modifications to the signal system.

The existing traffic signal at the intersection of NE 116th Street and the NB I-405 Off-Ramp shall remain in place. Equipment required to be relocated shall be replaced with new material to current standards including but not limited to loop detectors, pull boxes, junction boxes, conduit and conductors. If a traffic signal pole location is impacted by new geometry, the pole may be relocated onto a new foundation provided signal head placement satisfies all requirements of the MUTCD, the foundation is placed in a protected area or outside of the clear zone and the plans are approved by WSDOT. The Design-Builder shall reposition traffic signal heads as required to satisfy visibility requirements.

2.17.4.1.1 Aesthetics

The Design-Builder shall design and construct all Work in compliance with the *Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1* and the requirements presented in Section 2.15.

2.17.4.1.2 Design Documentation

The Design-Builder shall provide all documents and information required for the Design Documentation Package as specified in Section 2.12.

2.17.4.2 Permanent Traffic Signal Construction Requirements

2.17.4.2.1 General

The Design-Builder shall use approved materials as required by Section 2.25.3.

The traffic signals systems including the detection and preemption systems at NE 116th Street/120th Avenue NE, NE 116th Street/124th Avenue NE and NE 116th Street/NB I-405 Off-ramp shall be maintained in working condition at all times. The Design-Builder shall stage the construction of this revised signal system in conjunction with all corresponding road work to ensure that the in-place signal system is operational at all times.

The Design-Builder shall perform the required testing in accordance with the provisions of Section 8-20.3(11) Standard Specifications. WSDOT will perform the final electrical inspection and acceptance of traffic signal systems as required in accordance with WAC 296-46B-040.

2.17.4.2.2 Electrical Service

The Design-Builder shall coordinate with WSDOT, per Section 2.10 Utilities and Third Party Agreements, and submit the necessary design information for new and modified electrical services. WSDOT will obtain any Service Agreements from the public utility company. The Design-Builder shall pay all costs charged by the electric power companies for providing power connections. The Design-Builder shall pay the monthly electric bills starting on the day Work begins for the existing lighting and lighting installed under the Contract until Final Acceptance of the Project.

WSDOT will supply electrical service cabinets if required, see Section 2.16.4.1.5.

2.17.4.2.3 Material Requirements

The Design-Builder shall furnish and install all materials required for revisions to the existing traffic signal systems. No traffic signal materials will be provided by WSDOT for this Project. Materials shall meet the requirements specified in Section 8-20 of the Standard Specifications and as supplemented and amended by these Technical Specifications and Appendices B1 and B2.

As described in Section 2.17.4.1, traffic signal materials that must be built into the I-405 bridge structures over NE 116th Street as part of the future traffic signal shall be provided and installed by the Design-Builder. Additional materials required for the completion of the future traffic signal specified in the plans developed by the Design-Builder will be provided and installed by others in a future Project under a separate contract.

2.17.4.2.4 Operation and Maintenance

WSDOT will be responsible for the operation and maintenance of the signal controllers and signal controller cabinets for existing traffic signals which are to remain. WSDOT will also be responsible for operation of new and temporary signals from the time the signal is put into operation and accepted by WSDOT.

The Design-Builder shall be responsible for repairing, to WSDOT's satisfaction, any damage to traffic signal systems caused by the Design-Builder at no cost to WSDOT and shall take all necessary action to ensure safe operation of the intersection.

The Design-Builder shall remove all temporary signal system installations, if any, after the new permanent signal systems are completed and operational.

2.17.4.2.5 Emergency Maintenance

The Design-Builder shall notify the Traffic Systems Management Center (TSMC) and WSDOT in the event that a situation related to public safety, such as a dark or flashing signal intersection, improper pedestrian signal timing, misaligned signal heads, exposed wires, or knockdowns is observed.

2.17.4.2.6 Salvage

No signal equipment is anticipated to be removed or salvaged as part of this Project. However, any poles, cabinets or other traffic signal fixtures removed shall be salvaged to WSDOT, refer to the Project Special Provisions for delivery of removed items.

2.17.4.2.7 Conduit Installation

The Design-Builder shall not sawcut or open trench:

- Concrete pavement to be overlaid
- Asphalt after final lift of wearing course is placed
- Pavement that is to remain.

Conduit systems for lighting, signals and ITS shall be separated such that each may only be accessible in corresponding pull boxes; conduits may be installed in common trenches and utilize common power sources.

The Design-Builder shall install a spare 2-inch conduit associated with every conduit crossing under pavement.

The Design-Builder shall ensure the placement of traffic signal poles and the associated conduit system do not interfere with nearby guardrail, noise walls, retaining walls, utilities, and overhead power lines. All conduits shall be a minimum of three feet clear of guard rail.

All junction boxes shall be load bearing.

2.17.4.2.8 Permits

The Design-Builder shall request a Traffic Signal Permit from WSDOT. WSDOT will prepare the signal permit application. The Design-Builder shall provide supplemental information as described in Section 6.2 of WSDOT *Traffic Manual* as requested by WSDOT. No construction of new traffic signals may begin until an approved permit is obtained.

2.17.4.3 Special Provisions

WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require WSDOT approval prior to application during construction.

2.17.5 SUBMITTALS

The Design-Builder shall prepare final design documents for the interim traffic signal elements and the future traffic signal system located at NE 116th Street and the I-405 ramp terminals. All deliverables shall follow the requirements in the Design-Build Quality Management Plan as specified in Section 2.28. All plans shall be prepared in accordance with the requirements of Section 2.12. Refer to WSDOT Northwest Region Current Practices in Electrical Design for drawing content requirements.

2.17.5.1 Future Signalization Plans (Kirkland Stage 1 and Stage 2 Combined) (60 Percent Submittal)

The Draft Future Signalization Plans shall show all signalization required upon completion of the Kirkland Stage 2 Project. The Future Signalization Plans shall include as a minimum, the following:

- Base configuration of NE 116th Street interchange including channelization upon completion of Kirkland Stage 2
- Placement of all signal heads including pedestrian signal heads
- Location of all signal standards including pedestrian push button poles
- Location of cabinet and power source.

The Design-Builder shall submit the Draft Future Signalization Plans to WSDOT for review as part of the 60 percent submittal package.

2.17.5.2 Interim Signalization Plans (Kirkland Stage 1) (60 Percent Submittal)

The Draft Interim Signalization Plans shall show all signalization required upon completion of this Project, Kirkland Stage 1. The Interim Signalization Plans shall include all conduit, pull box and mounting bracket installations to be bridge-mounted, to be installed through foundations or retaining walls, or to be installed under ramps. The Draft Interim Signalization plans shall include as a minimum, the following:

- Base configuration of NE 116th Street interchange including channelization upon completion of this Project, Kirkland Stage 1
- Identification of all existing items to remain, to be removed or to be abandoned

- Foundation details
- Revised field wiring diagrams
- Overhead mast arm signing, if applicable
- Interconnect layout, if applicable
- Utility plan sheet

The Design-Builder shall submit the Draft Interim Signalization Plans to WSDOT for review as part of the 60 percent submittal package.

2.17.5.3 Final Interim Signalization Plans (Kirkland Stage 1) (90 Percent Submittal)

The Final Interim Signalization Plans for this Kirkland Stage 1 Project shall address and incorporate all comments received on the Draft Interim Signalization Plans.

The Design-Builder shall submit the Final Interim Signalization Plans to WSDOT for review as part of the 90 percent submittal package.

2.17.5.4 Final Future Signalization Plans (Kirkland Stage 2) (90 Percent Submittal)

The Final Future Signalization Plans will be used for Kirkland Stage 2 construction. All items to be constructed by the Design-Builder in Kirkland Stage 1 shall be shown as existing in the Final Future Signalization Plan. The Final Future Signalization Plans shall include as a minimum, the following:

- Details and standard plans
- Revised, permanent, and temporary Intersection layouts
- Revised, permanent, and temporary field wiring diagrams
- Overhead mast arm signing
- Interconnect layout
- Utility plan sheet
- As-built plan sheets of the in-place, post-Kirkland Stage 1 signal systems.

The Design-Builder shall submit the Final Future Signalization Plans to WSDOT for review as part of the 90 percent submittal package.

2.17.5.5 Released for Construction (RFC) Documents

RFC plans for the NE 116th Street and I-405 ramp terminal shall be prepared, clearly identifying which items are to be installed by the Design-Builder as part of the interim traffic signal elements and which items will be installed by others as part of the future traffic signal system.

The Design-Builder shall include the following items with the RFC Documents:

- Documentation regarding source of power and coordination with the local power company
- Design Documentation (such as clearance measures, loop test sheets, voltage drops, and conduit fill calculations).

Refer to Section 2.12 for additional requirements.

2.17.5.6 Shop Drawings

No traffic signal items requiring shop drawings are anticipated to be installed for this Project. If items such as traffic signal poles are required, the Design-Builder shall be required to provide shop drawings for such items.

Any Inspection by WSDOT will not constitute a Certificate of Materials.

End of Section

2.18 INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

2.18.1 GENERAL

The Design-Builder shall conduct all Work necessary to meet the requirements for intelligent transportation systems (ITS) and make the ITS system functional during the construction of the project and after the completion of the project. The Design-Builder shall include, but is not limited to, the following ITS elements:

- Replace two CCTV cameras located at stations 4165 and 4217 (Cameras and controller cabinet will be furnished by WSDOT. Design-Builder is responsible for the rest of the accessories needed to make it functional).
- Relocate one ramp meter, on the southbound I-405 on-ramp from NE 116th Street.
- Replace, upgrade and install new data stations within the Project limits to provide speed data at ½ mile maximum spacing within the Project limits (The controller cabinets will be furnished by WSDOT, the Design-Builder is responsible for the rest of the accessories needed to make it functional). The Design-Builder shall make sure the maximum ½ mile spacing is determined such that the distance between the data stations bordering the project limits do not exceed the ½ mile spacing.
- Install one new VMS on northbound I-405 between NE 85th Street and NE 116th Street (VMS Sign will be furnished by WSDOT, Design-Builder is responsible for the rest of the accessories that are required to install it and make it functional).
- Install new conduit and communication systems within the Project limits, including all associated cables, junction boxes, pull boxes, cable vaults and accessories.
- Replace all multimode fiber optic cable with single mode fiber optic cable from the south end of the Project limits to the BNSF railroad crossing.
- Install all necessary loop detectors.
- Install mainline loop detectors, conduits and accessories for future 116th Street southbound on-ramp to avoid future disturbance to the mainline pavement.

2.18.2 MANDATORY STANDARDS

2.18.2.1 General

The following is a list of publications that shall be used for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications may be required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

2.18.2.2 Mandatory Standards

- WAC 296-46B-040 Traffic Management Systems
- Appendix B1, Project Special Provisions
- Appendix B2, Amendments to the Standard Specifications
- Appendix B3, ITS Project Special Provisions
- WSDOT ITS Design Guide, latest edition at the time of contract execution

- WSDOT Standard Specifications
- WSDOT Northwest Region Electrical Details
- WSDOT Northwest Region Standard Plans
- WSDOT Northwest Region ITS Details
- *Manual on Uniform Traffic Control Devices (MUTCD)-WSDOT Modified*
- WSDOT *Traffic Manual*
- WSDOT *Design Manual*, including instructional letters
- WSDOT Amendments to the Standard Specifications
- All State and local codes to include, but not limited to, National Electric Code (NEC) Listing Requirements and the Uniform Building Code (UBC)
- National Fire Protection WSDOT *NEC Standards*
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals*
- AASHTO *Roadside Design Guide*
- National ITS Architecture
- NEMA National Electrical Manufacturers Association Standards
- EIA Electronics Industries Alliance Standards
- TIA Telecommunications Industries Association Standards
- NTCIP National Transportation Communications for ITS Protocol Standards
- ITE Institute of Transportation Engineers Standards
- EIA/TIA Fiber Optic Test Procedure(FOTP) Standards
- USDA United States Department of Agriculture Rural Utilities Service (RUS) Specifications

2.18.3 PERFORMANCE REQUIREMENTS

2.18.3.1 Meetings

The Design-Builder shall establish an ITS design team in consultation with WSDOT to oversee and provide input on the ITS design and construction. The Design-Builder shall schedule and chair the ITS design team meetings every other week during the design stage, then monthly or as needed during the construction stage. The Design-Builder shall prepare the agenda, meeting minutes, exhibits and design plans necessary for the meeting.

2.18.3.1.1 ITS Design Workshop

The Design-Builder shall schedule the ITS design workshop not more than sixty (60) calendar days after the execution of the Contract. The ITS design workshop shall include representatives of WSDOT and other invitees by WSDOT.

The Design-Builder shall be responsible for determining the number and location of all proposed ITS components. The Design-Builder shall document this information, along with preliminary quantities, in an ITS Conceptual Plan.

At the ITS design workshop, the Design-Builder shall present a functional ITS design with hardcopy layouts. The ITS design workshop shall include proposed approaches for and discussion of the following topic areas:

- Preliminary plan for maintaining camera operation during construction
- Fiber optic cable/conduit location
- Blown in fiber (practices and procedure)
- Splice vault location
- Cabinet locations
- Ramp metering
- Fiber optic cable splicing and testing
- Locating ITS components (ramp control signals, cameras, detection, Variable message signs)
- VMS coordination to take delivery from the WSDOT
- Salvaged items
- State provided equipment lead time
- Worker certifications
- Component testing (wire tests, loop detector testing)
- Test equipment calibration
- ITS construction Best Practices
- Documentation of all design elements
- Value Engineering proposals (if any)
- Temporary ITS devices
- Spare parts.

2.18.3.1.2 ITS Design Progress Meetings

During the ITS design development, it is recommended that the Design-Builder organize, schedule, and conduct bi-weekly meetings with the ITS design team, WSDOT, and other invitees in accordance with WSDOT's direction, to discuss goals and parameters of the ITS design. The ITS design progress meetings are intended to build consensus on system functionality as well as feasibility. It is recommended that the Design-Builder hold meetings until the design is 100 percent complete (As-Built Documents have been submitted).

To monitor design progress and assist in the conduct of these meetings, the Design-Builder shall have available for review and inspection location maps showing all proposed locations for highway ITS components and how the equipment locations interrelate to form the highway ITS component system.

For the Design Progress Meetings, the Design-Builder shall schedule, organize, and conduct the ITS design progress meetings to accomplish the following:

- Review existing ITS systems and operations, including field verification of all ITS systems and components
- Define and finalize ITS functional, technical, operational, and maintenance requirements
- Finalize goals and parameters of ITS design

- Establish integration requirements
- Develop Acceptance of ITS design
- Address and discuss ITS construction issues
- Discuss testing procedure for equipment and communication system

The Design-Builder shall provide WSDOT five (5) hard copies and one electronic copy of plans at least three (3) days prior to each ITS design progress meeting.

The Design-Builder is not required to submit training course documentation to WSDOT for the ITS work in this Project.

2.18.3.1.3 ITS Training

The Design-Builder is not required to provide training to WSDOT ITS staff for this Project.

2.18.3.1.4 WSDOT Personnel

2.18.3.1.4.1 ***ITS Implementation Engineer***

The ITS Implementation Engineer acts as WSDOT ITS expert.

The ITS Implementation Engineer performs the following:

- Recommends acceptance of components and/or methods to WSDOT
- Reviews the certification of test device calibration (to American National Standards Institute (ANSI) specified guidelines)
- Reviews and makes recommendations for acceptance to WSDOT of the required documentation including specifications, shop drawings, and all measured and recorded values for the system and for each cabinet
- Is present when splice vault, CCTV, cabinet, and communication hub locations are staked
- The ITS Implementation Engineer or representative will supervise all connections to the existing ITS communication network
- Reviews component-submittal packages
- Makes recommendations to WSDOT for the acceptance of ITS components based on the submittal and other documentation packages.

2.18.3.1.4.2 ***Electrical Inspector***

WSDOT Signal Branch office will designate an Electrical Inspector. The Design-Builder shall contact WSDOT for contact information.

The Department of Labor and Industries has authority over all electrical installation within the State of Washington. The WSDOT has been granted authority over all electrical installations within the rights-of-way of state highways, provided WSDOT maintains and enforces an equal, higher or better standard of construction and of materials, devices, appliances and equipment than is required by state law. It is the role of WSDOT Electrical Inspector to assure compliance of all electrical installations to meet the requirements of the National Electric Code and all applicable state laws and provisions.

The WSDOT Electrical Inspector performs the following:

- Assists as a resource for the ITS design team
- Assists with ITS plan reviews

- Performs periodic inspections during construction
- Witnesses required ITS field tests (as desired)
- Inspect and approve of all electrical and ITS installations provided under this RFP.

2.18.3.1.4.3 ***Northwest Region Signal Maintenance Superintendent***

The Northwest Region Signal Maintenance Superintendent is Brian Bailey, 3700 9th Avenue S., Seattle WA 98134 (206) 442-2110. The Northwest Region Signal Maintenance Superintendent supervises the maintenance of all existing WSDOT signal, illumination and ITS facilities within the rights of way of state highways.

The Northwest Region Signal Maintenance Superintendent performs the following:

- Where called for in this RFP provides State supplied ITS materials
- Where called for in this RFP accepts salvaged ITS materials
- Performs acceptance inspection of all Design-Builder installed ITS facilities prior to project completion. (Before these ITS facilities are turned over to the State to maintain).

2.18.3.2 ITS Testing

The Design-Builder shall coordinate ITS testing with the WSDOT Signal Branch Office. The Design-Builder shall provide thirty (30) calendar days notice to the WSDOT Signal Branch Office.

The Design-Builder shall have current training and certification on all testing equipment used. The Design-Builder shall provide documentary evidence that the instruments used for testing have been calibrated in accordance with the instrument manufacturer's specifications within the last twelve months. The Design-Builder shall have all testing equipment calibrated annually for the life of the Contract. Measurements recorded during the tests shall be supplied to WSDOT.

The Design-Builder shall have in its possession a certification of test device calibration (American National Standards Institute [ANSI] specified guidelines) used to measure electrical and insulation characteristics of power and signal control cables and calibration documentation of optical cable test equipment. ANSI guidelines call for annual calibration of test equipment.

Depending on the construction schedule, highway ITS components may be installed and operational and later relocated. Highway ITS components shall undergo all series of tests when relocated.

The Design-Builder shall provide a schedule for all testing to allow WSDOT personnel to observe. Time and locations for all tests shall be provided to WSDOT a minimum of five (5) working days in advance of any test.

The Design-Builder shall develop all ITS testing procedures and pass/fail requirements. Testing procedures and requirements must be approved by WSDOT prior to any testing. WSDOT may observe any tests and will audit test results.

2.18.3.2.1 Pre-Installation Test (PIT)

The Design-Builder shall perform a pre-installation test (PIT) on all ITS devices supplied by the Design-Builder under this Contract. The purpose of the PIT is to ensure that all ITS devices meet the requirements of the Contract prior to leaving the storage and testing facility.

The PIT shall be completed and all results must be accepted by WSDOT prior to installation of ITS devices. The PIT test shall include the following:

- PIT overview (objectives of the test, relationship to other tests)

- Test equipment to be used (including calibration certificates)
- Setup of test environment
- Specific methodology for each test to be completed.

The Design-Builder shall obtain WSDOT's approval of the PIT test procedures. Specific PIT requirements shall include:

- Visual Inspection: The Design-Builder shall perform detailed visual inspection to confirm that the ITS devices are in compliance with the requirements of this Contract
- Functional Testing: The Design-Builder shall perform tests to demonstrate that all functional requirements are in compliance with the Contract, in addition to all environmental testing.

For standard off-the-shelf products, submission of a warranty certificate may be used as an alternative to a PIT.

For WSDOT supplied equipment, WSDOT will do the testing and provide the results to the Design-Builder. The Design-Builder may inspect the equipment before taking delivery.

2.18.3.2.2 Proof of Performance Test (POP)

The proof of performance (POP) test shall be completed by the Design-Builder on all ITS devices including the fiber optic cable links and each electrical system supplied for this Contract, following installation and prior to ITS devices becoming operational. POP tests shall verify that the subsystem is fully functional under local control, usually independently from other portions of the Work. The POP test shall verify all essential operational features of the installed component on a stand-alone basis.

The Design-Builder shall obtain WSDOT's approval of the POP test procedures prior to commencing with the POP test.

The POP test shall be performed for all highway ITS devices at each site location. If the ITS devices and system perform trouble free for thirty (30) calendar days of continuous operation, testing may stop. If not, repairs shall be made and a second 30 calendar day test shall be conducted. This process shall continue until the system operates trouble free for 30 calendar days.

2.18.3.2.3 System Integration Test (SIT)

Following completion and WSDOT's acceptance of all POP tests, the Design-Builder shall conduct a System Integration Test (SIT) for acceptance by WSDOT to demonstrate and verify the full functionality and integrated operability of all portions of the system. The Design-Builder shall obtain WSDOT's approval of the SIT procedures prior to commencing with the SIT.

This testing shall demonstrate successful interface of all ITS devices, ramp metering control system, and with other applicable ITS related computer systems of WSDOT, with applicable local jurisdiction systems and with ITS devices installed in previous highway ITS implementation projects.

Completion of the SIT shall include a 60 day burn-in period. WSDOT shall be provided with access to all ITS devices during this period for purposes of verifying operations. The Design-Builder shall log all ITS device failures during this period and provide this log to WSDOT prior to SIT acceptance. The highway ITS devices shall exhibit a failure rate lower than what is expected during final operation during the entire burn-in period. Only failures due to activities of others, power failures, or traffic accidents are excluded. The burn-in may be repeated if other failures are experienced.

Following Acceptance of the SIT, the system shall be put into service and the system performance monitored for not less than six months to verify system reliability in an operating environment. Any failures and defects occurring during this period shall be documented. Any serious defects that affect

the functionality or availability of the system will be a basis for restarting the SIT, at which time performance shall be monitored for not less than fourteen (14) days. ITS acceptance will not occur until the monitoring period is completed.

2.18.3.2.4 Loop Detector Testing and Setup

Testing and setting up of the loop detector installation shall be in accordance with Appendix B3, Project Special Provisions and WSDOT *ITS Design Guide*.

All tests shall be performed by the Design-Builder in the presence of the WSDOT assigned Engineer for each loop. The testing shall meet the requirements of the Project Special Provisions, WSDOT *ITS Design Guide* and Section 8-20.3(14)D of the Standard Specifications.

2.18.3.2.5 Fiber-Optic Cable Testing

The Design-Builder shall develop a fiber optic system test plan which identifies the approach to performance and operational tests for the fiber optic system installed. The Design-Builder shall follow the requirements and specifications of the Project Special Provisions, WSDOT *ITS Design Guide* and WSDOT Standard Specifications and document the results as specified in the Project Special Provisions. The Design-Builder shall define the fiber optic system test plan by the information required on the fiber designation sheets and the test parameters defined in this RFP. The Design-Builder shall use the fiber optic system test plan sheets as part of the test documentation.

The Design-Builder shall notify WSDOT a minimum of ten (10) business days prior to beginning fiber optic system testing. A WSDOT representative may observe each test.

The Design-Builder shall measure the quality of each fusion splice by performing Optical Time Domain Reflectometer (OTDR) tests in the forward and backward directions and recording each reading – not the average. All events showing losses of 0.03 dB or greater shall be recorded.

The Design-Builder shall perform OTDR testing as the fibers are being spliced and after the splices are sealed in the outdoor fiber splice enclosure. Should a fiber fail either OTDR test, the Design-Builder shall re-splice that fiber and re-test all fibers disturbed in the splice enclosure.

The Design-Builder shall mark each fusion splice.

The Design-Builder shall use a light source and power meter, in accordance with EIA/TIA-455-171 FOTP-171, and TIA-526-14-A OFSTP-14, except as otherwise noted, to test the cable plant. Power meter tests shall be made shelter to shelter and spliced pigtail to shelter. The Design-Builder shall measure and record the values of the completed single mode optical link at 1,300 nanometer (nm) and 1,550 nm wavelengths. The Design-Builder shall measure and record the values of the completed multimode optical link at 850 nm and 1,300 nm.

The Design-Builder shall perform OTDR tests from shelter to shelter, shelter to hub and from spliced pigtail to shelter. The loss through a fusion splice, when measured at wavelengths of 1,300 nm and 1,550 nm for single mode; and 850 nm and 1,300 nm for multi mode, shall be no more than an average of 0.2 dB for both directions and shall be no more than 0.25 dB in any one direction.

The Design-Builder shall measure and record the following values for each furnished and installed trunk cable or pigtail:

- Cable length markings at all splice and termination locations. The objective is to accurately determine the fiber distance between splice enclosures. The Design-Builder shall estimate and record the length of the fiber stored inside the splice enclosures.
- Fiber index of refraction (usually included on the cable spool documentation).
- Attenuation of each splice in both directions.

- Attenuation of each single-mode fiber, in both directions, at 1,300 nm and 1,550 nm with an OTDR.
- Attenuation of each multi-mode fiber, in both directions, at 850 nm and 1,300 nm with an OTDR.
- Attenuation of each fiber optic link, in both directions, as measured with a light source and power meter at 850 nm and 1,300 nm for multi-mode and 1,300 nm and 1,550 nm for single mode.
- Power meter results and splice losses on the fiber optic schematics.

2.18.3.2.5.1 ***Outdoor Fiber Splice Pressure Test***

To ensure that the outdoor fiber splice enclosure is properly sealed, the Design-Builder shall use the following test procedure:

- Perform the test while the enclosure is in its final hanging position and in the presence of the ITS Implementation Engineer.
- Pressurize the enclosure to 7 to 9 psi.
- After 45 seconds, the enclosure shall not have lost more than 2.5 psi. If the pressure loss is greater than 2.5 psi, proceed to the next step for further testing.
- Pressurize the enclosure again to 7 to 9 psi and lightly spray soapy water around the seal to check for leaks. If a leak is found, repair the leak and retest the enclosure.
- The enclosure will lose air through the fiber optic cable. The soapy water test should verify the enclosure seal.

2.18.3.2.6 **Power and Control Cable Testing**

The Design-Builder shall test power and control cables according to the requirements of Section 8-20.3(11) of the Standard Specifications, Appendix B3 and the applicable sections of Appendix B2.

2.18.3.2.7 **Maintenance/Operation of Furnished and Installed ITS Components**

The Design-Builder shall provide maintenance of furnished and installed highway ITS component equipment as part of this Project until Final Acceptance of the Project unless otherwise noted.

Maintenance and operation includes the response to faults. There are three categories of faults: urgent, priority, and minor, as follows:

- **Urgent**: Any fault that causes a total failure, disruption, or system-wide disruption of the following equipment or services:
  - Communications links and equipment
  - Ramp metering facility or CCTV facility

  The response time for urgent faults of ITS components shall be less than two hours. The repair time for urgent faults of ITS components shall be less than four hours.
- **Priority**: Any fault that causes a failure or disruption of an operator workstation, local control unit for Variable Message Signs (VMS), or the VMS itself. The response time shall be by noon the next day. The repair time shall be less than four hours.
- **Minor**: Any other fault. The response time shall be by midnight of the next day. The repair time shall be less than four hours.

The Design-Builder shall supply as part of the Work a written description for providing maintenance and operation of furnished and installed ITS components. The description shall include, at a minimum, the following:

- For each highway ITS component, details of the proposed preventive maintenance program, including frequency.
- For each highway ITS component, a general description of the proposed emergency maintenance/operation response program shall be provided. This description shall include the categories of faults and how the faults will be detected.
- Maintenance/operation activities.

As of the execution of the Contract, the Design-Builder shall be responsible for any and all highway ITS/communications components that the Design-Builder works on, including those components already in place. These responsibilities include the operation and maintenance of these components until one year following ITS Acceptance.

The Design-Builder shall replace, not repair, a piece of hardware or equipment if any of the following occurs:

- The Design-Builder has attempted to repair the piece of hardware or equipment on at least one previous occasion and there has been a subsequent failure.
- The repair activities interfere with the movement of traffic.
- WSDOT decides that replacement is necessary in the interest of public safety.

2.18.3.3 Coordination with Adjoining Project

The Design-Builder shall obtain the ITS Design plans of the Totem Lake Freeway Station/NE 128th Street Project and determine the coordination requirements for continuous functioning of the ITS equipments and adjust the design and construction of this Project's ITS components.

2.18.4 Design Requirements

2.18.4.1 General Requirements

The ITS shall provide for fiber optic communications, real-time National Television System Committee (NTSC) closed circuit television (CCTV) surveillance, operations data collection, motorist information features, and traffic control devices. CCTV surveillance shall be maintained during construction.

The Design-Builder shall provide a complete, operational, and maintainable ITS and/or components. These systems and/or components shall be compatible with the in-place system. The Design-Builder shall be responsible for all electrical power service and communication necessary for the ITS system. The Design-Builder shall label the ITS devices with WSDOT-provided naming and numbering convention. The Design-Builder shall provide an ITS that meets the following requirements:

- Expandability
- Consistent cabinet layouts throughout field device locations
- Documentation reflecting National ITS Architecture and incorporated into the Statewide Architecture using Turbo Architecture software or Approved equal.
- Support stand-alone operation of all field devices using backup software components
- Protection from voltage surges and lightning

- Weather-resistant components capable of operating in rain, snow, and wind conditions and in temperature and humidity ranges encountered in the Project area
- ITS components mounted along the side of the road beyond the clear zone or in protected areas and not presenting hazards
- If ITS components are mounted in the clear zone, they shall be constructed and protected in accordance with the requirements in the AASHTO Roadside Design Guide
- Field cabinets with standard WSDOT locking devices

The Design-Builder shall use stainless steel mounting hardware (e.g., bolts, nuts, washers, and external hinges) on vaults, cabinets, shelters, junction boxes, and other outdoor ITS devices. The Design-Builder shall use only components designed for 10 or more years of industrial use.

All material, equipment, and component parts furnished shall be new (within 12 months from the date of manufacture), of the latest design and manufacture, in an operable condition at the time of delivery and installation, and compatible with the in-place system.

The Design-Builder shall not mount any ITS equipment on sign structures.

The Design-Builder shall install the cabinets in such a way that it is easily accessible to the maintenance crew from the roadway. Provisions shall be made for the maintenance crew to park their vehicles and access the cabinets. The Design-Builder shall locate the cabinets such that it eliminates the need for relocation when Stage 2 of this project is implemented.

2.18.4.2 Ramp Metering/Data Stations

The Design-Builder shall follow the requirements and specifications of Appendix B3, the Project Special Provisions, WSDOT *ITS Design Guide*, the Standard Specifications and WSDOT *Design Manual* for placement, equipment and installation requirements for data stations and ramp metering.

2.18.4.2.1 Vehicle Detection

The Design-Builder shall provide permanent detection which measures, at a minimum, vehicular volume and lane occupancy on the highway. The Design-Builder shall place permanent mainline detection at ½-mile spacing with speed detection at a maximum spacing of 1 mile. The Design-Builder shall place permanent detection in ramps, loops, auxiliary and mainline lanes.

The Design-Builder shall not exceed the maximum loop lead-in length of 500 feet. Any increase shall require WSDOT approval. Data stations shall have mainline speed loops, located 17 feet downstream of the mainline loops, used for calculating vehicle speed and length.

The Design-Builder shall not have more than 22 detector inputs per cabinet. The Design-Builder shall limit the number of speed loops to eight per cabinet.

2.18.4.2.1.1 ***Loop Detectors***

The Design-Builder shall furnish and install Type 3 induction loop detectors in accordance with the requirements of Appendix B3, the Project Special Provisions, the Standard Plans, WSDOT *ITS Design Guide*, and the Standard Specifications, unless otherwise specified.

The Design-Builder shall use preformed Type 3 induction loops with new pavement construction and place under the wearing course or in the subgrade. The Design-Builder shall use saw cut Type 3 induction loops with existing pavement. The Design-Builder shall locate detector loops in the center of the lane and approximately 3 feet from transverse panel joints.

The Design-Builder shall furnish and install loop detection on all ramps, auxiliary and mainline lanes. The Design-Builder shall furnish and install queue detection on metered entrance ramps

and collector-distributor roads. The Design-Builder shall furnish and install queue loops at the distances based on volume and storage capability of the ramp. The location of queue loops shall be determined during the ITS design workshop.

Loop detectors shall meet the requirements of Appendix B3, the Project Special Provisions and Section 8-20.3(14)C of the Standard Specifications and be tested in accordance with the requirements of the Project Special Provisions and Section 2.18.3.2.4 of the Standard Specifications.

2.18.4.2.1.1.1 Loop Conductor

The Design-Builder shall provide the loop detector performed conductor. The loop detector conductor shall meet the following requirements:

- 1/C No. 16 or 1/C No.14 XHHW or XLP stranded
- XHHW or XLP insulation
- Continuous through the loop head, tail, and entrance conduit to the junction box

2.18.4.2.1.1.2 Loop Conduit

The Design-Builder shall provide the loop detector conduit. The loop detector (design preformed) conduit shall be flexible, provide protection from moisture, provide protection from pavement expansion/contraction, and hold the loop conductor firmly in place. The loop conduit shall meet the following requirements:

- 3/8 inch inner diameter and 5/8 inch outer diameter polypropylene
- Two 5 inch expansion/contraction joints
- Each expansion/contraction joint protected with a 9-inch schedule 80, polypropylene slide cover.

2.18.4.2.1.1.3 Loop Tail

The loop detector (design preformed) loop tail shall be the part of the assembly that runs from the tee connector to the junction box.

The Design-Builder shall use a loop tail flex-hose encasement that has a seamless, urethane, non-perforated jacket reinforced with extruded polyester fiber braid. The Design-Builder shall use a non-conductive loop tail flex hose.

2.18.4.2.1.1.4 Splice Encapsulator

The splice protection device shall be Underwriters Laboratory (UL) listed. The Design-Builder shall provide and install a splice protection device to meet the following requirements:

- Usable in weather-exposed or direct-burial locations
- Allow for making splices on unshielded synthetic insulated cables
- Usable in direct-burial and submerged applications up to 600 volts
- Capable of withstanding temperatures up to 194°F
- Capable of accommodating cable and connector outside diameters of up to 5/8 inch Loop Detector (Design Saw Cut)

2.18.4.2.1.1.4.1 Loop Conductor

The Design-Builder shall provide the loop detector conductor. The loop detector (design saw cut) conductor shall meet the following requirements:

- 1/C No. 14 AWG and shall conform to ISMA Specifications 51-7
- Insulated with XLPE Jacket
- 0.25 inches in diameter
- Encased with a flexible, black, 0.032-inch thick polyethylene jacket
- Temperature rated to 205°C

2.18.4.2.1.1.4.2 Lead-in Cable

The Design-Builder shall comply with the following for the loop detector lead-in cable:

- WSDOT Project Special Provisions and WSDOT ITS Design Guide (latest version as of the execution of the Contract)
- International Municipal Signal Association Specification No. 50-2
- Lead-in cable wires shall be polyethylene insulated
- Lead-in cable shall be polyethylene jacketed

2.18.4.2.1.2 ***Non-intrusive Detection***

The Design-Builder shall use type 3 induction loops for all permanent data station and ramp meter installations. The use of non-intrusive detection technologies may be considered for temporary data collection during construction with WSDOT approval only.

2.18.4.2.2 Ramp Metering

2.18.4.2.2.1 ***Southbound on-ramp from NE 116th Street***

The Design-Builder shall evaluate the need for re-locating the control cabinet within 60 calendar days of the execution of the Contract and notify WSDOT immediately and arrange an on-site meeting to determine feasibility of relocation. If it is determined a new cabinet is required, WSDOT will furnish the cabinet and the Design-Builder shall install it and make it operational.

2.18.4.3 Closed Circuit Television (CCTV) System

Two CCTV cameras and two controller cabinets associated with the cameras will be furnished by WSDOT. All other accessories/components to make the cameras functional shall be the responsibility of the Design-Builder and shall be in accordance with the requirements specified in Appendix B3, the Project Special Provisions, WSDOT *ITS Design Guide*, applicable Standard Specifications and ITS Detail Drawings. All existing CCTV cameras including poles, cabinets and associated hardware shall be removed and salvaged to WSDOT and replaced with new equipment.

The new CCTV equipment shall be installed in approximately the same location as the existing CCTV cameras allowing for future roadway widening. CCTV cameras at interchanges shall be located so as to provide a view of the intersecting arterial.

The Design-Builder shall consult with WSDOT on the placement of CCTV hardware during the design workshop. Camera views, accessibility, and maintainability are issues of concern and the Design-Builder shall obtain approval from WSDOT on camera location. The Design-Builder shall provide a bucket truck for WSDOT personnel to inspect the camera view, to facilitate decision on camera location.

2.18.4.3.1 CCTV Camera Pole

The Design-Builder shall design the Camera Poles in accordance with the requirements of Appendix B3, the Project Special Provisions, ITS Detail Drawings and the WSDOT *ITS Design Guide*, and meet the following requirements:

- Wind velocity of 80 mph
- Service life of greater than 20 years
- Dead load of 100 lbs.
- Height of 50 ft.
- The yield strength of the standard shall be greater than 345 MPa and the tensile strength shall be greater than 485 MPa. The CCTV Camera Pole shall be fabricated from hot dipped galvanized, ASTM A572 high carbon steel. Each standard shall have the following:
  - Transformer base with grounding lugs for two 1/C No. 6 conductors and an access door
  - Mounting surface for a pan and tilt unit
  - Two equally spaced internal cable supports. The upper cable support shall be less than 10 feet from the top and held in place by the center-mounting bolt of the junction box

The Design-Builder shall paint the CCTV Camera Pole in accordance with the requirements of Appendix B3, the Project Special Provisions and WSDOT *ITS Design Guide*.

2.18.4.3.1.1 ***Lightning Protection***

The Design-Builder shall furnish and install lightning protection for the CCTV hardware.

The Design-Builder shall orient the lightning protection bracket for the environmental housing away from the freeway at approximately 90 degrees to centerline or as directed by the TSMC System Inspector.

The Design-Builder shall install a lightning protection conductor having 32 strands of No. 17 AWG tinned copper wire, 11.1 mm (0.4375 in) in diameter, a braided smooth twist, and a net weight of 97 kg (215 lb) per 305 m (1,000 ft). The Design-Builder shall connect the conductor to the standard at seven points with a conductor clamp. The conductor clamp shall

- be specially plated for use as a bimetal connection, and
- facilitate cables from 0.375 inches to 0.625 inches in diameter.

The Design-Builder shall install the top of the ground rod greater than 0.150 meters (6 inches) below the surface. The Design-Builder shall exothermically weld or use an Approved compression fitting to connect the ground conductors (standard lightning rod, standard ground lug, and JB) to the ground rod after cleaning connection points with 300-grit emery cloth.

2.18.4.3.1.2 ***Access to CCTV Camera Pole***

The Design-Builder shall construct access for maintenance vehicles, such as a bucket truck, to back up adjacent to the camera pole for repairs to camera as well as access back on to the freeway.

2.18.4.3.1.3 ***CCTV Hardware Cables***

The Design-Builder shall provide the CCTV hardware cables in accordance with the CCTV manufacturer's specifications.

2.18.4.3.1.4 ***CCTV Control Cabinet***

WSDOT will furnish the CCTV control cabinet and the Design-Builder shall provide all necessary accessories as specified in the Project Special Provisions.

2.18.4.4 Variable Message Signs

The Design-Builder shall install, test and make functional, a WSDOT furnished Variable Message Sign (VMS) in accordance with Appendix B3, the Project Special Provisions, the WSDOT *ITS Design Guide*, and the Standard Specifications, unless otherwise specified.

The Design-Builder shall install the VMS along the Project corridor, between NE 85th Street and NE 116th Street. The Design-Builder shall position the sign to achieve the optimum sight line for the vehicles driving below the sign. The new VMS shall not be mounted on or supported by roadway bridges.

The Design-Builder shall have a Structural Engineer licensed in the State of Washington design the VMS support structure in accordance with Appendices B2 and B3 and the Project Special Provisions.

A VMS sign structure, foundation, and a maintenance walkway shall be included in the construction. The sign housing shall be provided with all necessary hardware including sign mounting beams, vertical and horizontal brackets, maintenance walkways and all related hardware to install the VMS.

The maintenance walkway shall be a minimum of five (5) feet wide measured from the face of the sign and equipped with a folding handrail on the front of the walkway and either a safety chain or rail between the handrails. The walkway shall extend from the nearest edge of the pavement to 5 feet beyond the opposite end of the sign. A 5 foot platform shall be provided on both ends of the bottom edge of the VMS. All mounting hardware shall be hot-dip galvanized or stainless steel and shall conform to the G series Standard Plans and the Standard Specifications. All nuts used in the mounting hardware shall be self-locking nuts with nylon inserts.

The VMS housing structural framing, face covering, and mounting members shall be designed to withstand a wind velocity of 100 mph with a 30 percent gust factor and shall otherwise comply with the latest requirements of AASHTO's *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*.

The Design-Builder shall submit detailed structural design calculations and plans of the VMS support structure for WSDOT's review.

The Design-Builder shall refer to Appendix B3 and the Project Special Provisions for other details of the VMS sign.

The Design-Builder shall mount the VMS to the support structure. The Design-Builder shall position the signs to allow motorists to select alternate routes and to advise travelers of adverse road conditions, including construction-related congestion. WSDOT TSMC personnel will remotely operate the messages on the signs.

The Design-Builder shall account for sign viewing angle for the VMS location.

The Design-Builder shall provide VMS with a safe ingress/egress structure to accommodate maintenance personnel.

The Design-Builder shall obtain WSDOT's approval of the sign locations with safety and aesthetics considered as part of the process. An operating policy will be established by WSDOT working with the Design-Builder and the ITS design team that addresses sign messages, control, and responsibilities. Messages on the signs will be controlled from the TSMC or from a remote site, depending on the operating policy established.

The Design-Builder shall locate the VMS such that no lane closures are required to perform maintenance.

The Design-Builder shall design the support structure consistent with the provisions of the Appendix L, I-405 Urban Design Criteria.

2.18.4.5 Highway Advisory Radio

No improvements are planned to the Highway Advisory Radio (HAR) system.

2.18.4.6 Communication Network

The Design-Builder shall follow the requirements of the Project Special Provisions and WSDOT *ITS Design Guide*. The Design-Builder shall not use leased telephone lines or microwave communications on this Project.

The Design-Builder shall provide a communication network that has redundant routing capabilities and enough bandwidth to meet the operational requirements of WSDOT. Communication hardware typically consists of modems, servers, network connections, cables, connectors, and switches. The backbone of the communication network shall be fiber optic cable.

The Design-Builder shall perform the following:

- Perpetuate the existing communications functionality during the construction period at all times except for pre-approved outages by WSDOT
- Design and construct a communications network to serve the highway ITS components along the segments of the Project
- Propose solutions to achieve design objectives based on WSDOT functional, technical, operational, and maintenance requirements, in accordance with the Project Special Provisions, the WSDOT *ITS Design Guide* and the Standard Specifications.

The Design-Builder shall not substitute or apply any part or attach any piece of equipment contrary to the manufacturer's recommendations and standard practices.

2.18.4.6.1 Fiber Optic Cable

The Design-Builder shall follow the requirements of the Project Special Provisions, WSDOT *ITS Design Guide* for the fiber optic cable.

The Design-Builder is responsible for determining the number of optical fibers needed, and shall adjust the specifications accordingly (i.e. 48, 36, 24 etc. for single mode fibers and 24, 12, 2 etc. for multimode fibers).

The Design-Builder shall locate trunk fiber optic cable or cable conduit systems as close to the right-of-way line as practicable on the freeway side of sound walls and right-of-way fences. The Design-Builder shall minimize the number of transverse crossings of the freeway. The Design-Builder shall place the fiber optic trunk cable in conduit. The Design-Builder shall provide armored fiber optic pigtails between splice vaults/shelters and field device control cabinets.

The Design-Builder shall locate fiber optic trunk cable that happens to parallel overhead electrical transmission lines as far from the transmission lines as possible. The Design-Builder shall not place the fiber optic cable in the bottom of a ditch or near culvert clean-out areas.

2.18.4.6.2 Fiber Optic Cable Assemblies

Several different fiber optic cable assemblies may be required for this Project. The Design-Builder shall assemble the fiber optic cable as described in the USDA RUS 7 CFR 1755.900 specifications, Project Special Provisions, WSDOT *ITS Design Guide* and WSDOT Standard Specifications:

For the cable assemblies:

- Dielectric strength member and color-coded thermoplastic buffer tubes
- Buffer tubes that are stranded around the dielectric central strength member using the reverse oscillation stranding process
- Inner sheath applied directly over tensile strength members and water blocking material
- Minimum of a 0.055 inch thick Medium Density Polyethylene (MDPE) outer jacket containing carbon black
- Indented markings on 3-foot intervals showing the manufacturer, fiber count, mode, and length in feet

For the cable assembly of the EIA Class IV single-mode fibers:

- Diameter of the cladding within 1 μm of 125 μm
- Coating diameter within 10 μm of 245 μm
- Dual layer acryl ate coating in physical contact with the cladding surface
- Zero dispersion wavelength (ZDW) of 1,300 to 1,321.5 nm
- Cutoff wavelength < 1,260 nm
- Maximum attenuation at 1,310 nm is 0.35 dB/km and 0.25 dB or less/km at 1,550 nm
- Mode field diameter between 8.5 and 9.8 micrometers at 1,310 nm and between 9.8 and 11.2 micrometers at 1,550 nm
- Maximum dispersion ≤ 3.2 ps/nm²·km from 1,285 to 1,330 nm and < 18 ps/nm²·km at 1,550 nm
- Core-to-cladding offset (Core/cladding concentricity) ≤ 0.6 μm
- No splices in the optical fibers

The Design-Builder shall comply with the latest issue of TIA-492AAAA for multiple mode fibers. The multiple mode fibers shall have the following optical and physical characteristics:

- UV acrylate (or equal) coating
- Mechanically stripped
- Core diameter within 3 μm of 62.5 μm
- Cladding diameter within 2 μm of 125 μm
- Numerical aperture within 0.015 of 0.275
- Attenuation coefficient 3.5 dB/km or less at 850 nm and 1.0 dB/km or less at 1,300 nm
- ITC of the cable ≥ 160 MHZ/km at 850 nm and 500 MHZ/km at 1,300 nm
- ZDW 1,301.5 nm to 1,321.5 nm and zero-dispersion slope: 0.92 ps/ (nm².km)
- No splices

2.18.4.6.3 Fiber Optic Connection Components

2.18.4.6.3.1 ***Indoor Patch Cords***

For indoor patch cords, the Design-Builder shall meet the following requirements for single-mode fibers:

- Indoor patch cords shall not be armored.
- Single mode patch cord jackets shall be yellow, 3 mm (0.12 inches) outside diameter, have aramid strength members, and yellow boots.
- Patch cord fibers shall have a secondary buffer from 250 μm to 900 μm.
- Patch cords shall be individually constructed.
- Patch cords shall not have factory fusion fiber splices.
- Patch cords shall have FC-UPC connectors.
- Boots shall be glued to the patch cord jacket.

2.18.4.6.3.2 ***Indoor Pigtails***

The Design-Builder shall provide and install indoor pigtails. The indoor pigtails shall be used to terminate trunk cables, installed between a splice tray and patch panel, and described as follows:

- A single yellow outer jacket contains six color-coded 900 μm fibers.
- Plug-in receptacles with zirconia ceramic sleeves are attached for ready panel mounting.
- Breakouts are 16.4 feet long.
- All splices shall be of fusion spliced.

2.18.4.6.3.3 ***FC-UPC Fiber Connectors***

The Design-Builder shall use factory installed FC-UPC connectors with yellow boots for single mode fibers and also follow these requirements:

- FC-UPC connector loss shall be < 0.3 dB.
- Patch cords and armored pigtails shall have factory-installed connectors with return loss greater than
  52 dB for single mode.
- Connector ratings shall be from -30 to 60°C (-22 to 140°F) for operation and from -40 to 60°C (-40 to 140°F) for storage.
- Connectors shall have protective caps.
- Connectors shall be secured to the aramid fibers surrounding the individual optic fibers.
- Connector bodies shall be of one-piece construction, have metallic coupling nuts and bodies, and have zirconia ceramic ferrules.
- Bulkhead adaptors shall be of one-piece construction, have metallic bodies, and have zirconia ceramic sleeves.

2.18.4.6.3.4 ***Splice Panel Components***

The Design-Builder shall provide splice panels as needed. The splice panels shall meet the following requirements:

- Offer a combination of splicing protections and associated pigtail/fiber storage
- Compatible with a splice wheel or splice deck

- Available in 48, 96, and 144 splice capacities
- Front loaded
- Designed for a 0.483-meter (19 inch) EIA rack with brackets available to accommodate a 0.584-meter (23 inch) rack
- Hinged on one side allowing access to both the front and back of the front plate and the interior of the panel
- Provide for 0.127-meter (5 inch) recess rack mounting
- Provide for easy roll-up of pigtail and buffer tube lengths with bend radius control on the splice wheel

2.18.4.6.3.5 ***Patch Panel Components***

The Design-Builder shall provide patch panels as needed. The patch panels shall meet the Project Special Provisions and the following requirements:

- Allow for single fiber maintenance access
- Constructed of high-strength aluminum
- Equipped with metal doors with Plexiglas windows
- Available in 12, 24, 36, 48, 72, and 96 termination capacities
- Front loaded
- Designed for a 0.483-meter (19 inch) EIA rack with brackets available to accommodate a 0.584-meter (23 inch) rack
- Hinged on the left front side allowing access to both the front and back of the front plate and the interior of the panel
- Provide for pigtail storage
- Provide for 0.127-meter (5 inch) recess rack mounting
- Equipped with designation labels

2.18.4.6.4 **Wireless Communications**

The Design-Builder shall not use wireless communications between field devices and communication nodes.

2.18.4.6.5 **Twisted Pair Media**

The Design-Builder shall provide twisted pair media between field end equipment and communications nodes in accordance with Appendix B3, the Project Special Provisions, WSDOT *ITS Design Guide*, and the Standard Specifications.

2.18.4.6.6 **Camera Cables**

The Design-Builder shall follow the requirements of Appendix B3, the Project Special Provisions and the manufacturer's specifications for the camera cable.

The Design-Builder shall use coaxial cables to transmit video signal between pole-mounted cameras and video transceivers located in camera control cabinets.

2.18.4.6.7 **Conduit and Bored Conduit**

The Design-Builder shall follow the requirements of Appendix B3, Section 8-20.3(5) of the Standard Specifications and the Project Special Provisions. Mainline communication shall use two 4 inch conduits with four 1.12 inch factory silicon lined and installed, smooth-walled, inner ducts. The Design-Builder shall install all communications cables within a conduit system, direct-buried or

exposed cables will not be permitted. A minimum of two (2) inch conduits shall be provided to each cabinet or field device.

The conduit and pull box system shall be separated from lighting conduits and traffic signal conduits, although a shared trench, shared power service and shared cabinet pads may be used. Where conduit is trenched, it shall be encased in red tinted CDF and shall include a trace wire.

All conduits shall be a minimum of three feet clear of guardrail.

2.18.4.7 Junction Boxes

See Section 8-20.3(6) of the Standard Specifications and Standard Plan J-11a for junction box requirements in addition to the requirements specified in Appendix B3 and the Project Special Provisions. All junction boxes shall be load bearing. Junction boxes shall be placed at or no more than 0.25 inch below grade in an unpaved area. Junction boxes shall be sized according to the requirements specified in Appendix B3 and the Project Special Provisions, although larger junction boxes may be installed.

2.18.4.8 Cable Vault

Cable Vaults shall be installed in accordance with Section 8-20.3(6) of the Standard Specifications and the requirements specified in Appendix B3 and the Project Special Provisions. Cable Vaults shall be located with consideration for accessibility including access along arterial routes such as NE 116th Street.

2.18.4.8.1 Outdoor Fiber Splice Enclosure

The Design-Builder shall provide an outdoor fiber splice enclosure which includes an outer enclosure, an inner enclosure, and plastic splice trays.

The temperature rating for the splice enclosure shall be -22 to 140°F.

2.18.4.8.1.1 ***Outer Enclosure***

The outer enclosure shall meet the following requirements:

- Protect splices from damage
- Be of salt corrosion resistant material and compatible materials not supporting galvanic cell action
- Be re-enterable
- Permit splicing without circuit disruption
- Have a grounding lug (ground all fiber optic cable shields)
- Have cable (trunk and pigtail) strain relief and be compatible with the inner enclosure, splice trays, and cables

2.18.4.8.1.2 ***Splice Enclosure***

The splice enclosure (which allows re-entry of fiber optic cable), shall permit the cable to enter without exceeding the minimum bending radius, have non-oxidizing coating on all connections, and have a cable clamp bonding it to the armor of the cable. The enclosure shall have space to terminate up to two trunk cables and armored pigtails.

The splice enclosure shall permit selective fiber splicing (a cable can loop in and out with only the selected fibers cut). The Design-Builder shall pressurize each splice enclosure to 3 psi.

The enclosure shall expand to allow eight fiber optic cables and pigtails to enter through one end. All cables shall enter the enclosure through one end of the enclosure. The eight-cable

configuration shall include a splice case, three cable addition kits, and a triple butt adapter bolt kit.

2.18.4.8.1.3 ***Inner Enclosure***

The inner enclosure (plastic splice tray) shall meet the following requirements:

- Allow entry to individual fibers
- Be stackable
- Hold 12 splices and 24 fibers
- Not violate bare fiber bend radius
- Have room for splice identification on the cover

2.18.4.9 Grounding

Not Used, Refer to 2.18.5.2.2

2.18.4.10 Electrical Service

Not Used, Refer to 2.17.4. 2.2

2.18.4.10.1 Furnish and Install Service Equipment

The Design-Builder shall furnish and install all required service equipment. If additional transformers and electrical service cabinets are necessary, then the transformers and electrical service cabinets will be procured by WSDOT. The service equipments shall be delivered for testing, thirty (30) days ahead of installation date to:

WSDOT Northwest Region Signal and ITS Maintenance Superintendent
3700 9th Avenue S.
Seattle, WA 98134
Phone: (206) 442-2110

The business hours for the signal branch are 0600 to 1530 Monday to Friday.

The Design-Builder shall schedule an appointment not less than two (2) business days in advance by calling the signal and ITS superintendent Bryan Bailey at (206) 442-2110.

Once notified of acceptance, within five (5) business days, the Design-Builder shall move the equipment to the storage area until installation. The design-builder is responsible for providing everything necessary to unload, setup and re-load the equipment.

The Design-Builder shall process an "Application for Electrical Service" for each new power service location required.

All of the existing service cabinets shall be replaced and salvaged to:

WSDOT Northwest Region Signal and ITS Maintenance Superintendent
3700 9th Avenue S.
Seattle, WA 98134
Phone: (206) 442-2110

Payment to PSE for providing connection services, if required, shall be coordinated by the Design-Builder. PSE will submit invoices to the Design-Builder for material expense and work performed. The Design-Builder shall submit the Utility company invoice to WSDOT for payment by WSDOT.

2.18.4.10.2 Coordination with Power Utility

The Design-Builder shall coordinate with WSDOT to ensure the proper location of electrical services provided by PSE.

The Design-Builder shall provide WSDOT with the construction schedule for coordination with PSE so that power is available when needed.

2.18.5 Construction Requirements

The Design-Builder shall design the ITS system as a whole before installation of any individual field component. The Design-Builder shall not make final connections of the newly installed or temporary ITS components to the existing system until receiving approval from WSDOT. The Design-Builder shall notify WSDOT a minimum of three (3) business days in advance of staking locations for ITS devices.

2.18.5.1.1 General Requirements

The Design-Builder shall provide WSDOT x, y, z coordinates on the newly installed ITS components using GPS pathfinder .cor format:

- Loop detectors
- Loop detector junction boxes
- Control cabinets
- Camera Standards
- Variable message signs
- Ramp meters and signal standards
- Advance warning signs
- Mainline Communication Conduit every 50 feet
- Cable vaults, junction boxes and pull boxes
- Stand alone electric service pads
- Abandoned foundations

The Design-Builder shall also provide WSDOT with x, y, z coordinates on existing components within the Project limits when they are connected to the new system.

2.18.5.1.1.1 ***Surveillance to Support Motorist Information during Construction***

The Design-Builder may provide wireless communications for maintaining temporary communications with the CCTV cameras. If wireless is used, the Design-Builder shall provide 100 percent duty cycle to allow continuous polling. The Design-Builder shall provide full motion NTSC video and EIA 422 communication for pan-tilt-zoom. The Design-Builder shall submit proposed wireless components for review by WSDOT for compliance with the existing communications network.

2.18.5.1.1.2 ***Allowable Working Hours on the ITS System***

All ITS devices outside the Project limits shall not be effected by the Design-Builder and remain operable during construction of the Project. The Design-Builder shall be restricted to only work on the active part of the system from 10:00 a.m. to 3:00 p.m. and 9:00 p.m. to 4:00 a.m. The Design-Builder shall notify WSDOT Electrical Inspector 48 hours prior to performing any work on existing/active ITS devices. The Design-Builder shall perform all work in a matter ensuring the integrity and proper performance of all ITS components during these hours.

2.18.5.1.1.3 ***Repair Parts***

The Design-Builder shall identify local vendors for repair parts during construction for all ITS components, so that the parts can be obtained within 4 hours. The Design-Builder shall provide a list of vendors identified within 60 calendar days of the execution of the Contract.

2.18.5.1.1.4 ***Materials and Fabrication***

The Design-Builder shall round and smooth sharp corners and edges on all ITS components that are furnished and installed. All materials and fabrication shall comply with Appendix B3, the Project Special Provisions, the Standard Specifications and WSDOT *ITS Design Guide*.

2.18.5.1.1.5 ***Locates***

The Design-Builder shall be responsible only for equipment they have installed. WSDOT will be responsible for existing system underground locates. The Design-Builder shall utilize the One-Call number for underground locates to notify all utilities they need located performed.

2.18.5.1.1.6 ***State Provided Equipment***

Unless otherwise specified, Design-Builder is responsible for all the ITS components and material. The WSDOT will provide the following equipment:

- Closed Circuit Television System – Two each of Cohu 3955 Color Cameras, Housings, Pan/tilt/zoom Drives, Camera control cabinets, Camera control receivers, Transformers, Video Transmitters, AC/DC Adaptors, Optical Transmitters, Optical Receivers, Video Modulator, Cabinet Chassis, Optelecom 4170-LD-FC Modems.
- VMS – One *Daktronics Vanguard VF-1000-27X105-18W LED* Variable Message Sign. One Control Equipment and Cabinet and VMS Software for one VMS Sign.
- Speed Detection System – Four Controller Cabinets for Mainline Speed Detection Loops.
- Service Cabinets – Four each of Electrical Service Cabinets and Transformer Cabinets

2.18.5.1.2 Ramp Metering/Data Stations

The Design-Builder shall follow the requirements and specifications of Appendix B3, the Project Special Provisions, and WSDOT *ITS Design Guide*, for construction of data stations and ramp metering.

2.18.5.1.2.1 ***Vehicle Detection***

The Design-Builder shall install Type 3 induction loop detectors for permanent detection as described in Section 2.18.4.2.11.

2.18.5.1.2.2 ***Loop Detectors***

The Design-Builder shall install induction loop vehicle detectors in accordance with Appendix B3, Appendix I2, the Project Special Provisions and WSDOT *ITS Design Guide*. In areas where new pavement will be constructed, the Design-Builder shall install the loops in the pavement base in advance of paving operations. The Design-Builder shall coordinate detector loop installation with the base and paving operations. Paving operations shall avoid disruption of and damage to detector loops and leads.

When installing queue detection loops, the Design-Builder shall evaluate the site conditions and determine the locations of queue detection loops and the advance queue detection loops in

accordance with WSDOT *ITS Design Guide*. The Design-Builder shall consult WSDOT to determine the distance when the distance is specified as "varies" in the design guide.

2.18.5.1.2.2.1 Loop Detector (Design Preformed)

The Design-Builder shall install the conductor so it is continuous throughout the assembly. The Design-Builder shall install design preformed type 3 loop detectors in accordance with Appendix B3, the Project Special Provisions and the manufacturer's requirements.

The Design-Builder shall obtain from WSDOT the lane identification markings and place them on loop tail wires, on the lead-in wire in the junction box and on the lead-in wire in the cabinet. The Design-Builder shall identify all detectors by WSDOT standard identification system.

2.18.5.1.2.2.2 Loop Conductor

The Design-Builder shall twist the un-encased tail wire to the junction box three turns per foot and it shall be installed in conduit.

2.18.5.1.2.2.3 Loop Conduit

The Design-Builder shall fill the loop conduit with 3M 5000 sealant or equivalent approved by WSDOT.

2.18.5.1.2.2.4 Loop Conduit Head

The Design-Builder shall attach the loop detector (design preformed) and loop conduit head to the PVC/preformed loop lead encasement with a schedule 80 CPVC tee.

2.18.5.1.2.2.5 Loop Tail

The loop tail shall consist of protected and unprotected lead wire. The protected lead portion shall be between the tee connector and the 0.75-inch NMC entrance to the junction box.

The Design-Builder shall completely fill loop tail flex hose encasement with 3M 5000 sealant or equivalent approved by WSDOT. The length of the loop tail flex hose encasement shall be the distance from the loop head tee connector and the junction box entrance conduit plus 1 foot. The loop tail varies in length depending on lane location.

2.18.5.1.2.2.6 Loop Requirements

The Design-Builder shall be responsible for ordering loops with the proper dimensions and grades of materials. Note the preformed loop detector installed in the grade (below the pavement) has five turns of No. 16 or No. 14 XHHW or XLP insulated wire.

2.18.5.1.2.2.7 Lead-in Cable

The loop detector lead-in cable shall comply with the requirements of Appendix B3, the Project Special Provisions and the Standard Specifications.

2.18.5.1.2.2.8 Splice Encapsulator

Not Used.

2.18.5.1.2.2.9 Protecting Lead Ends

The Design-Builder shall protect loop wire ends (whenever the loop wire ends are not immediately spliced to the 2/C No. 14) in the junction box by

- encapsulating the wire ends (with WSDOT approved encapsulator), and
- attaching the protected wires to the eyebolt near the top of the junction box (and install an eye bolt if the eye bolt is missing).

2.18.5.1.2.2.10 Splicing Requirements

For loop detector splice requirements the Design-Builder shall use the Project Special Provisions and follow the construction requirements provided in Appendix T5, 11.01E and 11.02E for building the loops.

2.18.5.1.2.2.11 Loop Installation

For loop installation, the Design-Builder shall comply with Section 8-20.3(14) of the Standard Specifications, Standard Plan J-8c and these requirements:

- Junction box entrance conduit shall be furnished and installed.
- Loop tails shall enter an appropriately sized junction box entrance conduit.
- WSDOT shall be notified as soon as the preformed loop, the lead-in cable, and the splice are installed. A WSDOT representative will test the loop and lead-in and terminate the lead-in within seven days.

2.18.5.1.2.3 ***Loop Detector (Design Saw Cut)***

The Design-Builder shall obtain from WSDOT the lane identification markings and place them on loop tail wires, on the lead-in wire in the junction box and on the lead-in wire in the cabinet. The Design-Builder shall use WSDOT standard identification labels.

2.18.5.1.2.3.1 Detector Loop Conductor

The Design-Builder shall splice the detector loop conduit to the 2/C No. 14 in the junction box.

2.18.5.1.2.3.2 Lead-in Cable

The Design-Builder shall connect the detector loop and the instruments in the control cabinet with the lead-in cable.

2.18.5.1.2.3.3 Loop/Lead-in Splice Encapsulator

The Design-Builder shall install a splice encapsulator manufactured for buried power cable splices. The encapsulator shall be constructed of a plastic tube, with end caps that function as spouts, and a two-part plastic envelope. The envelope shall contain resins that turn black when mixed and become hard when cured.

2.18.5.1.2.3.4 Junction Box Entrance Conduit

The Design-Builder shall furnish and install junction box entrance conduit. The Design-Builder shall protect the tails of the detector loop with an appropriately sized (see Standard Plan J8-a) non-metallic conduit (NMC) between the edge of traveled way and the junction box. The Design-Builder shall seal the openings cut in the junction box to insert conduit with a material compatible compound to make the opening watertight.

Conduit placement may require cutting and removing of some shoulder material.

2.18.5.1.2.3.5 Installing Detector Loop Wire and Lead-in Cable

The Design-Builder shall use a flat strap to pull cable through conduit to alleviate damage to the NMC bushings in the junction box. The Design-Builder shall be permitted to pull cable with round rope in conduit that has a rigid steel conduit bushing.

2.18.5.1.2.3.6 Protecting Wire Ends

The Design-Builder shall protect un-spliced loop wire and lead-in wire ends whenever wire ends are left exposed in a junction box for extended periods (more than three days) or whenever water is present.

2.18.5.1.2.3.7 Splice Requirements

The Design-Builder shall splice the detector loop wire in accordance with the requirements of Appendix B3, the Project Special Provisions and Appendix I2, ITS Details, Electrical Detail on sheets.

2.18.5.1.2.3.8 Splicing an Existing Lead-in Cable to a New Detector Loop

The Design-Builder shall verify that existing loop identification markings (lane and cabinet identification) are correct prior to cutting the splice to the lead-in cable. The Design-Builder shall splice the existing lead-in cable to the new detector loop. The Design-Builder shall notify WSDOT following the installation of the splice.

2.18.5.1.2.3.9 Testing and Setting Up the Loop Detector Installation

The Design-Builder shall test and set up the loop detector (design saw cut). The Design-Builder shall be responsible for notifying WSDOT when the loop and lead-in wire are ready for testing and termination. A WSDOT representative will test the loop and lead-in and terminate the lead-in within seven (7) days. The tests will be conducted in accordance with WSDOT Project Special Provisions.

2.18.5.1.2.3.10 Terminating Lead-in Wires in the Cabinet

Detector loop lead-in cables shall be terminated on the compression terminal block in the control cabinet. The WSDOT Electrical Inspector will terminate the loop lead-in cable.

2.18.5.1.3 Non-Intrusive Detection

The Design-Builder shall use induction loops for all permanent data station and ramp meter installations. The use of non-intrusive detection technologies may be considered for temporary data collection during construction with WSDOT approval.

2.18.5.2 Ramp Meter Stations

Ramp meters shall be constructed of nonferrous materials, have the proper signing, and comply with Section 8-20 of the Standard Specifications, Appendix B3, and the Project Special Provisions.

Reconfiguration of the on-ramp from NE 116th Street to southbound I-405 will require relocation of the existing two-lane ramp meter DURING Stage 2 of this project; therefore, the Design-Builder shall place necessary data loops in the mainline. The ramp metering stations shall be provided and installed in accordance with Appendix B3, the Project Special Provisions and the WSDOT *ITS Design Guide*.

The Design-Builder shall not disconnect power to the existing ramp meter system more than one Day prior to the salvage operation. The Design-Builder shall not disconnect the existing ramp metering system without having indications covered.

2.18.5.2.1 Ramp Meter Signal Foundation

The Design-Builder shall comply with Appendix B3, the Project Special Provisions, the Standard Specifications and the WSDOT *Highway Design Manual* when constructing the ramp meter signal foundation.

2.18.5.2.2 Grounding

The Design-Builder shall perform grounding in accordance with Appendix B3 and the Project Special Provisions.

2.18.5.2.3 Ramp Meter Pole

The Design-Builder shall install for the ramp meter signal and flasher pole two components, the pole base and the pole shaft. The Design-Builder shall install the ramp meter signal and flasher poles in accordance with the applicable provisions of Standard Plan No J-7a and Section 8-20 of the Standard Specifications.

2.18.5.2.4 Signal Head Assembly

The Design-Builder shall construct the ramp meter signal housings of yellow polycarbonate and otherwise compliant with Section 8-20 of the Standard Specifications, Standard Plan J-7a, Appendix B3 and the Project Special Provisions.

The Design-Builder shall install powder coated cast aluminum background shields, with reinforced edges on the upper heads. The Design-Builder shall not install a background shield on the lower heads.

The Design-Builder shall install metal reinforcement plates for the top and bottom of the polycarbonate signal head to improve the structural stability of the signal head-mounting bracket.

2.18.5.2.5 Control Cable and Connections

The Design-Builder shall install general purpose ramp meter signal and flasher control cables rated for 600 volts. The Design-Builder shall comply with the IMSA specifications for the control cables.

2.18.5.2.6 Ramp Control Signal Signing

Design-Builder shall provide all necessary signing in accordance with the Project Special Provisions, WSDOT *ITS Design Guide* and WSDOT *Design Manual*.

2.18.5.2.7 Salvage

The Design-Builder shall salvage the following components of the in-place ramp meters:

- Poles (if aluminum)
- Non-metallic signal heads.

The Design-Builder shall haul salvaged poles and signal head materials to:

WSDOT Northwest Region Signal and ITS Maintenance Superintendent
3700 9th Avenue S.
Seattle, WA 98134
Phone: (206) 442-2110

2.18.5.3 Closed Circuit Television (CCTV) System

The Design-Builder shall install WSDOT furnished cameras and controller cabinets. All other accessories required to make the CCTV system functional shall be furnished by the Design-Builder and installed in accordance with Appendix B3, the Project Special Provisions, the Standard Specifications and WSDOT *ITS Design Guide*. The Design-Builder shall notify WSDOT when the installation of the CCTV hardware is complete.

2.18.5.3.1 Salvage

The Design-Builder shall salvage the CCTV cameras and the camera poles.

The Design-Builder shall haul salvaged CCTV cameras and the camera poles to:

WSDOT Northwest Region Signal and ITS Maintenance Superintendent
3700 9th Avenue S.
Seattle, WA 98134
Phone: (206) 442-2110

2.18.5.4 Variable Message Sign

The Design-Builder shall install WSDOT furnished cameras and controller cabinets. All other accessories required to make the CCTV functional shall be furnished by the Design-Builder and installed in accordance with Appendix B3, the Project Special Provisions and the WSDOT *ITS Design Guide*. The Design-Builder shall notify WSDOT Electrical Inspector when the installation of the CCTV hardware is complete.

The Design-Builder shall notify WSDOT a minimum of 120 business days prior to requiring the VMS installation.

The Design-Builder shall make arrangements to pick up the VMS and cabinet within 5 business days of notification by WSDOT Signal Branch office that the VMS is available.

WSDOT-supplied materials will be available for pick up and inspection during normal working hours from the Northwest Region Signal Maintenance Office located at 3700 9th Avenue South, Seattle, WA 98134.

The Design-Builder shall supply all equipment needed to load, transport, and unload the VMS.

2.18.5.5 Highway Advisory Radio

No improvements are planned to the Highway Advisory Radio (HAR) system for this Project.

2.18.5.6 Communication Network

The Design-Builder shall furnish (except WSDOT furnished equipments discussed in this RFP) and install materials and equipment such that highway ITS communications network is functional and the components shall be composed of identical sub-components. Identical sub-components shall be defined as components of the same manufacturer, model, and installation configuration. The highway ITS communications sub-components include the following:

- Fiber optic cable
- Communication end equipment

- Splice vaults, splice enclosures, and fiber optic connection components

All locations containing identical equipment shall be configured and wired in a consistent if not identical manner by the Design-Builder, including internal wiring and harnesses, wiring color codes, labeling terminal block positions, termination strips, power service configuration, and panel and equipment mounting and locations.

2.18.5.6.1 Fiber Optic Cable

The Design-Builder shall install fiber optic cable in accordance with Appendix B3, the Project Special Provisions WSDOT *ITS Design Guide* and Section 9-29.3(1) of the Standard Specifications.

The Design-Builder shall repair each active fiber optic cable that is severed or otherwise rendered not usable by Contract activities. Liquidated Damages may apply in accordance with the Project Special Provisions. The penalty shall begin two hours after the Design-Builder severs the cable, or otherwise renders the cable not usable, and continue until the permanent repair is complete or until an Accepted temporary splice is installed. A part of an hour counts as a full hour. The Design-Builder shall notify WSDOT Electrical Inspector as soon as the cable damage is discovered.

The Design-Builder shall exercise caution and dig by hand when exposing an existing fiber optic cable. The Design-Builder shall report all nicks or abrasions to WSDOT Electrical Inspector prior to making repair. The Design-Builder shall not exceed the bending radius while handling and rerouting the cable.

The Design-Builder shall use lubricants referenced in the Project Special Provisions during cable pulling operations. The lubricants shall be compatible with cable insulation materials and shall not deteriorate the cable insulation. The Design-Builder shall use stock approved splice kits to repair any WSDOT fiber optic cable damaged by Construction activities. In the event a cable is severed or otherwise rendered not usable by Contract activities the Design-Builder shall perform the following steps:

- Use mechanical splices to make the initial emergency repair to fiber optic cable. It is not necessary to install the mechanical splices if all fibers (severed and not severed) are fusion spliced within 24 hours of severing the cable. Install the splices in existing splice vaults using all of the materials required for splicing furnished and installed fiber optic cable. The fusion splices shall meet the requirements of splices in furnished and installed fibers. The Design-Builder shall install approved fiber optic cable (with fusion splices) before WSDOT accepts the Contract.
- Install new cable between existing terminations or vaults as appropriate for cable severed by Contract activities.
    - If minor nicks or abrasions occur the Design-Builder shall seal all nicks or abrasions with rubber splicing tape. If the cable jacket is nicked so deeply that the armor is exposed, the Design-Builder shall use an epoxy repair kit over the damaged area.
    - The Design-Builder shall furnish and install new fiber optic cable for this Project.

2.18.5.6.1.1 ***Armored Fiber Optic Pigtails***

The Design-Builder shall use armored fiber optic pigtails (six single mode) for outdoor use, and they shall not be direct buried unless otherwise permitted by WSDOT. The physical design for the cable assembly and the fiber specifications apply to the construction of armored fiber optic pigtails:

The following requirements apply to the installation of armored fiber optic pigtails:

- The Design-Builder shall remove the following lengths of outer jacket and armor from behind the breakout to allow for attaching the sheath grounding unit lead to the cable as close as possible to the cabinet ground buss. The Design-Builder shall remove 6 inches of the outer jacket of cable terminating in the local control cabinet for CCTV. The Design-Builder shall remove 8 feet of the outer jacket of cable terminating in a 334 series cabinet. The Design-Builder shall remove 13 feet of the outer jacket of cable terminating in a shelter cabinet. The Design-Builder shall bond a sheath grounding unit lead to the armor of the cable 3.28 feet in length and terminate at the ground buss. The Design-Builder shall label the cable near its cabinet entry point using white tape with cable name and meter marker.
- The Design-Builder shall use caution when handling the breakout portion of the armored pigtail since fiber splices under the breakout are vulnerable to damage from pressure. Within control cabinets inside the patch panel, the Design-Builder shall provide strain relief on the inner jacket of the pigtail, not on the breakout.

The Design-Builder shall coil 60 feet of the armored pigtail in the splice vault.

Factory terminated indoor pigtail breakouts shall be described as follows:

- Secondary buffer from 250 µm to 900 µm.
- One end shall be terminated with FC-UPC connectors for single mode.
- The individual 0.118 inch outer jacket shall be labeled with the fiber number (place the fiber number label within 3 inches of the connector).
- The breakouts shall be 4 feet in length.

2.18.5.6.1.2 ***Fiber Optic Cable Installation***

The Design-Builder's cable installation shall conform to Appendix B3, the Project Special Provisions and the following:

- The Design-Builder shall pre-rip the route for direct buried fiber optic trunk cable and armored pigtails. The pre-ripped route shall be 36 inches deep. The Design-Builder shall not use a single piece of equipment to pre-rip the route and plow in the conduit at the same time. Pre-ripping the route and plowing in the conduit are separate operations and shall be done separately by the Design-Builder.
- The Design-Builder shall calculate the expected tension on fiber optic trunk cable and pulling tape prior to installing trunk cable in conduit runs. The Design-Builder shall distribute the pulling force between the inner strength member and the aramid fibers by securing both to the main pulling device.
- The Design-Builder shall use a "break-away" type pulling attachment to protect against over stressing cable. The Design-Builder shall not use a cable grip that pulls only on the outer jacket to pull fiber optic cable.
- The Design-Builder shall backfill open trench installations of trunk cable and armored pigtails with granular material 6 inches over the cable elevation.
- Damage to the cable from any source which exceeds the manufacturer's recommended tensile strength limits or cable-bending radius is cause for the cables to be rejected. The Design-Builder shall ensure a minimum loaded bend radius of 10 inches and minimum installed bend radius of 8 inches.

2.18.5.6.1.3 ***Air-Assisted Fiber Optic Cable Installation***

The Design-Builder shall ensure that the duct system is properly installed with pressure-tight splices by performing the following:

- Sealing one end of the duct and pressurize the duct using a sealed blowing machine
- Maintaining a 130 psi pressure without a significant loss
- Using care around pressurized ducts

For high-speed air blowing, the Design-Builder shall end-cap the front end of the cable so that it does not hang up in the duct. The Design-Builder shall use proper air seals to fit the outer diameter of the cable being pushed.

The Design-Builder shall clean, dry, and prove that the duct is not crushed and properly spliced. The Design-Builder shall prove this by performing the following:

- Blow a hard tight mandrel through the duct to establish the duct is not crushed.
- Blow a tight fitting foam carrier through the duct at a high pressure. The foam shall travel at 100 ft/s.
- If excess water or dirt comes from the duct, repeat the process until minimal water and dirt is extruded.
- Dry the duct with airflow.

For high-speed air machines (no missile), the Design-Builder shall inject the recommended amount of approved lubricant and spread it with a foam carrier. For piston-type machines, the Design-Builder shall inject the majority of the lubricant in front of the missile with some placed behind the missile.

The Design-Builder shall hook the blowing machine to the duct. For push/pull machines, the Design-Builder shall attach the piston to the cable and insert the piston into the duct. For high-speed blowing machines, the Design-Builder shall hand push approximately 100 feet of cable into the duct prior to activating the machine.

The Design-Builder shall use caution when bringing up the air and hydraulic pressure.

2.18.5.6.1.4 ***Air-Assisted Fiber Optic Cable Installation***

The Design-Builder shall use air-assisted cable installation methods for all trunk fiber cables installed. Fiber shall be blown from vault to vault or vault to shelter or shelter to hub.

2.18.5.6.1.5 ***Fiber Optic Cable Splicing***

The Design-Builder shall splice fiber optic cable as part of the fiber optic pigtail termination as specified in Appendix B3 and the Project Special Provisions.

The Design-Builder shall only fusion-splice the fiber optic cable. Cable splices will only be allowed with the approval of WSDOT and only at the location specified and then only when there are no practical alternatives. Splices shall be made only in cabinets and splice vaults using WSDOT approved splice closures.

The Design-Builder shall strictly follow the fiber optic cable manufacturer's methods, recommendations, materials, and techniques for splicing.

The Design-Builder's splicing equipment shall be in good working order, properly calibrated, and meet all industry standards and safety regulations. The cable preparation, closure installation, and splicing shall be accomplished in accordance with industry standards.

To minimize mechanical stress and splicing locations, cables shall be trained into final position observing minimum bending radii of the cable of not less than 20 times the diameter of the cable or as specified in the manufacturer's requirements, whichever is greater.

Cleanliness and freedom from contamination shall be strictly observed with respect to splicing materials and joint construction. Upon completion of the splicing operation, the Design-Builder shall deposit all waste material in suitable containers, remove from the job site, and dispose.

2.18.5.6.1.6 ***Fiber Optic Connection Components***

Fiber optic connection components may be necessary to connect Project-installed cable to the ITS communications network. The Design-Builder shall follow the requirements of the necessary components in the following sections.

2.18.5.6.1.7 ***Indoor Patch Cords***

Not used.

2.18.5.6.1.8 ***Indoor Pigtails***

Indoor pigtails (six single mode) shall be required for field splicing, for connecting armored pigtails, and for connecting to patch panels for fiber splicing and testing at trunk cable termination points.

The ADC 6-pak, FL2-6PLSC605R, complies with this specification for single-mode, 5-meter (16.4-foot) pigtails. The Design-Builder may propose to construct indoor pigtails that are compatible with existing fiber management equipment. The ADC 6-pak, FL2-6P5BC605R, complies with this specification for multi-mode.

2.18.5.6.1.9 ***FC-UPC Fiber Connectors***

All Fiber Optic Connectors shall be of FC-UPC and factory-connectorized.

2.18.5.6.1.10 ***Splice Panel Components***

Not used.

2.18.5.6.1.11 ***Patch Panel Components***

The Design-Builder shall move the fiber distribution frame, patch panel, and splice panel from the existing to the required shelter. The Design-Builder shall provide additional matching fiber distribution components as needed (e.g., splice panel, patch panel, patch cords, and six packs). Other shelters will require additional components provided by the Design-Builder.

2.18.5.6.1.12 ***Fiber Optic Cable Identification Requirements***

The Design-Builder shall identify all fiber optic cable whenever the cable is entering or leaving a vault, junction box, housing, or enclosure and at all terminals. The Design-Builder shall use permanent non-conducting white colored heat shrink wraps with identification based on the ITS detail sheets fastened securely to the cables.

The Design-Builder shall use cable designations that consistently conform to the Accepted overall scheme developed by the Design-Builder to indicate location, circuit, device, cable number, terminal branch, position, etc. Letters and numbers shall be used by the Design-Builder.

The outer jackets shall have the surface printed with manufacturer's identification, date of manufacture, and manufacturer's part number.

2.18.5.6.2 Wireless Communications

Not used.

2.18.5.6.3 Twisted Pair Media

Not used.

2.18.5.6.4 Camera Cables

Not used.

2.18.5.6.5 Conduit and Bored Conduit

The Design-Builder shall follow the requirements of Appendix B3, Section 8-20.3(5) of the Standard Specifications, the Project Special Provisions and WSDOT *ITS Design Guide*.

The Design-Builder shall furnish and install new conduit for this Project.

The Design-Builder shall not direct-bury fiber optic cable on this Project. The Design-Builder shall install armored fiber optic cables in conduit for the entire length of the corridor. The Design-Builder shall use high density polyethylene non-metallic conduit (NMC).

The Design-Builder shall ensure the conduit and conduit splices sustain a pressure of 150 psi.

The Design-Builder shall install conduit systems for power and communication systems that comply with the NEC and the local standards. The Design-Builder shall not use buried rigid steel conduit (RSC) except for under rail crossings as negotiated with Railroad companies and under bridges.

The Design-Builder shall immediately cap all open ends of installed conduit until cables are installed.

"Abandon conduit" shall mean the Design-Builder removes the abandoned cables.

Standard bell ends shall be installed on all conduit ends by the Design-Builder to prevent damage to the installed cable.

The Design-Builder shall install locator balls at the ends of all conduit runs. The Design-Builder shall bury the locator ball within 1 foot of the finished grade.

With open trench installations of NMC across roadways, the Design-Builder shall place the conduit a minimum of 3 feet below the bottom of the pavement. The Design-Builder shall place granular material in the bottom of the trench and shall compact the granular material to a depth of 6 inches over the top of the conduit.

The Design-Builder shall install a 3.15 inch wide, stretchable, orange warning tape between 18 inches and 12 inches below the surface over all conduit bearing communications cables. The tape shall bear the permanent legend "CAUTION: WSDOT CABLE BELOW."

The Design-Builder shall install NMC used for fiber optic cable a minimum of 36 inches below the finished grade.

The Design-Builder shall use orange colored split conduit or half non-metallic conduit (FNMC) to protect fiber optic cable through junction boxes. The Design-Builder shall extend the conduit 2 inches beyond the interior junction box walls and seal openings cut in the junction box with a material compatible compound to make the opening watertight.

2.18.5.6.5.1 ***Existing Conduit Systems***

Existing conduit systems may consist of stick PVC, stick polyethylene, continuous polyethylene, or Rigid Steel Conduit (RSC).

When installing fiber optic cable assemblies in existing conduits through existing junction boxes, the Design-Builder shall check the cable route to ensure that there is a smooth transition between exit and entrance elevations and that the horizontal angle is not so sharp as to cause damage to the cable as it is being pulled through the existing conduit. If the Design-Builder encounters sharp bends, the Design-Builder shall reinstall conduit to provide a smooth transition.

The Design-Builder shall clean the existing conduit of any debris that could impede pulling fiber optic or copper cable through it or that could damage the cable if the debris remained.

2.18.5.6.5.2 ***Non Metallic Conduit (NMC)***

The Design-Builder shall use NMC PVC schedule 80.

2.18.5.6.5.3 ***Directionally Bored NMC***

The Design-Builder shall use a SDR 13.5 polyethylene conduit whenever conduit is directionally bored under an existing roadway or under other paved surfaces. Longer bores may require SDR 11 polyethylene conduit due to high tensile stress during installation. If the inside diameter is 2 inches or less the Design-Builder shall use SDR 11 polyethylene conduit.

When installing conduit under slope paving, the Design-Builder shall use directional boring so as to not damage the slope paving.

The Design-Builder shall install directionally bored conduit 60 inches below the bottom of the finished driving surface. The bore under the roadway surface shall extend 10 feet beyond the pavement edge or curb line. The Design-Builder shall make a smooth transition from the routine 36-inch depth of direct-buried cable to the 60-inch depth under a roadway or paved shoulder.

2.18.5.6.5.4 ***Air Assisted Fiber NMC***

The Design-Builder shall place the NMC for air assisted fiber optic cable a minimum of 36 inches below the finished grade.

The Design-Builder shall install the conduit as a continuous flexible duct and direct buried. The Design-Builder shall meet the following specification for NMC for air assisted fiber:

- 1.5-inch high density polyethylene (HDPE) duct
- Minimum pressure rating of 130 psi

WSDOT prefers the Design-Builder to plow in the duct versus trenching in the duct.

For blown-in fiber optic cable, the Design-Builder shall pre-rip the route for direct buried conduit. The Design-Builder shall pre-rip the route 36 inches deep. The Design-Builder shall not use a single piece of equipment to pre-rip the route and plow in the conduit at the same time. Pre-ripping the route and plowing in the conduit are separate operations and shall be done separately by the Design-Builder.

The Design-Builder shall backfill the open trench installations of NMC with granular material 6 inches over the conduit elevation.

2.18.5.6.5.5 ***Conduit Signing***

The Design-Builder shall mark all fiber route changes in direction with buried cable signs. Buried cable signs shall comply with Appendix B3, the Project Special Provisions, WSDOT *ITS Design Guide* and the Standard Specifications. The Design-Builder shall install the signs as follows:

- On 7-foot by 2-pounds-per-foot galvanized posts
- Spaced no more than 500 feet apart along the fiber optic cable route
- Between the cable and the Right-of-Way marker, offset 3 feet from the cable trench
- Sign bottom shall be 4 feet above the ground

To enhance the visibility of buried cable signposts, the Design-Builder shall install an orange plastic resin sheath on the above-ground portion of each post below the bottom of the sign. The orange plastic resin sheath shall meet the following requirements:

- Triangular
- Temperature stable from -30 to 150°F
- Ultraviolet (UV) resistant
- Made of 100 percent recycled plastic resin

2.18.5.6.6 Electric, Electronic, Variable Message Sign Control, Video and Telephone Cables

Electric, electronic, VMS control, video, and telephone cables may exist within the Project limits and may be impacted by construction activities and/or require replacement. The Design-Builder shall exercise caution when working near existing cables. When exposing the existing cables, the Design-Builder shall dig by hand.

Industry-accepted lubricants used during cable pulling operations shall be compatible with cable insulation materials and shall not degrade the cable insulation. The Design-Builder shall stock Approved splice kits to repair any cable damaged by construction activities. When making temporary twisted pair control cable splices, the Design-Builder shall use button style, gel filled, crimp-on butt splices enclosed in zippered poly bags. The Design-Builder shall protect the splices above ground until the permanent splices are installed.

For cable severed by Contract activities, the Design-Builder shall install new cable between existing terminations or vaults as appropriate.

The Design-Builder shall seal all nicks or abrasions caused when exposing a cable by hand digging with rubber splicing tape. The Design-Builder shall seal a nick penetrating the cable jacket to the armor with a cast epoxy kit using 3M Scotchcast kits and 3M Scotch #23 rubberized splicing tape have met the requirements for cable jacket repair or WSDOT approved equal.

The Design-Builder shall make permanent repairs to twisted pair cables by using rigid-body, non-re-enterable, enclosures in combination with button style, crimp-on butt splices. The closure shall be made of translucent polypropylene and packed with a urethane compound. Rubber tape shall be used to seal the ends of the closure. The closure is available in 4-pair, 18-pair, and 50-pair sizes.

All cables connecting equipment such as VMS signs, CCTV cameras and cabinets shall conform to the equipment manufacturer's specifications and as specified in Appendix B3, the Project Special Provisions and the Standard Specifications.

2.18.5.6.6.1 ***Electric and Electronic Cable***

The Design-Builder shall not splice electric or electronic cables without WSDOT Electrical Inspector's Acceptance. The Design-Builder shall use one-piece cables between termination points for power, control, and RF cables.

When using crimp-on connectors, the Design-Builder shall install the insulation of electrical cables deep enough into the lug that the insulation acts as a strain relief. The Design-Builder shall use an AMP 59250 crimp tool or WSDOT approved equal. When using crimp-on

connectors, the Design-Builder shall make the crimps with a ratchet style crimp tool. The AMP 59250 complies with this specification.

The Design-Builder shall maintain the electrical continuity of the cable shields. The Design-Builder shall ground all cable shields entering cabinets and splice enclosures in accordance with the Project Special Provisions. The Design-Builder shall comply with USDA RUS splicing Standard PC-2, Section 3.3 for shield bonding. The Design-Builder shall use bonding connectors complying with RUS standard PE-33 (Cable Shield Connectors).

2.18.5.6.6.2 ***Variable Message Sign Control Cable***

The VMS control cable shall be installed between the VMS ground control cabinet and the sign cabinet.

The Design-Builder shall furnish and install VMS Control Cable and all necessary cables and accessories in accordance with Appendix B3, Project Special Provisions and the manufacturer's specifications to make the VMS sign operational.

This cable shall be pulled between the ground control cabinet and the sign cabinet by the Design-Builder. The cable will be terminated by WSDOT.

The Design-Builder shall provide 10 feet of coiled slack cable in the ground control cabinet and 39 feet in the sign cabinet.

2.18.5.6.6.3 ***Video/Control Cable and Accessories for CCTV Camera***

The Design-Builder shall furnish and install CCTV control cable and all other necessary cables and accessories in accordance with Appendix B3, Project Special Provisions and the manufacturer's specification to make the CCTV cameras operational.

2.18.5.6.7 Junction Boxes

Junction boxes serve as collection points for conduits entering a cabinet, shelter, or service. Install junction boxes in accordance with Appendix B3, the requirements of the Project Special Provisions, Sections 9-29.2 and 8-20.3(6) of the Standard Specifications, Standard Plan J-11a and WSDOT *ITS Design Guide*.

The Design-Builder shall place junction boxes adjacent to all control cabinets, shelters, electrical service points, and detector stations.

For each detector station, the Design-Builder shall provide a junction box for each direction of travel. The Design-Builder shall locate the detector station junction box on the right side of the roadway in the direction of travel.

On long conduit runs, the Design-Builder shall space junction boxes no farther apart than 1000 feet.

For junction boxes that are not subject to vehicular loading, the Design-Builder shall install the junction boxes as required by the Standard Plans and emboss the letters on the lid as required by Section 9-29.2(4) of the Standard Specifications.

When the junction box is abandoned, the Design-Builder shall remove the junction box lid and fill the abandoned junction box with compacted granular material.

Existing junction boxes (installed by others) shall be cleaned by the Design-Builder prior to use.

Each existing ITS PVC junction box shall contain a locator in accordance with Appendix B3, the Project Special Provisions and the Standard Specifications. When pulling cable through existing junction boxes, the Design-Builder shall install locators if the locators are missing. In older styles of

junction boxes, the Design-Builder shall install the locator such that the locator is suspended within 1 foot of the junction box cover.

The Design-Builder shall install a 2-inch NMC stub-out that is 36 inches in length for all direct-buried fiber entering or exiting the junction box.

For PVC junction boxes placed in unpaved areas and not subject to vehicular loading, the Design-Builder shall install the junction boxes level with the final grade and have steel lids and frames.

2.18.5.6.8 Cable Vault

The Design-Builder shall place the cable vaults in locations to minimize the number and length of pigtails. However, the location of field devices shall be the controlling factor in vault placement.

The Design-Builder shall include in the construction of a fiber optic splice vault a drainage system, grounding provisions, enclosure hanger bracket assembly, and a ground rod marker.

The fiber optic splice vault protects the outdoor fiber splice enclosure and shall meet the following requirements:

- The vault and lid material shall meet the UL requirements for Tier 10 heavy-duty splice vault.
- The vault lid shall have a non-slip surface.
- The vault shall provide one ferrous device to lift the cover from the body for every three furnished and installed vaults.
- The vault shall contain a locator ball.
- The fiber optic cables shall sweep up near the vault to meet the conduit entrance to the vault (take care not to exceed minimum bend radius).

The Design-Builder shall furnish and install a sheath grounding unit between the splice enclosure and the ground rod.

Design-Builder shall furnish an orange-colored, UV-resistant, two-piece, polyethylene ground rod marker post for encasing and accessing ground rod and connection at fiber optic splice vault locations. The Design-Builder shall install a 2 inch NMC stub-out that is 3 feet in length, for all direct buried fiber entering or exiting the vault.

The Design-Builder shall clean existing vaults prior to installing cable.

2.18.5.6.9 Outdoor Fiber Splice Enclosure

The Design-Builder shall install sufficient desiccant (packaged silica) in the enclosure to reduce possible damage from moisture.

The Design-Builder shall bond all fiber optic cable shields in fiber optic splice vaults to the ground lug of the outdoor fiber splice enclosure. The Design-Builder shall bond a sheath grounding unit conductor to the ground lug of the splice enclosure and the other conductor to the outside ground rod. The Design-Builder shall mount the sheath grounding unit to the inner wall of the vault along the upper half.

2.18.5.6.9.1 ***Splice Protection***

The Design-Builder shall mount all splices on the splice tray. Polyethylene tubes protect the fibers and ethylene vinyl acetate sleeves with stainless steel rods protecting the splices. Vinyl markers shall identify each fiber in the enclosure.

2.18.5.6.9.2 ***Mounting Splice Enclosure in Vault***

The Design-Builder shall mount the furnished and installed outdoor fiber splice enclosure in the splice vault. Mounting of the outdoor fiber splice enclosure shall require a bracket to be constructed to fit the opening to the splice vault. The bracket shall be constructed so that the bracket and enclosure cannot fall into the vault. The bracket shall remain long enough to rest on the vault lid ledge. The objective of this bracket shall be to keep the splice enclosure off the floor of the vault. The Design-Builder shall construct the bracket as follows:

- The main support member shall be placed 1/8 inch under the vault opening and is 1 inch by 1.5 inches by variable inches variable-length "C" channel and may be perforated with web-centered holes. The length dimension will vary with the diameter of the access cover.
- The ends of the main support member shall have "Z" brackets constructed of 3/16 inch steel 1.5 inches wide. The "Z" brackets rest on the vault lip for the round access cover.
- The outdoor fiber splice enclosure shall be hung from the bracket assembly with 1/8 inch stainless-steel cable.

2.18.5.6.10 Grounding

The Design-Builder shall install a grounding system and protection devices that are suitable for the specific installation and equipment being supplied. The Design-Builder shall meet the requirements of Appendix B3, the Project Special Provisions, Section 8-20.3(9) of the Standard Specifications and Standard Plan J-9a for additional requirements.

2.18.5.6.11 Electrical Service

The Design-Builder shall be responsible for proper cable sizing.

2.18.5.6.12 Control Cabinets

WSDOT will furnish the control cabinets. The Design-Builder shall install the cabinets and make them functional.

During construction the Design-Builder shall provide rodent control packets for all new control cabinets, as well as for all existing cabinets entered as part of the Project.

The Design-Builder shall ensure the existing control cabinets are operational during the weekday peak periods of 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 7:00 p.m.

When bringing fiber in conduit inside a control cabinet, the Design-Builder shall attach a ground wire to the cable 12 inches from the entrance on the inside of the control cabinet. The Design-Builder shall strip the insulation off to the armor and attach the ground wire to the armor to ground the fiber optic cable.

The Design-Builder shall use good fiber management practices and techniques in all control cabinets. The Design-Builder shall be responsible for ensuring proper fiber management practices and techniques are utilized when fiber work is being done in new and existing control cabinets.

*2.18.5.6.13*Control Cabinet - 334 Series

Design-Builder shall install WSDOT furnished control cabinets in accordance with Appendix B3, the Project Special Provisions, WSDOT *ITS Design Guide* and the Standard Specifications.

The Design-Builder shall notify WSDOT 30 business days ahead of installation.

The Design-Builder shall make arrangements to pick up the cabinets within 5 business days of notification by WSDOT Signal Branch office.

The Design-Builder shall notify the Signal Branch Office Electrical Inspector 48 hours before transporting the cabinet or components from the storage site to the Project Site. The Design-Builder shall inspect the cabinet in the presence of the Electrical Inspector before the cabinet leaves the storage site.

The Design-Builder shall supply all equipment needed to load, transport, and unload the cabinet.

The Design-Builder shall install the control cabinet, which includes mounting the cabinet on its foundation, terminating power cables, grounding the cabinet and terminating communications cables. The Design-Builder shall install the sheath grounding unit between the fiber armor and the cabinet ground buss in all cabinets with fiber optic communications.

2.18.5.6.13.1 ***Variable Message Sign Control Cabinet***

The Design-Builder shall install WSDOT furnished 334 series VMS control cabinet in accordance with Appendix B3, the Project Special Provisions, WSDOT *ITS Design Guide* and the Standard Specifications.

The Design-Builder shall notify WSDOT Signal Branch office 30 business days ahead of installation.

The Design-Builder shall make arrangements to pick up the cabinets within 5 business days of notification by WSDOT Signal Branch office.

The Design-Builder shall notify the Signal Branch Office Electrical Inspector 48 hours before transporting the cabinet or components from the storage site to the Project Site. The Design-Builder shall inspect the cabinet in the presence of the Electrical Inspector before the cabinet leaves the storage site.

The Design-Builder shall supply all equipment needed to load, transport, and unload the cabinet.

The Design-Builder shall install the control cabinet, which includes mounting the cabinet on its foundation, terminating power cables, grounding the cabinet, and terminating communications cables. The Design-Builder shall install the sheath grounding unit between the fiber armor and the cabinet ground buss in all cabinets with fiber optic communications.

2.18.5.6.14 ITS Communication Hub

Not Used

2.18.5.6.15 ITS Communications Hub Cabinet Foundation

Not Used

2.18.5.7 Special Provisions

WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require WSDOT approval prior to application during construction.

2.18.6 SUBMITTALS

The Design-Builder shall comply with Section 2.12 and 2.28 of this RFP for plan/test report submittals, review and other administrative processes unless otherwise specified.

2.18.6.1 ITS Conceptual Plan Submittal (30 Percent Level)

The ITS Conceptual Plans and Fiber Optic System Test and other Test Plans mentioned in Section 2.18 of this RFP shall be submitted for review twenty (20) calendar days after the ITS Design Workshop. WSDOT will respond within ten (10) business days.

The Design-Builder shall include the devices described in Section 2.18 in this submittal in addition to the following:

- Title sheet, north arrow and scale bar
- Legend of symbols
- Existing ITS features and utilities
- Locations of all proposed ITS devices with labels
- Communication schematics and fiber distribution diagrams
- Test schematics
- Proposed channelization
- Power service locations
- Conduit runs and junction box location.

2.18.6.2 Final Submittals (60 Percent, 90 Percent and Final Submittals)

The Design-Builder shall provide a final ITS plan that addresses the comments received from the Conceptual ITS Plan review and any issues raised during the ITS design meetings.

These plans shall be complete and include all items from the Conceptual ITS Plan and the following:

- Wire and Construction Notes
- ITS Details
- All ITS labels
- Calculations to support transformer sizing and transformer overcurrent protection devices
- Conduit fill and junction box capacity calculations
- Service load calculations
- Soils information for foundation design
- VMS support structure and foundation details
- CCTV Camera Poles
- Foundation details for CCTV Camera Poles.

2.18.6.3 Component, Test, and Project Documentation

The Design-Builder shall prepare and submit component, test, and Project documentation. The test documentation shall include completed forms and electronic documentation. Two sets of component and test documentation shall be submitted directly to WSDOT for acceptance.

The Design-Builder shall complete and submit to WSDOT inspection checklists listed in 2.18.7.

The Design-Builder shall obtain WSDOT acceptance of the ITS component submittal package before installation of the ITS components will be authorized.

The Design-Builder shall notify WSDOT when all ITS requirements have been met. The WSDOT will accept the Contract work after verifying proper operation of all components.

The Design-Builder shall submit to WSDOT for approval detailed pre-installation test (PIT) procedures in accordance with standard testing procedures at least ten (10) business days before the commencement of the test. The Design-Builder shall submit the PIT results to WSDOT for approval at least 14 business days prior to the scheduled installation of the equipment.

The Design-Builder shall submit the proof of performance (POP) test results following the completion of the POP tests to WSDOT for acceptance.

The Design-Builder shall provide test reports from a WSDOT approved independent laboratory certifying that the manufacturer's ramp control signal pedestal base has been tested and meets all requirements. The Design-Builder shall supply the manufacturer's statement of certification stating such tests have been approved.

The Design-Builder shall submit to WSDOT specifications for the following: loop detector (design preformed), loop assembly, loop lead-in, loop conductor (design saw cut), and the splice encapsulator. The Design-Builder shall obtain WSDOT's acceptance of each submittal before the installation of the component will be authorized.

The Design-Builder shall submit the loop detector test report to WSDOT within one week after completing installation for both the preformed and saw cut loops.

The Design-Builder shall submit all wiring diagrams for review to WSDOT and incorporate all comments in the wiring diagram.

The Design-Builder shall submit power and control cable test results to WSDOT within one week of making final connections.

The Design-Builder is required to submit pre-installation test procedures to WSDOT for this Project.

2.18.6.3.1 Fiber Optic Cable Test Documentation

The Design-Builder shall submit fiber optic cable test documentation including calibration and certification of the fiber optic cable test equipment as part of the component documentation.

The Design-Builder shall follow the format of the Fiber Optic System Test Plan.

The Design-Builder shall use WSDOT 's file naming convention for all test files. The Design-Builder shall provide all test documentation on a CD.

The Design-Builder shall store OTDR files under a directory named by the highway number. These files shall include the following: actual date of testing, all splice points marked, the "index of refraction" (recorded on the cable spool by the manufacturer), and file names and notes as described by WSDOT 's file naming convention.

The Design-Builder shall provide a test summary describing the final measurements out of range, any approved changes in specified methods, and actual dates of tests performed by both power meter and OTDR.

The Design-Builder shall provide the TSMC System Inspector with two (2) copies of the manufacturer's reel (spool) test documentation. The test documentation is shipped with the fiber optic cable spool.

2.18.7 ITS Testing and Checklists

- WSDOT Loop Detector Test Report
- WSDOT Power Cable Insulation Test Results
- WSDOT Ramp Meter Signal Inspection Checklist
- WSDOT F.O. Vault Inspection Checklist
- WSDOT VMS Inspection Checklist
- WSDOT 334 Cabinet Inspection Checklist
- WSDOT Loop Detector Inspection Checklist
- WSDOT Advance Flasher Inspection Checklist

End of Section

2.19 SIGNING

2.19.1 GENERAL

The Design-Builder shall conduct all Work to meet the requirements for permanent signing for the Project. Refer to the Maintenance of Traffic section for additional temporary signing requirements.

2.19.2 MANDATORY STANDARDS

2.19.2.1 General

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications may be required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

2.19.2.2 Mandatory Standards

- *Project Special Provisions* – Appendix B1
- *Amendments to the Standard Specifications* – Appendix B2
- WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction*
- WSDOT *Washington State Modifications to the MUTCD*
- WSDOT *Northwest Region Current Practices Manual – Traffic Sign Design*
- WSDOT *HOV Design Guide for the Northwest Region*
- WSDOT *Northwest Region Traffic Operations RedBook Section F*
- WSDOT *Traffic Manual*
- WSDOT Design Manual, including instructional letters
- WSDOT *Sign Fabrication Manual*
- WSDOT *Standard Plans for Road, Bridge, and Municipal Construction*
- WSDOT *Motorist Information Signs*
- WSDOT *Construction Manual*
- WSDOT *Plans Preparation Manual*
- WSDOT *Maintenance Manual*
- FHWA *Manual on Uniform Traffic Control Devices* (MUTCD)
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*
- AASHTO *Roadside Design Guide*
- *Highway Capacity Manual* - TRB
- AASHTO *Guide for Selecting, Locating and Designing Traffic Barriers*
- AASHTO *Guidelines for Traffic Data Programs*

- ITE *Traffic Control Devices Handbook*
- FHWA *Traffic Control Systems Handbook*
- ITE *Transportation and Traffic Engineering Handbook*

2.19.3 Performance Requirements

2.19.3.1 Software

The Design-Builder shall use software for the design of guide signs that is compatible with and/or can be imported to MicroStation design files.

2.19.3.2 Meetings

It is recommended that the Design-Builder establish a Traffic Design Team in consultation with WSDOT to oversee and provide input on the traffic design and construction to discuss traffic-related design items including signing, pavement marking, signalization, and lighting. The Design-Builder shall schedule and chair the Traffic Design Team meetings every other week during the design stage and then monthly or as needed during construction stages until Substantial Completion. The Design-Builder shall prepare the agenda, meeting minutes, exhibits and design plans necessary for the meeting. Traffic Design Team meetings shall include representatives from the City of Kirkland and adjacent projects as required.

2.19.3.3 Permanent Sign Concept Meeting

The Design-Builder shall schedule a permanent signing concept meeting(s) not more than thirty (30) calendar days after the date the Contract is executed to present an Existing Sign Inventory and a sketched layout of the in-place signing on the Project to WSDOT. The Design-Builder shall use the meeting to finalize the permanent signing needs of the Project. The Permanent Sign Concept Meeting(s) shall include representatives from the City of Kirkland to identify City-owned signs and determine salvage requirements.

2.19.4 Design and Construction Requirements

2.19.4.1 Signing Design Requirements

2.19.4.1.1 General

The Design-Builder shall design and assemble a signing plan to be reviewed by WSDOT prior to furnishing and installing signs. The preliminary Guide Sign Plan included in Appendix M shall be incorporated into the signing design. The preliminary Guide Sign Plan is intended to identify the general location of required mainline guide signs and identify required overhead sign locations. The preliminary Guide Sign Plan does not include regulatory, warning, marker, ramp or cross-road signing. The Design-Builder shall be responsible for including these signs in the permanent signing design. Final placement of all signs must be determined during the design process. The Design-Builder shall obtain approval from WSDOT for modifications to the sign placement and legends shown in the preliminary Guide Sign Plan.

The Design-Builder shall provide illumination for all mainline overhead sign panels and provide sufficient electrical conduit in the sign structure foundation to accommodate the sign lighting.

The Design-Builder shall provide a minimum vertical clearance of 17-feet, 6-inches for all overhead sign structures including illumination elements and sign brackets.

2.19.4.1.2 Plan Requirements

The Design-Builder shall develop a Permanent Signing Concept Plan for the Project that includes all necessary guide, warning, regulatory, and Variable Message Signs (VMS). The Permanent Signing

Concept Plan shall provide for modifications to signage outside the limits of the Project that are rendered inaccurate, ineffective, confusing, or unnecessary by WSDOT as a result of modifications by this Project. The modifications shall include the addition, removal, or alteration of signs and appurtenances. The Permanent Signing Concept Plan shall include and provide for all signing necessary for the Project inside and outside of the Project limits.

The Permanent Signing Concept Plan shall include as a minimum, the following:

- Sign locations
- Panel legends
- Proximity to ITS devices
- Types of proposed sign structures
- Permanent signing proposed on bridges
- Signal system mast arm sign legends
- Identify all existing signs to remain or to be relocated

The Design-Builder shall replace all signing on the Project installed more than five (5) years in advance of the date the Contract is executed within the Project limits or affected by the Project. This includes all signs affected by the Project due to modified lane or ramp configurations, so that continuous information is provided to the motorists. Signs fabricated and installed five years or less from the date the Contract is executed may remain in place or be relocated as necessary to accommodate the new geometry. The installation date shall be considered to be the date shown on the sign fabrication decal located on the back of the sign. In the event the sign fabrication decal is missing, the sign shall be deemed to be more than five (5) years old and shall be replaced. Motorist Information Signing may be excluded from this requirement, see Section 2.19.4.1.3. All signs that are relocated must be installed on new sign posts and foundations.

As required by Section 2.4 of the WSDOT *Traffic Manual*, the minimum spacing is 800 feet between guide signs. Lateral clearance requirements for all signs are included in WSDOT *Design Manual*.

The permanent signing plans shall include the sign legend, legend layout and spacing, and the sign material requirements in accordance with the *Northwest Region Current Practices Manual – Traffic Sign Design*. Placement of the signs shall account for the required sight distances.

The Design-Builder shall coordinate with the City of Kirkland regarding proposed signing modifications within City right-of-way.

Signing along NE 116th Street not impacted by the Project may remain. If signing along NE 116th Street must be replaced, the Design-Builder shall consider the future Kirkland Stage 2 SPUI configuration when designing the signs to minimize replacing or relocating signs. The Design-Builder shall also plan for Kirkland Stage 2 signing to determine necessary sign brackets to be installed in the bridge structures such as for lane control and traffic signal signs, refer to Section 2.17.

The Design-Builder shall not mount signs for I-405 traffic on bridges, with the following exceptions: exit signs to loops at cloverleaf interchanges, street identification signs for roadways crossing I-405, and vertical clearance signs as required. Bridge-mounted signing for arterial roads crossing under I-405 bridges shall be limited to regulatory and lane designation signing. When it is necessary to mount signs on bridges, the Design-Builder shall design the signs so that the structure and the sign panel height compliment the depth of the structure and/or railing height, refer to *Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1* for additional requirements.

The Design-Builder shall place sign structures no closer than 100 feet in advance of bridges.

2.19.4.1.3 Motorist Information Signing

If the removal of any Motorist Information Signs (MIS) are required for construction, the Design-Builder will be instructed by WSDOT to salvage and reinstall the existing MIS at a location approved by WSDOT, see Section 2.19.4.2.3. Existing MIS shall be relocated, replaced or temporarily mounted within 24 hours of removal.

WSDOT may supply new sign back panels or business logo signs at it's discretion to replace existing MIS being relocated. The Design-Builder will not be required to pay for or supply new MIS unless damaged by the Design-Builder. The Design-Builder shall furnish new sign foundations and supports and install the new sign panels or relocated existing sign panels.

2.19.4.1.4 Material Requirements

Sign face material: traffic signs shall be constructed in accordance with the provisions of Section 9-28 of the Standard Specifications. WSDOT *Traffic Manual*, Section 2.1C, provides the requirements for reflective sheeting types, the Urban classification shall be used for determining minimum sheeting requirements.

Sign Structure: All cantilever and sign bridge structures shall be monotube, see bridge standard drawings.

Steel Signs Posts: Steel sign posts shall be used for all MIS and guide signs.

Wood Sign Posts: Wood sign posts placed in HMA or concrete shall be sleeved.

2.19.4.1.5 Aesthetics

The Design-Builder shall design and construct all Work in compliance with the *Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1* and the requirements presented in Section 2.15.

All monotube sign structures shall be painted, the color of the finish coat of paint shall match the color specified in Appendix L, I-405 Urban Design Criteria for Kirkland Stage 1, when dry.

2.19.4.2 Permanent Signing Construction Requirements

2.19.4.2.1 General

Sign structure foundations should not encroach into shoulders. Any shoulder encroachment will require documentation and approval for a spot deviation.

The Design-Builder shall mark in the field locations of the proposed signs and conduct a construction design review with WSDOT before installation. The Design-Builder shall obtain WSDOT's concurrence for each sign location in the field prior to installation.

The Design-Builder shall use approved materials as required by Section 2.25.3.

Existing sign panels and sign structures shall remain in place or shall be temporarily mounted until new or replacement signs are installed or removal is approved by WSDOT. Refer to Section 2.22.4.4.4 for additional requirements.

2.19.4.2.2 Material Requirements

The Design-Builder shall supply new materials for all sign posts, structures and foundations.

2.19.4.2.3 Salvage

The Design-Builder shall notify the City of Kirkland sign shop at (425) 587-3925 a minimum of two (2) business days in advance of removal of existing City of Kirkland signs and sign structures. If the City of Kirkland requests the items be salvaged, the Design-Builder shall make arrangements to deliver the items to the location specified by the City of Kirkland.

Motorist Information Signing shall be salvaged to WSDOT as described in Section 2.19.4.1.3.

Existing monotube sign structures identified in the sign concept plan to be salvaged, if any, shall be salvaged to WSDOT and delivered to the Totem Lake Storage Yard located on NB I-405 at milepost 21.5. The Design-Builder shall prepare plans for disassembly of the structure to ensure structural integrity of the structure. The Design-Builder shall contact WSDOT a minimum of three (3) business days prior to delivery. The Design-Builder shall offload the structure at the storage facility. All other sign materials shall become the property of the Design-Builder.

All other sign panels, sign structures and associated sign lighting fixtures and ballasts removed from within WSDOT right-of-way shall become the property of the Design-Builder.

2.19.4.3 Special Provisions

WSDOT Standard Specifications for Road, Bridge and Municipal Construction (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require WSDOT approval prior to application during construction.

2.19.5 SUBMITTALS

All deliverables shall follow the requirements in the Design-Builder's Quality Management Plan, refer to Section 2.28.

2.19.5.1 Existing Sign Inventory (30 Percent Submittal)

The Design-Builder shall use the WSDOT Northwest Region Sign Inventory Sheet provided in the Appendix of WSDOT *Northwest Region Current Practices Manual for Traffic Signs*. The Existing Sign Inventory shall include as a minimum, the following:

- Location of sign by Station
- Horizontal Distance from edge of traveled way
- Legend
- Size of sign panel
- General condition of sign, noting any apparent damage
- Post type, size and length
- Condition of Posts
- Vertical Clearance
- Photographs of all existing signs along the corridor with identifying labels including station and direction

The Design-Builder shall submit the Existing Sign Inventory with the 30 percent submittal package.

2.19.5.2 Permanent Signing Concept Plan (60 Percent Submittal)

The Design-Builder shall submit the Permanent Signing Concept Plan with the 60 percent submittal package.

2.19.5.3 Permanent Signing Plans (90 Percent Submittal)

The Design-Builder shall prepare plan sheets in accordance with Section 2.12 Plans Preparation and Project Documentation, the I-405 Congestion Relief and Bus Rapid Transit Project, CADD *Standards Manual*, and WSDOT *Plans Preparation Manual* (PPM).

The Permanent Signing Plans shall include, but not be limited to, the following items:

- Sign Specification Sheets containing all necessary fabrication, installation, station, offset, relocation and removal information for each sign
- Design drawings showing location of all new signs and existing signs to remain, to be relocated, or to be removed
  - Include sign number referenced from Sign Specification Sheet
  - Include small scale layout of all signs including guide, regulatory, and warning and object markers
  - Include existing and proposed utilities within a 20-foot radius of new overhead sign structure foundations
- Show final pavement markings on the Permanent Signing plans
- Sign format plans including panel sizes, background and legend color, border width and corner radius, text height, font and character spacing
- Design drawings (other than Standard Plans) showing details of sign mounting, foundations, base connections, and frames
- For each overhead span and cantilever sign structure, depiction of a cross section with indication of footing details, locations of utilities within 20 feet of foundation, offsets, sign placement and mounting heights
- Complete design of overhead signs and sign structures, including provisions for sign lighting
- Analysis of signal system mast arm loading for mast-arm installed signs

Any deviations in the Permanent Signing Plans from the Sign Concept Plan will require approval from WSDOT. The Permanent Signing Plans shall be submitted to WSDOT for review as part of the 90 percent submittal package.

2.19.5.4 Released for Construction (RFC) Signing Plans

All comments from the review of the Permanent Signing Plans shall be responded to prior to releasing the Plans for Construction. Any deviations from the Sign Concept Plan will require WSDOT approval. Refer to Section 2.12 for additional requirements.

2.19.5.5 As-Built Documentation

The Design-Builder shall submit, as part of the As-Built survey, base-map file, data in .Cor format with x, y and z coordinates for all new signs and existing signs to remain within the Project limits, refer to Section 2.5.

Refer to Section 2.12 for additional requirements.

The Design-Builder shall submit digital photographs cross-referenced to the sign number and location for all new signs and existing signs to remain within the Project limits.

End of Section

2.20 PAVEMENT MARKING

2.20.1 GENERAL

The Design-Builder shall conduct all Work to meet the requirements for permanent pavement marking for the Project. Refer to the Maintenance of Traffic section for additional temporary pavement marking requirements.

2.20.2 MANDATORY STANDARDS

2.20.2.1 General

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications may be required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

2.20.2.2 Mandatory Standards

- *Project Special Provisions* – Appendix B1
- *Amendments to the Standard Specifications* – Appendix B2
- WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction*
- WSDOT *Standard Plans for Road, Bridge, and Municipal Construction*
- WSDOT *Washington State Modifications to the MUTCD*
- WSDOT *Traffic Manual*
- WSDOT *Design Manual*, including instructional letters
- WSDOT *Construction Manual*
- WSDOT *Plans Preparation Manual*
- WSDOT *Maintenance Manual*
- WSDOT *Northwest Region Traffic Operations RedBook* Sections F, G and H
- WSDOT *HOV Design Guide for the Northwest Region*
- FHWA - *Manual on Uniform Traffic Control Devices* (MUTCD)
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*
- AASHTO *Roadside Design Guide*
- TRB - *Highway Capacity Manual*
- AASHTO - *Guide for Selecting, Locating and Designing Traffic Barriers*
- AASHTO - *Guidelines for Traffic Data Programs*
- ITE - *Traffic Control Devices Handbook*
- FHWA - *Traffic Control Systems Handbook*

- FHWA - *Traffic Monitoring Guide*
- ITE - *Transportation and Traffic Engineering Handbook*
- ITE - *Manual of Traffic Engineering Studies*

2.20.3 PERFORMANCE REQUIREMENTS

2.20.3.1 Software

Refer to Section 2.21 for Traffic Operations software requirements.

2.20.3.2 Meetings

It is recommended that the Design-Builder establish a Traffic Design Team in consultation with WSDOT to oversee and provide input on the traffic design and construction to discuss traffic-related design items including signing, pavement marking, signalization, and lighting. The Design-Builder shall schedule and chair the Traffic Design Team meetings every other week during the design stage and then monthly or as needed during construction stages until Substantial Completion. The Design-Builder shall prepare the agenda, meeting minutes, exhibits and design plans necessary for the meeting. Traffic Design Team meetings shall include representatives from the City of Kirkland and adjacent projects as required.

2.20.3.3 Acceptance of Pavement Markings

The Design-Builder shall determine that pavement marking performance has failed if any of the following occur:

- More than 10 percent of the substrate is exposed in a running 1,950-foot section of longitudinal pavement marking line.
- The average of readings taken from a mobile retroreflectometer at a minimum of every 0.10 miles falling below the manufacturer's warranted retro-reflective values.
- If any five consecutive readings fall below 10 percent of the manufacturer's warranted retroreflectance values or if any one reading falls below 20 percent of the manufacturer's warranted retroreflectance values, the portion(s) of the line associated with the deficient readings shall be considered unacceptable.

The Design-Builder shall take one reading per mile, per color line using a spectrophotometer to verify chromaticity meets the manufacturer's declared minimum chromaticity coordinates (falls within the same limits of the color box) relative to the respective age of the pavement marking.

The Design-Builder shall prepare a report with all readings taken. Readings not satisfying the above criteria shall be clearly identified with documentation that the segments have been replaced and the new readings included.

2.20.3.4 Certification

The Design-Builder shall provide WSDOT a manufacturer's certification that the pavement marking material proposed is subject to and shall meet the requirements of Section 9-34.3(4) of the Standard Specifications. The Design-Builder shall include the manufacturer's address, telephone number, and contact person.

2.20.3.5 Material Qualification and Acceptance Program

The Design-Builder shall submit the material specifications to WSDOT and WSDOT will review the material and accept it if the material submitted meets standards. The Design-Builder shall follow the procedure listed in Section 2.25 of these Technical Specifications.

2.20.4 Design and Construction Requirements

2.20.4.1 Permanent Pavement Marking Design Requirements

The Design-Builder shall prepare permanent pavement marking plans that show center striping, edge striping, lane line striping, arrows, legends, symbols, object markers, delineation, and other markings consistent with the needs of the Project.

The pavement marking plans provided in the Contract Documents provide a basis for the pavement marking requirements for this Project. The Design-Builder shall include aerial surveillance markers, drainage marking and crosswalk lines on the plans. The Design-Builder shall be responsible for replacing existing pavement marking in areas where temporary pavement marking is used during construction.

On access-controlled, multi-lane, divided facilities, the Type 2 RPM's included in the lane lines separating lanes of traffic in the same direction shall be installed at 40-foot spacing with white on the side facing oncoming traffic and red on the back side to alert drivers they are traveling in the wrong direction. Type 2Y RPM's shall be placed outside of the left edge line as shown in Standard Plan H-3 spaced at 80-foot intervals on tangents and horizontal curves with a radius of five thousand feet or more, and 40-foot intervals on horizontal curves having radii of less than five thousand feet.

2.20.4.1.1 Permanent Pavement Marking Material Requirements

The Design-Builder shall provide permanent pavement markings that meet the requirements of Section 9-34.3(4), Type D – Liquid Cold Applied Methyl Methacrylate (MMA), of the Standard Specifications for all locations within WSDOT-maintained facilities including lane lines and edge lines. On arterial and local streets maintained by the City of Kirkland, the Design-Builder shall use pavement marking materials following the City of Kirkland Public Works Engineering Department Requirements for Arterials and Local Streets. At a minimum, the Design-Builder shall use a Thermoplastic pavement marking material for permanent pavement markings not maintained by WSDOT. All standard plans and guidelines referring to MMA as 'desirable' shall be modified to require MMA. Use of Thermoplastic or RPMs as an alternative to MMA is not acceptable for this Project.

The Design-Builder shall test the retroreflectivity of the pavement markings and meet the requirements of Section 9-34, Pavement Marking Materials, of the Standard Specifications. The Design-Builder shall maintain the retroreflectance values for the pavement markings as listed in these Technical Specifications until Final Acceptance.

2.20.4.2 Permanent Pavement Marking Construction Requirements

The Design-Builder shall use approved materials as required by Section 2.25.3.

2.20.4.2.1 Materials

The Design-Builder shall use a pavement marking material on the Qualified Products List (QPL). If the proposed pavement marking material is not on WSDOT QPL, the Design-Builder shall submit the material through the Pavement Marking Qualification and Acceptance Program as discussed in Section 2.20.3.5. The Design-Builder's submittal package shall contain all supporting documentation and technical literature, which includes previous testing and analysis (including field performance evaluations) by an independent third party.

The Design-Builder shall provide WSDOT with a copy of the manufacturer's application instructions. The Design-Builder shall apply the pavement markings according to the manufacturer's recommendations.

2.20.4.2.2 Equipment

The Design-Builder shall use equipment designed for the preparation and application of the appropriate type of pavement marking material as required by the manufacturer.

2.20.4.2.3 Surface Preparation

The Design-Builder shall remove the temporary pavement markings, if any, in accordance with the requirements of Section 8-23.3(1) of the Standard Specifications. The Design-Builder shall prepare the surface as recommended by the material manufacturer.

2.20.4.2.4 Replacement of Unsatisfactory Pavement Markings

The Design-Builder shall remove and replace pavement marking not conforming to the tolerances established under Section 8-22.3(4) of the Standard Specifications). Lines that deviate laterally from the intended alignment more than 2 inches over 195 feet shall be rejected.

The Design-Builder shall remove and replace pavement markings that have drag marks, gashes, gouges, foreign covering, discolored areas, or areas that have failed to solidify. The Design-Builder shall remove and replace pavement markings that have improper adhesion, width, length, or thickness. The Design-Builder shall remove and replace pavement markings that have areas with a ragged appearance, areas without sharply defined edges, or areas with abrupt unintended changes in alignment. The Design-Builder shall remove and replace missing broken lines if two or more segments in a row are missing or not visible.

The Design-Builder shall remove and replace pavement markings that do not meet the manufacturer's warranted minimum retro-reflective values for the respective product. The Design-Builder shall use a retroreflectometer having 30 m geometry to determine the retroreflectivity. The Design-Builder shall use either a Flint LTL-X or a Flint LTL-2000 retroreflectometer. The Design-Builder shall make initial measurements after 12 hours and within fourteen (14) calendar days of the application. The Design-Builder shall take measurements consisting of 10 readings per color line evenly spaced on running 1,950-foot roadway sections every mile. The Design-Builder shall average all of the readings for each color line within the 1,950-foot section to determine retro-reflectivity.

The Design-Builder shall remove and replace pavement markings that do not meet the manufacturer's warranted minimum chromaticity coordinates (color box). The Design-Builder shall determine the chromaticity using a spectrophotometer. The Design-Builder shall take one reading every mile. The Design-Builder shall place a 1-foot section without beads to accurately test for chromaticity. The area without beads shall be recorded by the Design-Builder.

The Design-Builder shall remove and replace all unsatisfactory pavement markings discovered during the placement of the markings.

2.20.4.3 Special Provisions

WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design Builder require WSDOT's approval prior to application during construction.

2.20.5 Submittals

The Design-Builder shall prepare plan sheets in accordance with Section 2.12 Plans Preparation and Project Documentation, the I-405 Congestion Relief and Bus Rapid Transit Project, CADD *Standards*

Manual, and WSDOT *Plans Preparation Manual* (PPM). All deliverables shall follow the requirements in the Design-Build Quality Management Plan in accordance with Section 2.28.

2.20.5.1 Pavement Marking Plans

The Permanent Pavement Marking Plans shall be prepared in accordance with WSDOT *Plans Preparation Manual* including the following:

- Typical sections in lieu of plans will not be accepted. Include all existing pavement marking for a minimum of 300 feet past the limits of construction and provide adequate transition and tapers to maintain traffic at the design speed.
- Fully show and identify all new pavement marking by material type, color, and line width and completely dimension the pavement marking across the roadway, tying the pavement marking to a construction centerline or monument line.
- Locate by station or dimension lines all pavement arrows, legends, crosswalks, and other pertinent features.
- Station and offset or dimension shall be shown for the beginning and ending of all pavement markings and the beginning and ending of each taper. Locate the begin and end points of all curves and the associated radii.
- Include design drawings other than Standard Plans that show details of pavement markings, tapers, transitions, etc.

Pavement Marking Plans shall not be combined with the Paving Plans. Refer to Example 4-27 of WSDOT *Plan Preparation Manual* for sample pavement marking plans.

The Pavement Marking Plans shall be submitted to WSDOT for review as part of the 30 percent, 60 percent and 90 percent submittal packages.

2.20.5.2 Released for Construction (RFC) Pavement Marking Plans

All comments from the review of the Pavement Marking Plans shall be responded to prior to releasing the Plans for Construction. Refer to Section 2.12 for additional requirements.

End of Section

2.21 TRAFFIC OPERATIONS

2.21.1 GENERAL

Not Used.

2.21.2 MANDATORY STANDARDS

2.21.2.1 General

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications maybe required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. The WSDOT's interpretation and decision shall be final.

The Referenced Publications shall be used to supplement the Referenced Standards.

2.21.2.2 Mandatory Standards

- WSDOT *NE 116th Street Interchange Modification Analysis Report.*
- WSDOT *Northwest Region HAL-HAC-PAL Report (latest edition at the time of the execution of the contract*
- Transportation Research Board (TRB) *Highway Capacity Manual*
- WSDOT *Design Manual (DM) (M22-01), including all revisions and supplements*
- WSDOT *HOV Direct Access Guide, Draft* (M22-98
- WSDOT *Local Agency Guidelines*(LAG) (M 36-63)
- City of Kirkland *Pre-Approved Plans and Policy (2000)*
- American with Disabilities Act of 1990 (ADA)
- WSDOT *ADA Accessible Facilities on Road, Street and Highway Projects, Design Manual Supplement (June 29, 2004)*
- US Access Board *ADA Accessibility Guideline (ADAAG)*
- WSDOT *Bicycle Transportation Planning and Design Guidelines*
- WSDOT *Washington State Modifications to the MUTCD (M24-01)*

2.21.2.3 References

- AASHTO - *A Policy on Geometric Design of Highway and Streets*
- AASHTO - *Guide for the Design of High Occupancy Vehicles and Public Transfer Facilities (1983)*
- AASHTO - *Roadside Design Guide*
- *Manual on Uniform Traffic Control Devices (MUTCD, 2003)*

2.21.3 PERFORMANCE REQUIREMENTS

In addition to completing the design of the improvements identified in the Project Stage 1 Conceptual Plans, the Design-Builder shall advance the design of a Single Point Urban Interchange (SPUI) at NE 116th Street Interchange as shown in the Nickel Stage 2 Conceptual Plans and as defined in this RFP.

However, if the Design-Builder decides to change the configuration of the roadway/interchange, a traffic operations analysis and accident analysis required to prove that the newly proposed configuration by the Design-Builder is operationally either superior or equal to that proposed by the Project. These analysis are the responsibility of the Design-Builder.

2.21.3.1 Performance Criteria

2.21.3.1.1 Mainline Traffic Analysis and Performance

If a new configuration is proposed by the Design-Builder, an analysis associated with I-405 mainline operations will be conducted by the WSDOT. The performance will be compared for the two configurations to decide if the Design-Builder proposed configuration is equal to or superior in performance to that of the configuration originally proposed by the Project.

2.21.3.1.2 NE 116th Street Analysis and Performance

If a new configuration is proposed by the Design-Builder, the traffic operations analysis of the NE 116th Street corridor and interchange terminals shall be performed by the Design-Builder. The Corsim module of Traffic Software Integrated System (TSIS) Version 5.1, Build 9 shall be used for an analysis of intersections and local street operations. Queue distances shall be based on TSIS maximum queue values. All results shall be based on an average of five separate random seed runs.

The Traffic Performance Parameters (TPP) calculated for the proposed NE 116th Street configuration shall be equal or better than the TPPs calculated for the project proposed configuration of NE 116th Street as identified in WSDOT NE 116th Street Interchange Modification Analysis Report.

The analysis shall be conducted for year of opening (2014) and design year (2030) AM and PM conditions. The WSDOT will provide the necessary traffic volume projections. The following intersections shall be included for the analysis:

- 116th Street/120th Avenue
- 116th Street/I-405 Ramp Terminals
- 116th Street/124th Avenue

An electronic copy of the model must be submitted to WSDOT.

2.21.4 Accident Analysis and Mitigations Proposed

The Design-Build team shall review the latest published WSDOT Northwest Region HAL-HAC-PAL Report and determine if any High Accident Locations (HAL) or a High Accident Corridor (HAC) not previously identified in the preceding are within the project limits. If either is found, the Design-Build team shall review the accident data and submit to WSDOT a memorandum on how the proposed design mitigates the new High Accident Location or High Accident Corridor. The 85th Street southbound off-ramp has been identified as a HAL location by the Project and mitigation has been suggested.

2.21.5 Submittals

The Design-Builder shall prepare and submit a Local Street Traffic Operations Analysis Report for the proposed interchange configuration along with the proposal for the new configuration.

WSDOT will provide review comments in twenty (20) business days.

WSDOT will provide the mainline operations analysis report within twenty (20) business days after the receipt of the proposed new configuration layout.

2.21.5.1 Supporting Documents

Corsim Analysis input files (electronic)

Corsim Analysis output files for all random seed runs (electronic)

Corsim Analysis Summary

The following is a list of calculations required:

- Control delay and Level of Service for every movement
- Average Control Delay and Level of Service for the entire intersection
- Volume Throughputs
- Maximum Queue Lengths

End of Section

2.22 MAINTENANCE OF TRAFFIC (MOT)

2.22.1 GENERAL

The Design-Builder shall conduct all Work necessary to meet the requirements associated with Maintenance of Traffic (MOT), including providing for the safe and efficient movement of people, goods, and services through and around the Project while minimizing negative impacts to residents, commuters, and businesses.

The Design-Builder shall prepare a Traffic Management Plan, prepare a Traffic Incident Management Plan, prepare MOT plans and conduct all on-site activities relating to traffic maintenance in accordance with the requirements as set forth in this section.

The Totem Lake Freeway Station/NE 128th Street Project is anticipated to be under construction concurrently with this Project. The City of Kirkland may also have projects scheduled for construction during the Project duration. The Design-Builder shall be responsible for coordinating with projects within the vicinity of this Project including but not limited to scheduling of lane closures, detours, ramp closures, temporary alignments and phasing of construction activity. The Design-Builder shall not schedule or perform activities that will impede or hinder the progress and schedule of other projects.

2.22.2 MANDATORY STANDARDS

2.22.2.1 General

The following is a list of publications that shall be used to for all design and construction. They are listed in a hierarchical order, with the highest order at the beginning of the list. This is not a comprehensive list, and other applicable publications may be required to complete all design and construction elements. The Design-Builder shall request clarification of any ambiguity or conflict contained in these mandatory standards from WSDOT. WSDOT's interpretation and decision shall be final.

2.22.2.2 Mandatory Standards

- WAC 296-46B-040 Traffic Management Systems
- Project Special Provisions – Appendix B1
- Amendments to the Standard Specifications – Appendix B2
- WSDOT *Standard Specifications for Road, Bridge and Municipal Construction*
- WSDOT *Washington State Modifications to the MUTCD*
- WSDOT *Work Zone Traffic Control Guidelines* , (M54-44)
- WSDOT *Sign Fabrication Manual*
- WSDOT Design Manual, including instructional letters
- WSDOT *Traffic Manual*
- WSDOT *Plans Preparation Manual*
- WSDOT *Construction Manual*
- WSDOT *Maintenance Manual*
- IL 4008.00, *WSP Traffic Control Assistance*

- WSDOT Directive D55-20, *Reduced Speed in Maintenance and Construction Zones*
- WSDOT *Work Zone Safety Executive Order 1001.00*
- WSDOT *Work Zone Safety Policy 2002.00*
- FHWA *Manual on Uniform Traffic Control Devices* (MUTCD)
- National Cooperative Highway Research Project (NCHRP) Report 350
- AASHTO *A Policy on Geometric Design of Highways and Streets*
- AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*
- AASHTO *Roadside Design Guide*
- TRB *Highway Capacity Manual*
- AASHTO *Guide for Selecting, Locating and Designing Traffic Barriers*
- AASHTO *Guidelines for Traffic Data Program*
- ITE *Traffic Control Devices Handbook*
- FHWA *Traffic Control Systems Handbook*
- FHWA *Traffic Monitoring Guide*
- ITE *Transportation and Traffic Engineering Handbook*
- ITE *Manual of Traffic Engineering Studies*

2.22.2.3 Conformance to Established Standards

Flagging, signs, and all other traffic control devices and procedures furnished or provided shall conform to the standards established in the latest WSDOT adopted edition of the *Manual On Uniform Traffic Control Devices for Streets and Highways* (MUTCD), published by the U.S. Department of Transportation and the *Washington State Modifications to the MUTCD*. Judgment of the quality of devices furnished will be based upon *Quality Guidelines for Work Zone Traffic Control Devices*, published by the American Traffic Safety Services Association (ATSSA). Copies of the MUTCD and the Quality Guidelines for Work Zone Traffic Control Devices may be purchased from the American Traffic Safety Services Association, 15 Riverside Parkway, Suite 100, Fredricksburg, Virginia 22406-1022. The *Washington State Modifications to the MUTCD* may be obtained from the Department of Transportation, Olympia, Washington 98504.

In addition to the standards of the MUTCD described above, WSDOT has scheduled the implementation of crashworthiness requirements for most work zone devices. The National Cooperative Highway Research Project (NCHRP) Report 350 has established requirements for crash testing. Work zone devices are divided into four categories. Each of those categories and, where applicable, the schedule for implementation is described below:

- Category 1 includes those items that are small and lightweight, channelizing, and delineating devices that have been in common use for many years and are known to be crashworthy by crash testing of similar devices or years of demonstrable safe performance. These include cones, tubular markers, flexible delineator posts, and plastic drums. All Category 1 devices used on the Project shall meet the requirements of NCHRP 350 as certified by the manufacturer of the device.
- Category 2 includes devices that are not expected to produce significant vehicular velocity change, but may otherwise be hazardous. Examples of this class are barricades, portable sign

supports and signs, intrusion alarms and vertical panels. Any new Category 2 devices purchased after October 1, 2000 shall meet the requirements of NCHRP 350. Existing equipment, purchased prior to October 1, 2000, may be used on the Project until December 31, 2007. For the purpose of definition, a sign support and sign shall be considered a single unit. A new sign may be purchased for an existing sign support and the entire unit will be defined as "existing equipment."

- Category 3 is for hardware expected to cause significant velocity changes or other potentially harmful reactions to impacting vehicles. Barriers, fixed sign supports, crash cushions, truck mounted attenuators (TMA's) and other work zone devices not meeting the definitions of Category 1 or 2 are examples from this category. Many Category 3 devices are defined in the design of the Project. Where this is the case, NCHRP 350 requirements shall be incorporated into the design and the Design-Builder complies with the requirements by constructing according to the plans and specifications. Where the device is a product chosen by the Design-Builder, the device chosen must be compliant with the requirements of NCHRP 350.
- Category 4 includes portable or trailer-mounted devices such as arrow displays, temporary traffic signals, area lighting supports, and portable changeable message signs. There is presently no implementation schedule for mandatory crashworthiness compliance for these devices.

The condition of signs and traffic control devices shall be new or "acceptable" as defined in the book Quality Standards for Work Zone Traffic Control Devices, and will be accepted based on a visual inspection by the TCS. WSDOT may also identify devices that are unacceptable. WSDOT's decision on the condition of a sign or traffic control device shall be final. A sign or traffic control device determined to be unacceptable shall be removed from the Project and replaced within twelve (12) hours of notification.

Refer to Section 2.8 for additional requirements.

2.22.3 Performance Requirements

2.22.3.1 General

The Design-Builder shall prepare *Traffic Management Plan* (TMP) to be approved by WSDOT and establish a MOT Task Force prior to any construction activity that may impact traffic. An exception for environmental work or other work as authorized by WSDOT may be permitted provided the Design-Builder prepares MOT plans in accordance with the requirements in this section and the plans are approved by WSDOT.

2.22.3.2 Traffic Management Plan

The Design-Builder shall develop a Traffic Management Plan (TMP) that includes the following items:

- Descriptions of the qualifications and duties of the Design-Builder's Traffic Engineering Manager and other personnel with MOT responsibilities.
- Description of traffic phasing, including conceptual MOT plans, to accommodate construction staging.
- Descriptions of the design methods to be used for temporary roadways.
- Procedures to identify and incorporate the needs of transit operators, utility owners, schools, and business owners in the Project corridor.

- Procedures for obtaining concurrence of stakeholders and implementing road and lane closures.
- Process for developing and obtaining concurrence by stakeholders of switching procedures.
- Procedures to identify and incorporate the needs of traffic engineering agencies affected by the Work.
- Process for signing transitions during construction from one stage to the next and from interim to permanent signing.
- Procedures to identify and incorporate the needs of emergency service providers, law enforcement entities, and other related corridor users. Also include procedures to ensure all information needed by these agencies to protect the public is available.
- Provisions for incident and emergency response.
- Process to identify, produce, and receive acceptance for designs of any necessary temporary traffic signals.
- Methods and frequency of inspection and maintenance of all traffic control throughout the Project's limits.
- Descriptions of contact methods, personnel available, and response times for responses to any conditions needing attention during off-hours. Include communications plan to WSDOT radio and field offices.
- Identification of measurable limits for the repair and replacement of traffic control devices, including pavement markings.
- Process to determine the need for revised traffic signal timings, and if revisions are required, detail the procedures for the development, approval, implementation, testing, and maintenance of all affected signals.
- Provisions to maintain existing access to all properties within the Project limits for the duration of the Project, except as provided by other sections. Appropriate information about access modifications shall be made available to the appropriate parties.
- Provisions to provide continuous access to established truck routes, hazardous material (HazMat) routes, transit routes and school bus routes.
- Procedures to modify the plans as needed to adapt to current Project circumstances.
- Procedures to determine detour routes and for obtaining acceptance from all stakeholders for all proposed detour routes.
- Procedures to communicate TMP information to the Design-Builder's public information personnel and notify the public of maintenance of traffic issues in conjunction with the requirements of Section 2.9.
- Procedure to accommodate adjoining project's MOT plans if applicable.
- Procedure to accommodate the MOT plans when the staging schedule of the Project or any adjoining project changes.
- Identify haul routes.

The procedures developed in the TMP shall be used to create the MOT plans, including details of all phases, all required switching procedures, and the TIMP.

2.22.3.3 MOT Task Force

2.22.3.3.1 Membership

The Design-Builder shall establish and chair an MOT Task Force, inviting representatives of the Design-Builder, WSDOT, City of Kirkland, King County, law enforcement agencies, emergency response providers, and other agencies whose operations affect or are affected by the Project MOT plans.

The MOT Task Force will serve as an advisory committee to the Design-Builder. The Design-Builder shall consider all recommendations and input provided by the task force; however final design and implementation remain the responsibility of the Design-Builder.

2.22.3.3.2 Meetings

The Design-Builder shall schedule and chair MOT Task Force meetings twice each month from the date the Contract is executed to Project completion. The meeting schedule and frequency may be adjusted upon the agreement of the MOT Task Force members. The purpose of the meetings shall be to:

- Further refine and develop the MOT plans and strategies.
- Review the Design-Builder's MOT details.
- Disseminate Project MOT information to task force meeting attendees.
- Obtain MOT input from task force meeting attendees.
- Develop, refine, and review the TIMP and its implementation.

The Design-Builder shall prepare the agenda, meeting minutes, exhibits and design plans necessary for the meeting. The Design-Builder shall invite representatives from adjacent projects to the MOT Task Force meetings.

2.22.4 Design and Construction Requirements

2.22.4.1 Design Requirements

2.22.4.1.1 MOT Plans

The Design-Builder shall use the procedures in the TMP to develop detailed MOT plans that provide for all construction stages and phasing and identify opportunities to expedite construction throughout the course of the Project. The MOT plans shall be prepared under the direction of the Design-Builder's Traffic Engineering Manager.

All construction signs, flaggers, spotters and other traffic control devices shall be shown on the MOT plan(s) except for emergency situations. Where mainline MOT plans are developed with the intent of operating without the use of flaggers or spotters, the plans shall note that states, "NO FLAGGERS OR SPOTTERS". The use of flaggers or spotters to supplement these MOT plans will not be allowed except in a case where no other means of traffic control can be used or in the event of an emergency. If the Design-Builder proposes the use of flaggers or spotters with one of these plans, this will constitute a modification requiring approval by WSDOT. The modified plans shall show locations for all the required advance warning signs and a safe, protected location for the flagging station. If flagging is to be performed during hours of darkness, the plan must include appropriate illumination for the flagging station.

The MOT plans shall show the necessary construction signs, flaggers, spotters and other traffic control devices required to support the Work. The MOT plans shall conform to the established standards for plan development as shown in the MUTCD, Part VI. The Design-Builder shall be

solely responsible for submitting proposed MOT plans, obtaining WSDOT's approval and providing copies of the approved MOT plans to the Traffic Control Supervisor.

The Design-Builder's MOT plans shall include, at a minimum, the following items:

- Complete plan sheets and details for all stages of construction.
- The appropriate details when temporary construction of any of the following is required to maintain traffic: traffic signals, detour roadways, bridges, retaining structures, drainage, and other miscellaneous construction.
- Roadway plan sheets showing all traffic control devices that are in place that need to be retained, relocated, or removed and all temporary traffic control devices that need to be installed, retained, relocated, or removed.
- The spacing, size, color (legend and background, if applicable) and quantity of all traffic control devices.
- Work areas including ingress and egress for construction vehicles.
- Roadway plan sheets with the location of each sign so it can be easily read in relation to the roadway and other traffic control devices. A small scale layout of each sign shall be shown on the corresponding roadway plan sheet where the sign is to be placed.
- Provisions for using temporary guardrail, temporary concrete barrier wall, or attenuators to satisfy clear zone requirements and to protect the traveling public and Design-Builder's personnel.
- Temporary lighting, temporary signalization and temporary ITS details, as required. The Design-Builder shall refer to additional requirements stated within the respective sections in addition to the requirements herein.
- Signing plan sheets shall include layouts showing the locations of ground-mounted and overhead signs, special sign details, clear zones and structural and foundation requirements.
- Drawings on how to fabricate any sign not detailed in WSDOT *Sign Fabrication Manual* showing dimensions, the background color, and the legend.
- Methods for covering, partially covering or modifying signs when not applicable to the current phase.
- Pavement marking plan sheets shall include striping, crosswalks, intersection details, and traffic delineators.
- Type and location of all pavement markings to be installed, removed, or renewed for each stage and placement location of the final pavement markings.
- Access and control of bicyclists and pedestrians including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA) through the traffic control zones shall be included on the plans.
- Detail modifications to the Project MOT to address wintertime conditions or periods of suspended Work.
- A switching procedure for each control stage change identified in the MOT plans. The switching procedure shall consist of the methods, actions, and signing necessary to complete the switch and the number and duties of traffic personnel assigned to perform the switch.

The MOT plans shall be complete including all necessary details. Typical traffic control configurations such as those found in the MUTCD may be used to assist in developing the MOT

plans. Only approved MOT plans shall be used by the Design-Builder, typical plans are not acceptable unless incorporated as details into the approved plans.

The Design-Builder shall prepare documentation to justify all proposed road closures, detour routes and reductions in lane storage.

2.22.4.1.2 Design Vehicle

The MOT Plan shall accommodate the WB-67 design vehicle. At locations where the existing geometry does not currently accommodate the WB-67 design vehicle, at a minimum, the Design-Builder shall maintain the existing minimum curb radius. Provisions for oversized vehicles shall be coordinated with WSDOT when detours or limited vertical clearance are required by the MOT plans.

A minimum vertical clearance of 16-feet, 6-inches shall be maintained over all roadways at all times during construction except for locations where the existing clearance is less than 16-feet, 6-inches in which case the existing clearances shall be maintained.

2.22.4.1.3 Allowable Closures

This section lists the allowable lane closure hours for the I-405 SR 520 to SR 522 Stage 1 section of mainline. Any restrictions for roadway segments not listed in the table require advance WSDOT approval. The Design-Builder shall notify the public in advance of closures in accordance with the requirements of Section 2.9. No lane closures shall occur outside of the hours specified within this section unless approved in advance and in writing by WSDOT.

No temporary lane closures or restrictions including set-up of traffic control devices will be allowed except during the hours where permitted lane closures are allowed. In addition, no Work that restricts or interferes with traffic shall be allowed from 12:00 noon on the day preceding through 12:00 noon on the day following a holiday or holiday weekend. Holidays that occur on Friday, Saturday, Sunday or Monday are considered a holiday weekend. Holidays are: January 1, the third Monday of January, the third Monday of February, Memorial Day, July 4, Labor Day, November 11, Thanksgiving Day, the day after Thanksgiving, and Christmas Day. When any of these holidays fall on a Sunday, the following Monday shall be considered a holiday. When the holiday falls on a Saturday, the preceding Friday shall be considered a holiday.

Exceptions to the allowable lane closures may be necessary to accommodate wide loads or other permit loads through the temporary traffic control area. In addition, the Design-Builder shall coordinate with adjacent concurrent projects to provide continuity in the lane configurations.

The Design-Builder shall also identify any major event such as a sporting event that is likely to increase traffic volumes beyond the normal operating times and adjust closure times accordingly so as to minimize the impact to traffic, see Section 2.9.5.1.2.13. No traffic restrictions shall be implemented until two hours after events having a significant impact on traffic volumes.

Additional limitations may be placed on traffic restrictions such as lane closures, ramp closures and detours during the holiday period from November 15 of each year through January 2 of the following year. No shifts to traffic patterns or lane configurations shall be made during this period.

WSDOT shall have sole discretion on approving traffic restrictions and freeway closures.

Liquidated Damages will be assessed for failure to complete Work and open all lanes and ramps to traffic by the specified time, see Section 1-08.9.

2.22.4.1.3.1 ***Northbound I-405 Allowable Closures***

Sunday night to Monday morning
Monday night to Tuesday morning

Tuesday night to Wednesday morning
Wednesday night to Thursday morning
Thursday night to Friday morning

	From	To
HOV Lane closed	8:00 PM	7:00 AM
HOV and adjacent lane closed	10:00 PM	5:30 AM
HOV and two adjacent lanes closed	Midnight	4:30 AM
Right GP lane closed	9:00 PM	6:00 AM
Two right GP lanes closed	11:00 PM	4:30 AM
Three right GP lanes closed	Midnight	4:30 AM

Saturday night to Sunday morning (NB I-405)	**From**	**To**
HOV Lane closed	8:00 PM	Noon
HOV and adjacent lane closed	11:00 PM	10:00 AM
HOV and two adjacent lanes closed	Midnight	8:00 AM
Right GP lane closed	8:00 PM	01:00 AM
Two right GP lanes closed	11:00 PM	8:00 AM
Three right GP lanes closed	Midnight	7:00 AM

2.22.4.1.3.2 ***Southbound I-405 Allowable Closures***

Sunday night to Monday morning **Monday night to Tuesday morning** **Tuesday night to Wednesday morning** **Wednesday night to Thursday morning** **Thursday night to Friday morning**	**From**	**To**
HOV Lane closed	7:00 PM	5:00 AM
HOV and adjacent lane closed	8:00 PM	4:30 AM
HOV and two adjacent lanes closed	11:00 PM	4:00 AM
Right GP lane closed	7:00 PM	4:30 AM
Two right GP lanes closed	10:00 PM	4:00 AM
Three right GP lanes closed	11:00 PM	4:00 AM

Saturday night to Sunday morning	**From**	**To**
HOV Lane closed	7:00 PM	10:00 AM
HOV and adjacent lane closed	9:00 PM	9:00 AM
HOV and two adjacent lanes closed	Midnight	7:00 AM
Right GP lane closed	7:00 PM	9:00 AM
Two right GP lanes closed	10:00 PM	8:00 AM
Three right GP lanes closed	Midnight	7:00 AM

2.22.4.1.3.3 ***Allowable Ramp Closures***

NE 116th Street to SB I-405 On-Ramp Full Closure	From	To
Monday, Tuesday, Wednesday and Thursday Nights	8:00 PM	5:00 AM
Saturday Night	10:00 PM	8:00 AM
Sunday Night	7:00 PM	5:00 AM

SB I-405 to NE 85th Street Off-Ramp Full Closure	From	To
Monday, Tuesday, Wednesday and Thursday Nights	8:00 PM	5:00 AM
Saturday Night	10:00 PM	8:00 AM
Sunday Night	7:00 PM	5:00 AM

NE 85th Street to NB I-405 On-Ramp Full Closure	From	To
Monday, Tuesday, Wednesday and Thursday Nights	8:00 PM	5:00 AM
Saturday Night	10:00 PM	8:00 AM
Sunday Night	7:00 PM	5:00 AM

NB I-405 to NE 116th Street Off-Ramp Full Closure	From	To
Monday, Tuesday, Wednesday and Thursday Nights	8:00 PM	5:00 AM
Saturday Night	10:00 PM	8:00 AM
Sunday Night	7:00 PM	5:00 AM

NB I-405 to NE 124th Street Off-Ramp Full Closure	From	To
Monday, Tuesday, Wednesday and Thursday Nights	8:00 PM	5:00 AM
Saturday Night	10:00 PM	8:00 AM
Sunday Night	7:00 PM	5:00 AM

2.22.4.2 Traffic Operations During Construction

2.22.4.2.1 I-405 Mainline During Construction

The mainline includes all mainline temporary bypasses.

Existing shoulders may not be adequate for sustained traffic operations, refer to Section 2.7. for requirements for temporary use of portions of the existing shoulders as travel lanes.

All existing junction boxes, cable vaults, pull boxes, manholes, drainage inlets and other structures including the lids for such devices shall be inspected to ensure they are safe for traffic prior to shifting traffic. Any structures not designed or constructed to be traffic bearing shall be replaced, covered or secured as determined by WSDOT.

Mainline general purpose and HOV lanes shall be a minimum of 11-feet wide. Lanes shall be 12-feet wide when adequate room and 4-foot shoulders are available.

A nominal 8-foot right shoulder/distress lane shall be provided when feasible. Each shoulder shall be a minimum of 2-feet wide and shall be paved. Wider shoulders may be required to accommodate the necessary sight distance. A minimum 1-foot shoulder may be permitted over structures upon WSDOT's approval.

A minimum 2-foot lateral displacement distance shall be provided for any temporary or permanent barrier device for this Project, including portable temporary concrete barriers. Temporary Concrete Barrier (TCB) placed along the edge of a bridge structure shall be anchored.

The Design-Builder shall design any temporary construction and/or widening to withstand the anticipated traffic volumes and loadings during the applicable stage of the Project.

Opposing traffic lanes of mainline I-405 shall be separated by TCB in accordance with WSDOT design requirements.

Mainline general purpose lanes in the same direction of travel shall not be split or separated. The HOV lane may be separated from the general purpose lanes provided adequate advance signage and lighting is provided.

2.22.4.2.1.1 ***Design Criteria***

The design speed shall be 60 mph during construction unless the existing mainline design speed is below 60 mph, in which case the existing value must be maintained.

2.22.4.2.1.2 ***Temporary/Nighttime Lane Closures***

The Design-Builder shall obtain approval of the MOT plans and details prior to scheduling any lane closures. The Design-Builder shall provide written notification to WSDOT and the City of Kirkland a minimum of seven (7) calendar days prior to any closures. Each lane closure shall have one arrow board per closed lane as part of the traffic control layout.

2.22.4.2.1.3 ***Mobile Operations***

Moving lane closures shall only be conducted during the permitted lane closure times listed in the previous section. Truck-mounted attenuators shall be used for moving lane closures. Signs shall be placed along the shoulders in advance of the area of the moving lane closures and list the length of the closure area. Any Sequential Arrow Display used in moving lane closure operations shall be truck-mounted. Refer to Section 2.22.4.7.2 for additional requirements.

2.22.4.2.1.4 ***Full Roadway Closure***

The Design-Builder may close I-405 mainline between the hours of 11:00 PM and 4:00 AM Saturday through Thursday nights, to complete Work such as constructing and connecting to crossovers or bridge demolition Work. Full roadway closures shall be in accordance with the details of approved MOT plans. No more than four northbound I-405 and four southbound I-405 full roadway closures will be permitted during the Project. Closing northbound and southbound I-405 simultaneously may be permitted upon approval from the City of Kirkland and WSDOT.

Detour routes shall be provided by the Design-Builder for full freeway closures, ramp closures and all roadway closures. Detours must be approved by impacted local agencies a minimum of 10 business days prior to implementing the closure. The Design-Builder may be required to prepare traffic analysis of intersections along detour routes to obtain approval. All detours must be in place including all signing prior to closure of the roadway.

The Design-Builder shall provide written notice to WSDOT, a minimum of ten (10) business days prior to closing or detouring traffic.

2.22.4.2.1.5 ***Work Zone Speed Limit***

Speed reduction guidelines are outlined in RCW 46.61.405, WSDOT *Construction Manual*, and Directive D 55-20, "*Reduced Speed in Maintenance and Construction Zones*."

2.22.4.2.1.6 ***Extraordinary Enforcement***

Law enforcement for the Work Zone, when required by law or when requested by the Design-Builder, shall be included in the proposal price.

WSDOT reserves the right to order extra law enforcement for the Work Zone. When WSDOT provides extraordinary enforcement for the Work Zone, it will be at no expense to the Design-Builder.

2.22.4.2.1.7 ***Sequential Arrow Displays***

Each vehicle used to place, maintain, or remove components of a traffic control system on multilane highways shall be equipped with a sequential arrow display that shall be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with sequential arrow displays not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure shall display only the caution mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. Sequential arrow displays used in moving lane closures shall be truck-mounted. This requirement applies to all vehicles placing, maintaining, and removing traffic control devices, including concrete barrier trailers and "cherry pickers."

2.22.4.2.1.8 ***Advance Signing***

The Design-Builder shall develop and install Project Identification signs on mainline I-405 at both ends of the Project as required in Section 2.9.5.1.3.7. These signs shall be installed within 21 calendar days of the date the Contract is executed and prior to any other construction activity on the Project. The signs shall remain in place until final acceptance of the Project. Coordination with adjacent projects may be required for placement of the sign(s).

2.22.4.2.2 **I-405 Ramps During Construction**

2.22.4.2.2.1 ***Design Criteria***

The Design-Builder shall provide acceleration and deceleration lanes to ensure vehicles are within 10 mph of the mainline speed at the point they must merge or diverge from mainline lanes. For entrance ramps with ramp meters, the acceleration length shall be based on traffic accelerating from 0 mph at the stop bar for the meter. The minimum design speed during construction on the entrance and exit ramps shall be 35 mph, except for loop ramps, where the design speed may be reduced to 25 mph. Exit speeds shall be posted for all ramps. For ramps where the design speed during construction is reduced from existing conditions, black on orange construction signs shall be used for the exit speed signs.

A minimum of one lane shall be provided on each ramp. Each lane shall be a minimum of 12 feet wide on entrance and exit ramps. Minimum 2-foot wide paved shoulders shall be provided on both sides of each ramp. Wider ramp widths than these minimums shall be required where necessary to satisfy AASHTO design widths for turning roadways and horizontal stopping sight distance and to accommodate WB-67 design vehicle tracking, refer to WSDOT *Design Manual.*

2.22.4.2.2.2 ***Entrance and Exit Ramps Closures***

The Design-Builder will be allowed to close entrance and exit ramps upon written notification to WSDOT and upon prior approval of the MOT details, including detour routing, and provided that the requirements for ramp access are satisfied. Consecutive off-ramps or on-ramps may not be closed concurrently.

At least ten (10) business days in advance of a ramp closure, the Design-Builder shall furnish to WSDOT a written ramp closure schedule. The schedule shall show the locations and times of all ramp closures and the closure time limits specified in the Contract Documents. Any submittal that does not conform to the Contract time limits, is incomplete, is unintelligible, or includes inaccurate information will be returned to the Design-Builder for correction. The Design-Builder will be notified promptly of any disapproved closures or any closure that will require coordination with other parties as a condition of approval. Requests for ramp closures made less than ten (10) business days in advance will not be approved.

The Design-Builder shall confirm all scheduled closures with WSDOT at least three (3) business days prior to the date on which the ramp closure is scheduled; closures will be approved by 4:00 p.m. the following business day. All ramp closures not confirmed as scheduled shall be cancelled. Confirmed ramp closures that are cancelled for unsuitable weather may be rescheduled for the next day.

Detour routes shall be provided by the Design-Builder for full freeway closures, ramp closures and all roadway closures. Detours must be approved by impacted local agencies a minimum of ten (10) business days prior to implementing the closure. All detours must be in place including all signing prior to closure of the ramp.

The Design-Builder shall coordinate ramp closures with adjoining projects to ensure consecutive on-ramps or off-ramps are not closed simultaneously.

The Design-Builder shall complete all ramp Work within the specified closure times prior to opening the ramps to traffic.

2.22.4.2.2.3 ***Nighttime Closures***

The Design-Builder will be allowed to close ramps during the hours listed in the allowable closures section upon approval from WSDOT. These nighttime closures are meant to be short term in nature and should not be considered a long term approach to the ramp construction by the Design-Builder.

2.22.4.2.2.4 ***Notice of Closures***

See Sections 2.22.4.3.1.6 and 2.9 for advance notification, public notification and signing requirements.

2.22.4.2.2.5 ***Contingency Plan***

The Design-Builder shall provide WSDOT a contingency plan for reopening closed ramps to public traffic in the event of an equipment breakdown, shortage of materials, lack of production of materials, or other production failure, or when it becomes necessary to reopen the ramp closure for use by public traffic. The Design-Builder shall submit the plan at least two (2) business days prior to the scheduled closure. The submission of such a plan and its acceptance by WSDOT shall not relieve the Design-Builder from the impact charges as specified within this Section and Section 1-08.9.

2.22.4.2.2.6 ***Late Reopening***

Refer to Section 1-08.9 for liquidated damages.

2.22.4.2.2.7 ***Specific Ramp Requirements***

- **NE 116th Street to SB I-405 On-Ramp**

  - A maximum of 6 weeknight closures will be permitted to connect new and existing/temporary pavement and for final pavement marking.
  - A maximum of 2 weekend closures beginning at 11:00 PM Friday and opening no later than 4:00 AM the following Monday will be permitted to connect new and existing/temporary pavement.

- **SB I-405 to NE 85th Street Off-Ramp**
  - A maximum of 4 weeknight closures will be permitted to connect new and existing/temporary pavement and for final pavement marking.
  - A maximum of 2 weekend closures beginning at 11:00 PM Friday and opening no later than 4:00 AM the following Monday will be permitted to connect new and existing/temporary pavement.

- **NE 85th Street to NB I-405 On-Ramp**
  - A maximum of 4 weeknight closures will be permitted to connect new and existing/temporary pavement and for final pavement marking.
  - A maximum of 2 weekend closures beginning at 11:00 PM Friday and opening no later than 4:00 AM the following Monday will be permitted to connect new and existing/temporary pavement.

- **NB I-405 to NE 116th Street Off-Ramp**
  - A maximum of 6 weeknight closures will be permitted to connect new and existing/temporary pavement and for final pavement marking.
  - A maximum of 3 weekend closures beginning at 11:00 PM Friday and opening no later than 4:00 AM the following Monday will be permitted to connect new and existing/temporary pavement.

- **NB I-405 to NE 124th Street Off-Ramp**
  - A maximum of 6 weeknight closures will be permitted to connect new and existing/temporary pavement and for final pavement marking.
  - A maximum of 2 weekend closures beginning at 11:00 PM Friday and opening no later than 4:00 AM the following Monday will be permitted to connect new and existing/temporary pavement.

No other ramp closures will be permitted. Only the ramp closures listed above will be allowed, including during the full freeway closures. Work on the above ramps should be scheduled during the full freeway closures when possible to minimize the number of ramp closures required.

2.22.4.2.3 Local Roads During Construction

All MOT plans affecting local roads including but not limited to mainline I-405 closures, entrance and exit ramp closures and closure of other local roads shall follow requirements of each municipality impacted. The Design-Builder shall be responsible for submitting plans and obtaining approval from the City of Kirkland for each planned closure. The Design-Builder shall coordinate with the City of Kirkland regarding concurrent construction work along city cross streets that may be affected by traffic control for this Project.

2.22.4.2.3.1 ***Design Criteria***

The design speed of all local roads shall be at the existing posted speed limit. A design speed 10 mph under the posted speed limit may be used only with approval of WSDOT and the City of

Kirkland. A required reduction from the existing posted speed limit shall be identified in the TMP.

The existing number of through lanes must be maintained at all times except as approved by WSDOT and the City of Kirkland. All lanes for local roads shall be a minimum of 11 feet wide measured to the front of gutter unless the existing lane width is less than 11 feet, in which case the lane shall not be less than the existing width.

2.22.4.2.3.2 ***Detours***

All detours shall be in place, including all signing, prior to closure of the road. Detours using local roads shall follow traffic control permit requirements of each municipality impacted.

The Design-Builder shall identify all bus routes that may be affected by the detour and coordinate with the bus agency regarding impacts to schedule and location of bus stops.

2.22.4.2.3.3 ***Allowable Local Road Closures***

The Design-Builder shall provide written notice to WSDOT and impacted municipalities a minimum of ten (10) business days prior to closing, restricting, or detouring traffic. The Design-Builder shall be responsible for obtaining approval from WSDOT and the City of Kirkland for each planned closure. When any road is closed to traffic, a signed detour shall be provided.

- **NE 116th Street**
  - A maximum of 8 Weeknight closures will be permitted to place falsework/girders for the I-405 bridge structures, bridge deck concrete pours, bridge painting, demolition, and to perform any other required traffic shifts.
  - A maximum of 6 weekend closures beginning at 11:00 PM Friday and opening no later than 4:00 AM the following Monday will be permitted to place falsework/girders for the I-405 bridge structures, bridge deck concrete pours, bridge painting, demolition, and to perform any other required traffic shifts.

2.22.4.2.4 Temporary Mainline Crossovers

Temporary mainline crossovers shall be designed and constructed for four traffic lanes in the same direction (3 general purpose and 1 HOV), in accordance with the following criteria:

- Minimum design speed: 60 mph
- Minimum width of paved driving surface: 48 feet
- Minimum width of shoulder on each side of the traveled way: 2 feet
- Degree of Curve (Horizontal): 4-degree
- Infield slope: 4H:1V or flatter
- Temporary Concrete Barrier with Glare Screen separating opposing directions of traffic

2.22.4.2.5 Temporary Auxiliary Lanes and Exit Ramp Extensions

Temporary auxiliary lanes shall be designed and constructed to meet the following requirements:

- Exiting traffic must not have to slow down in the through lanes to less than 50 mph in order to safely gain access to the temporary auxiliary lane.
- The temporary auxiliary lane must be long enough so that traffic leaving the through lane at 50 mph can slow down to a safe speed of 30 mph by the gore point.

- The temporary auxiliary lane shall have a paved lane width of at least 12 feet and shoulder width of at least 3 feet.
- The infield slope shall be 4H:1V or flatter.
- Acceleration lanes shall be designed to meet the standards shown in the Standard Plans and WSDOT *Design Manual*.
- All temporary auxiliary lanes and extensions for exit ramps shall be provided with temporary overhead signing and shall be fully illuminated.
- A minimum 2 foot lateral displacement distance behind the barrier shall be provided for any temporary or permanent barrier device, including portable temporary concrete barrier.

2.22.4.2.6 Temporary Guardrail, Barrier Attenuators and Glare Screen

2.22.4.2.6.1 ***Vehicle Protection***

The Design-Builder shall be responsible for using temporary guardrail, barrier, and attenuators to protect the traveling public from the following:

- Hitting fixed objects within the clear zone
- Driving off drop-offs as required by Section 2.22.4.5.1
- Driving off slopes steeper than 3H:1V

2.22.4.2.6.2 ***Barrier and Glare Screen***

Opposing traffic lanes of mainline I-405 shall be separated by permanent or temporary concrete barrier in accordance with WSDOT design requirements.

To prevent traffic from hitting the end of temporary concrete barrier (TCB), the end shall not be placed within the clear zone of approaching traffic unless an appropriate attenuator is used, see Section 710.04 of WSDOT *Design Manual* for minimum taper rates and additional details.

Temporary glare screen meeting Sections 8-25 and 9-16.6 of the Standard Specifications using slats shall be placed on top of the median TCB to reduce the headlight glare of approaching vehicles when mainline median crossovers are used. All concrete barrier shall have reflectorized barrier delineators of the appropriate color with 20-foot maximum spacing. The barrier delineators shall be side mounted.

2.22.4.2.7 Pedestrian Access During Construction

The Design-Builder shall maintain existing pedestrian access on all sidewalks and at all intersections. Pedestrian sidewalks and paths that are currently ADA accessible shall be maintained conforming to ADA requirements. If Work will be performed over the pedestrian route, temporary lighted covered walkways shall be provided to protect pedestrians from overhead hazards. Refer to the *Pedestrian Facilities Guidebook*, Toolkit 11. All pedestrian access closures and detour routes shall be shown in the MOT plans.

Pedestrian access shall be maintained along the north side of NE 116th Street at all times with the exception of periods of full roadway closures or with prior approval from WSDOT, as required in Section 2.22.4.2.2.3. Pedestrian access along the south side of NE 116th Street through the I-405 interchange will not be permitted.

2.22.4.2.8 Traffic Incident Management Plan (TIMP)

During construction, maintenance of traffic will become increasingly sensitive to incidents such as equipment malfunctions, traffic crashes, inclement weather, and special events. The Design-Builder shall prepare and implement a formal Traffic Incident Management Plan (TIMP) to address how these incidents shall be managed.

2.22.4.2.8.1 ***General***

The TIMP shall identify methods for incident detection and verification, incident response, incident site management, incident clearance, and motorist information. Procedures for interaction with the Traffic Systems Management Center (TSMC) and Communication Center(s) shall be detailed. In addition, if any local agencies along the corridor have adopted incident management guidelines, the Design-Builder shall be responsible for coordinating with local policies and procedures.

The TIMP shall reflect proposed construction phasing. The Design-Builder shall modify and implement the TIMP in conjunction with planned special events. The TIMP shall provide a mechanism to review and capture lessons learned from incidents. The TIMP shall include specific time limits for the detection, verification, and classification of incidents, as well as for the dissemination of information about the incidents.

The TIMP shall identify and provide for the incorporation of design elements to aid incident management, including turn-around for emergency vehicles, emergency access points, incident investigation sites, and signing to help motorists report the location of incidents in the Project.

2.22.4.2.8.2 ***Incident Response Team***

The Design-Builder shall notify the Washington State Patrol of any vehicles blocking traffic lanes immediately upon detection. The Design-Builder shall notify the TSMC for any disabled vehicles on shoulders. The Design-Builder will not be required to provide additional Incident Response Team equipment nor personnel; however the Design-Builder shall make available materials and equipment that are on site as requested by WSDOT or the Washington State Patrol.

2.22.4.2.8.3 ***Drop Sites***

The Design-Builder shall identify a minimum of two Drop Sites along the construction Project where disabled vehicles can be safely towed off the freeway and motorists assisted. A phone and shelter must be available at the Drop Sites for motorists to use. These Sites may be retail establishments, such as a gas station or repair shop and must be located within 1 mile of the Project limits.

2.22.4.2.8.4 ***Temporary Emergency Pullouts***

Emergency pullouts shall be provided on segments where shoulder widths are less than 8 feet for sections longer than 4,000 feet in length. The minimum pullout width shall be 14 feet from the edge line for a minimum 150 feet in length not including transitions. The approach transitions shall be made at 15:1 or greater. The departure transition rate shall be made at 25:1 or greater. The pullouts shall be signed for emergency parking only, shall have a paved surface, and shall not be subject to ponding or other weather-related conditions that could render them ineffective. Pullouts shall be located on the right side of the travel lanes unless an exception is approved by WSDOT.

2.22.4.2.8.5 ***Staging Areas***

The Design-Builder shall provide staging areas where equipment or vehicles needed for incident clearance can be stored and easily accessible from the construction zone. The staging area can be used for storing additional traffic control devices and parking equipment such as loaders or tow trucks. Staging areas shall be designed to:

- Provide area large enough to store equipment.
- Provide easy access to mainline.
- Can be built in conjunction with temporary emergency pull-offs or emergency access ramps.
- Maintain spare traffic control devices including but not limited to:
  - Cones and/or Drums
  - Type II Barricades
  - Adequate signs for lane closure
  - Temporary Concrete Barrier sections

The Design-Builder shall comply with the performance standards of the *SR 522 to SR 520 Project Biological Assessment*, Section 7.3, Staging.

2.22.4.2.8.6 ***Emergency Vehicle Access***

The Design-Builder shall provide coordination with local and regional emergency service providers, law enforcement entities, and other related corridor users including timely communication of lane closure plans, detour plans, and other Project elements that may affect the appropriate delivery of time-sensitive services. Emergency vehicle access shall be maintained through all nighttime, weekend and evening closures when feasible.

Refer to Section 2.9 for additional requirements.

2.22.4.2.8.7 ***Maintain Camera Surveillance***

The freeway management system cameras are used to detect and verify incidents in the construction Work zone. The existing cameras shall remain operational or temporary cameras installed as follows:

- When any in-place camera is to be off line due to construction for greater than 24-hours, the Design-Builder shall install a temporary camera. The temporary camera shall be installed and operational within 24-hours of the removal of the existing in-place camera. Temporary cameras, if utilized, must be compatible with the existing system, must be installed at approximately the same height as the existing cameras, and must be aligned to produce a similar view as the cameras it replaces.

2.22.4.2.8.8 ***Variable Message Signs (VMS)***

There are no existing overhead variable message signs (VMS) within the Project limits. Existing VMS signs approaching the Project should be utilized to provide motorists with incident and construction-related information prior to entering the Work zone. The Design-Builder shall coordinate with the TSMC to provide timely, accurate information regarding planned closures and updated traffic and construction information. Refer to the Public Information Section for additional requirements.

2.22.4.2.8.9 ***Highway Advisory Radio***

There are no existing Highway Advisory Radio (HAR) transmitters within the Project limits. Existing HAR stations at the interchanges of I-405/SR 520 and I-405/SR 522 should be utilized to provide motorists with incident and construction-related information prior to entering the work zone. The Design-Builder shall coordinate with the TSMC to provide timely, accurate information regarding planned closures and updated traffic and construction information. If the Design-Builder elects to supplement the existing HAR with a portable HAR, the Design-Builder shall be responsible for all necessary permits, operating the HAR including recording messages, and ensuring compatibility with the existing HAR. Refer to the Public Information Section for additional requirements.

2.22.4.2.8.10 ***Design-Builder Response Time***

At all times the Design-Builder shall have a Traffic Control Supervisor on call equipped with a mobile phone who can respond to and take appropriate action to manage an incident within 45 minutes, refer to Section 2.22.4.5.2. Upon arrival that employee shall have the experience, resources and equipment required to repair barrier or set up temporary traffic control until the barrier can be repaired.

Refer to Section 1-08.9 of the General Conditions for liquidated damages.

2.22.4.3 Public Convenience and Safety

2.22.4.3.1 Construction Under Traffic

The construction safety zone will be determined as follows:

- When the posted speed is 35 MPH or under, the safety zone will be 10 feet from the outside edge of traveled way or 2 feet beyond the outside edge of the sidewalk
- When the posted speed is from 40 to 55 MPH, the safety zone will be 15 feet from the outside edge of traveled way
- When the posted speed is 60 MPH or over, the safety zone will be 30 feet from the outside edge of traveled way.

During nonworking hours equipment or materials shall not be within the safety zone unless it is protected by permanent guard rail or temporary concrete barrier. The use of temporary concrete barrier shall be permitted only if WSDOT approves the installation and location.

During the actual hours of Work, unless protected as described above, only materials absolutely necessary to construction shall be within the safety zone and only construction vehicles absolutely necessary to construction shall be allowed within the safety zone or allowed to stop or park on the shoulder of the roadway.

The Design-Builder's nonessential vehicles and employees private vehicles shall not be permitted to park within the safety zone at any time unless protected as described above.

Deviation from the above requirements shall not occur unless the Design-Builder has requested the deviation in writing and WSDOT has provided written approval.

Construction vehicles using a closed traffic lane shall travel only in the normal direction of traffic flow unless expressly allowed in an approved MOT plan. Construction vehicles shall be equipped with flashing or rotating amber lights.

Work over an open lane of traffic will not be allowed, unless a plan for the protection of the traveling public from debris falling onto the traveled way is approved by WSDOT. This protection shall

remain in place during construction and meet minimum vertical clearance for the highway.

Refer to Section 1-07.23 for additional requirements.

2.22.4.3.1.1 ***Controlled Access***

No special access or egress will be allowed the Design-Builder other than normal legal movements or as approved by WSDOT.

2.22.4.3.1.2 ***Night Work***

Night Work may be required for the Project. The Design-Builder shall obtain any required noise variance or exemption for such Work. The Design-Builder shall, at no additional cost to WSDOT, make all arrangements for operations during hours of darkness. Flagger stations shall be illuminated using a minimum 150 watt floodlight. Lighting for construction activity shall be directed away from maintained traffic to minimize glare to motorists.

The Design-Builder shall comply with the performance standards of the *SR 522 to SR 520 Project Biological Assessment*, Section 7.5, Lighting.

2.22.4.3.1.3 ***Signs and Traffic Control Devices***

All signs and traffic control devices for lane, ramp and roadway closures shall only be installed during the hours specified in Section 2.22.4.1.3. The construction signs, if placed earlier than the specified hours of closure, shall be turned or covered so as not to be visible to motorists.

2.22.4.3.1.4 ***Advance Notification***

The Design-Builder shall submit MOT plans for lane and sidewalk closure requests in writing to WSDOT in advance of the proposed closure as specified in these technical specifications and satisfy all public information requirements of Section 2.9.

2.22.4.3.1.5 ***Hour Adjustment***

If WSDOT determines that the permitted closure hours adversely affect traffic, causing queues in excess of 1.5 miles, WSDOT may adjust the hours accordingly. WSDOT will notify the Design-Builder in writing of any change in the closure hours.

2.22.4.3.1.6 ***Public Notification***

The Design-Builder shall furnish and install information signs that provide advance notification of ramp and road closures a minimum of seven (7) calendar days prior to closure. The signs shall have a black legend on a white reflective background. Sign locations, messages, letter sizes, and sign sizes shall be shown in the Plans. For full freeway closures, VMS or Portable Changeable Message Sign (PCMS) shall also be used to supplement the signs. For ramp and local road closures, PCMS shall be used to supplement the required signs. Also, the Design-Builder shall notify Washington State Patrol, local fire departments, police departments, city engineering departments, public transit agencies and the affected school districts in writing a minimum of five calendar days prior to implementation. The Design-Builder shall furnish copies of these notifications to WSDOT. Refer to Section 2.9 for additional requirements.

2.22.4.3.1.7 ***Mast Arm Erection and Traffic Block Allowance***

During erection of mast arm assemblies, the Design-Builder may, with the authorization of WSDOT, block all traffic for intervals of five minute maximum durations between the hours of

12:00 a.m. and 4:00 a.m. These five-minute blockages shall be separated by an interval long enough to allow the delayed vehicles to clear.

2.22.4.4 Construction Requirements

2.22.4.4.1 General

The Design-Builder, utilizing Design-Builder labor and Design-Builder-provided equipment and materials (except when such labor, equipment or materials are to be provided by WSDOT as specifically identified herein), shall plan, manage, supervise and perform all temporary traffic control activities needed to support the Work of the contract.

The Design-Builder shall be responsible for all Project maintenance of traffic starting at 12:01 a.m. on the day Work begins on the Project. The traffic control devices, including temporary and permanent signal systems, must be continually and adequately monitored and maintained to ensure proper placement and working order and to ensure the safe and efficient flow of all traffic through and adjacent to the Project. Such responsibility and maintenance shall continue until 11:59 p.m. on the day of Final Acceptance of the Project by WSDOT. WSDOT may, in writing, temporarily suspend such responsibility in conjunction with an official suspension for weather or other reasons.

2.22.4.4.2 Materials

Materials shall meet the requirements of the following sections of the amended Standard Specifications:

- Stop/Slow Paddles 9-35.1
- Construction Signs 9-35.2
- Wood Sign Posts 9-35.3
- Sequential Arrow Signs 9-35.4
- Portable Changeable Message Signs 9-35.5
- Barricades 9-35.6
- Traffic Safety Drums 9-35.7
- Barrier Drums 9-35.8
- Traffic Cones 9-35.9
- Tubular Markers 9-35.10
- Warning Lights and Flashers 9-35.11
- Truck-Mounted Attenuator 9-35.12

Additionally, all materials shall conform to the requirements of the Project Special Provision for Traffic Control Materials section in Appendix B2.

2.22.4.4.3 Description

The Design-Builder shall provide flaggers, spotters and all other personnel required for labor for traffic control activities and not otherwise specified as being furnished by WSDOT.

The Design-Builder shall perform all procedures necessary to support the contract Work.

The Design-Builder shall provide signs and other traffic control devices not otherwise specified as being furnished by WSDOT. The Design-Builder shall erect and maintain all construction signs,

warning signs, detour signs, and other traffic control devices necessary to warn and protect the public at all times from injury or damage as a result of the Design-Builder's operations which may occur on or adjacent to highways, roads, or streets. No Work shall be done on or adjacent to the roadway until all necessary signs and traffic control devices are in place.

The traffic control resources and activities described shall be used for the safety of the public, of the Design-Builder's employees, and of WSDOT's personnel and to facilitate the movement of the traveling public. Traffic control resources and activities may be used for the separation or merging of public and construction traffic when such use is in accordance with a specific approved MOT plan.

Upon failure of the Design-Builder to immediately provide flaggers; erect, maintain, and remove signs; or provide, erect, maintain, and remove other traffic control devices when ordered to do so by WSDOT, WSDOT may, without further notice to the Design-Builder or the Surety, perform any of the above and deduct all of the costs from the Design-Builder's payments.

The Design-Builder shall be responsible for providing adequate labor, sufficient signs, and other traffic control devices, and for performing traffic control procedures needed for the protection of the Work and the public at all times regardless of whether or not the labor, devices or procedures have been ordered by WSDOT, furnished by WSDOT, or paid for by WSDOT.

Wherever possible when performing contract Work, the Design-Builder's equipment shall follow normal and legal traffic movements. The Design-Builder's ingress and egress of the work area shall be accomplished with as little disruption to traffic as possible. Traffic control devices shall be removed by picking up the devices in a reverse sequence to that used for installation. This may require moving backwards through the work zone. When located behind barrier or at other locations shown on approved MOT plans, equipment may operate in a direction opposite to adjacent traffic.

The Design-Builder is advised that WSDOT may have entered into operating agreements with one or more law enforcement organizations for cooperative activities. Under such agreements, at the sole discretion of WSDOT, law enforcement personnel may enter the work zone for enforcement purposes and may participate in the Design-Builder's traffic control activities. The responsibility under the contract for all traffic control resides with the Design-Builder and any such participation by law enforcement personnel in Design-Builder traffic control activities will be preceded by an agreement and, if appropriate, a cost adjustment. Nothing in this contract is intended to create an entitlement, on the part of the Design-Builder, to the services or participation of the law enforcement organization.

2.22.4.4.4 Signing, Pavement Markings and Traffic Control Devices During Construction

The Design-Builder shall inspect all signing (existing and temporary) daily noting damaged signs, misplaced signs and graffiti affecting legibility of the sign. Every detour route shall be driven daily and at least twice each week at night, to ensure all detour signing is in place. Signing for detours shall be covered or removed when detours are not in use. The Design-Builder shall provide a schedule for repairing, cleaning or replacing signs; procedures shall address rectifying incorrect or misleading signing that may present a hazard to road users.

The Design-Builder shall inspect all pavement markings daily. The Design-Builder shall provide a schedule for replacing damaged pavement markings and establish minimum replacement timeframes based on the degree of degradation. If missing or damaged pavement markings present a hazardous condition, WSDOT may require the Design-Builder to close lanes or replace the pavement marking within 24 hours.

The Design-Builder shall clean or replace all pavement markings when they become damaged or lose reflectivity.

The Design-Builder shall use equipment that is not detrimental to the roadway surface for removing pavement markings, as approved by WSDOT. Refer to Section 8-23.3(1) of the Standard Specifications.

The Design-Builder shall replace or clean temporary pavement markings whenever the reflectance of the markings has deteriorated to 80 percent or less of the value specified for the material when new. Reflectance values shall be measured in accordance with ASTM D4061. The Design-Builder shall perform the required tests monthly at 1-mile intervals or at specific locations requested by WSDOT.

As each segment is completed, the Design-Builder shall install the final signing and pavement markings required to safely open that road to traffic. This Work shall be completed on or before the date of opening. Overhead signs may be temporarily ground-mounted at the Design-Builder's expense except for 'Exit Only' guide signs and all HOV exit signing.

The Design-Builder shall have adequate spare sections of temporary barrier and the necessary equipment onsite to replace and/or repair temporary barrier within four hours of identification by or notice given to the design-builder of damaged barrier. This requirement shall include replacement of impact attenuators. Temporary traffic control shall be set up immediately upon notice of damage to ensure motorist safety.

2.22.4.4.5 Temporary Signalization

This section applies to new temporary signals necessary for detour routes or other construction phasing, if any. Any modifications to existing traffic signals must be shown in the MOT plans and approved by the operating agency. Modifications proposed for signal timing or phasing must be coordinated with and approved by the operating agency.

2.22.4.4.5.1 ***Electrical Service***

The Design-Builder shall coordinate with the local power supplier to provide the electrical service connection for each temporary signal system. The Design-Builder shall pay the connection fees and monthly electrical power costs of the temporary signal system.

2.22.4.4.5.2 ***Material Requirements***

The Design-Builder shall furnish and install all required materials for the temporary signalization.

The Design-Builder shall provide vehicle detection methods to optimize all temporary signal system installations. The Design-Builder may use Type 3 inductive loops or video image detection for temporary signal installations.

2.22.4.4.5.3 ***WSDOT Inspection***

The Design-Builder shall provide 24-hour notice to WSDOT prior to implementing temporary signalization. WSDOT will perform the final electrical inspection and acceptance of temporary signal systems as required in accordance with WAC 296-46B-040.

2.22.4.4.5.4 ***Signal Turn-On***

The Design-Builder shall secure the services of a police officer to perform traffic control while the traffic signal is being placed into service.

2.22.4.4.5.5 ***Operation and Maintenance***

The Design-Builder shall develop timing plans and phasing for the Temporary Signal operation. WSDOT will enter the timing parameters into the signal controller. The Design-Builder may be allowed to enter the timing parameters into the signal controller with approval of WSDOT.

WSDOT will operate and maintain the temporary signal systems once the signal is turned on and operational. The Design-Builder shall remove all temporary signal system installations upon completion and operation of the new permanent signal systems.

2.22.4.4.6 **Temporary Lighting**

Temporary lighting shall be used when existing lighting must be removed or disconnected and new lighting is not in operation and for areas where traffic has been shifted and additional lighting is necessary for the safety of the traveling public or workers. Temporary lighting shall be provided for all on-ramps and off-ramps and at intersections where traffic control devices are in place. Temporary lighting shall also be provided along the full length of auxiliary lanes and at locations where HOV lanes separate from general purpose lanes, if any.

The Design-Builder shall comply with the performance standards of the *SR 522 to SR 520 Project Biological Assessment,* Section 7.5, Lighting.

2.22.4.4.6.1 ***General***

The Design-Builder shall:

- Design temporary lighting plans.
- Maintain current levels of roadway illumination for all roadway segments and interchanges that are currently lit.
- Provide all materials and equipment for temporary lighting installations.
- In the clear zone, provide only lighting units that are breakaway or protected from crash potential.
- Provide maintenance for the temporary lighting system. Maximum repair times shall be established by and adhered to by the Design-Builder for individual luminaires and segment outages.

2.22.4.4.6.2 ***Timber Light Standards***

Timber light standards may be used for temporary lighting where breakaway or slip bases are not required. Timber light standards must be outside of the clear zone or protected by barrier.

2.22.4.4.6.3 ***Power Service Costs***

The Design-Builder shall coordinate with the local power supplier to provide the power service connection. The Design-Builder shall pay all costs charged by the electric power companies for providing power connections. The Design-Builder shall pay the monthly electric bills for existing, temporary and new lighting installed under the Contract until Final Acceptance of the Project.

WSDOT or others will pay all monthly electrical bills for lighting after Final Acceptance of the Project.

2.22.4.5 **Traffic Control Personnel**

It is the Design-Builder's responsibility to plan, conduct and safely perform the Work. The Design-Builder shall manage temporary traffic control with his or her own staff. Traffic control management

responsibilities shall be formally assigned to one or more company supervisors who are actively involved in the planning and management of field contract activities. The Design-Builder shall provide WSDOT with a copy of the formal assignment. The duties of traffic control management may not be subcontracted.

The Design-Builder shall designate an individual or individuals to perform the duties of the primary Traffic Control Supervisor (TCS). The designation shall also identify an alternate TCS who can assume the duties of the primary TCS in the event of that person's inability to perform. The TCS shall be responsible for safe implementation of approved MOT Plans provided by the Design-Builder.

The TCS shall be certified by one of the following:

The Northwest Laborers-Employers Training Trust
27055 Ohio Avenue
Kingston, WA 98346
(360) 297-3035

Evergreen Safety Council
401 Pontius Avenue N.
Seattle, WA 98109
1-800-521-0778 or
(206) 382-4090

Possession of a current flagging card by the TCS is mandatory. A traffic control management assignment and a TCS designation are required on all projects that will utilize traffic control.

The Design-Builder shall furnish all personnel for flagging, spotting, for the execution of all procedures related to temporary traffic control and for the setup, maintenance and removal of all temporary traffic control devices and construction signs necessary to control traffic during construction operations.

Workers engaged as flaggers or spotters shall wear reflective vests and hard hats. During hours of darkness, white coveralls or white or yellow rain gear shall also be worn. The vests and other apparel shall be in conformance with Section 1-07.8 High Visibility Apparel.

2.22.4.5.1 Traffic Control Management

The responsibilities of the Design-Builder's traffic control management personnel shall include:

- Overseeing and approving the actions of the Traffic Control Supervisor (TCS) to ensure that proper safety and traffic control measures are implemented and consistent with the specific requirements created by the Design-Builder's work zones and the Contract. Some form of oversight shall be in place and effective even when the traffic control management personnel are not present at the jobsite.
- Providing the Design-Builder's designated TCS with approved MOT plans which are compatible with the Work operations and traffic control for which they will be implemented. Having the latest adopted edition of the *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD,) including the Washington State Modifications to the MUTCD and applicable standards and specifications available at all times on the Project.
- Discussing proposed traffic control measures and coordinating implementation of the Design-Builder-adopted MOT plan(s) with WSDOT.
- Coordinating all traffic control operations, including those of subcontractors and suppliers, with each other and with any adjacent construction or maintenance operations.

- Coordinating the Project's activities (such as ramp closures, road closures, and lane closures) with appropriate police, fire control agencies, city or county engineering, medical emergency agencies, school districts, and transit companies.
- Overseeing all requirements of the Contract that contribute to the convenience, safety, and orderly movement of vehicular and pedestrian traffic.
- Reviewing the TCS's diaries daily and being aware of field traffic control operations.
- Being present on-site a sufficient amount of time to adequately satisfy the above-listed responsibilities.

Failure to carry out any of the above-listed responsibilities shall be a failure to comply with the Contract and may result in a suspension of Work as described in Section 1.08.6.

2.22.4.5.2 Traffic Control Supervisor

A Traffic Control Supervisor (TCS) shall be present on the Project whenever flagging or spotting or other traffic control labor is being utilized or less frequently, as authorized by WSDOT.

The TCS shall personally perform all the duties of the TCS. During non-work periods, the TCS shall be available to the job site within a 45-minute time period after notification by WSDOT.

The TCS's duties shall include:

- Having a current set of approved MOT plans, applicable contract provisions as provided by the Design-Builder, the latest adopted edition of the MUTCD, including the Washington State Modifications to the MUTCD, the book Quality Standards for Work Zone Traffic Control Devices, and applicable standards and specifications.
- Inspecting traffic control devices and nighttime lighting for proper location, installation, message, cleanliness, and effect on the traveling public. Traffic control devices shall be inspected at least once per hour during working hours except that Class A signs and nighttime lighting need to be checked only twice a week. Traffic control devices left in place for 24 hours or more shall also be inspected twice during the nonworking hours when they are initially set up (during daylight or darkness, whichever is opposite of the working hours). The TCS shall correct, or arrange to have corrected, any deficiencies noted during these inspections.
- Preparing a daily traffic control diary on each day that traffic control is performed using DOT Forms 421-040A and 421-040B and submitting them to the Engineer-of-Record no later than the end of the next business day. The Design-Builder may use alternate forms if approved by WSDOT. Diary entries shall include, but not be limited to:
    - Time of day when signs and traffic control devices are installed and removed
    - Location and condition of signs and traffic control devices
    - Revisions to the MOT plan
    - Lighting utilized at night, and
    - Observations of traffic conditions.
- Making minor revisions to the MOT plan to accommodate site conditions provided that the original intent of the MOT plan is maintained and the revision has the concurrence of both the Design-Builder and WSDOT.
- Attending traffic control coordinating meetings or coordination activities, including for adjacent projects, as necessary for full understanding and effective performance.

- Ensuring that all needed traffic control devices and equipment are available and in good working condition prior to the need to install or utilize them.

The TCS may perform the Work described by "Flaggers and Spotters" or "Other Traffic Control Labor" provided that the duties of the TCS are accomplished.

The TCS will be considered a critical component of the Design-Builder's management team and must have prior experience managing MOT operations on similarly complex projects. Registration as a licensed Professional Engineer is not required; however, the Design-Builder may elect to use his Traffic Engineering Manager in this position. The TCS shall attend all MOT Task Force meetings. The TCS shall also coordinate activities with the public information officer.

The TCS or his designate shall be available on a 24-hour per day basis with a single contact phone number throughout the duration of the Project, must supervise and verify all changes in the MOT setup, and perform daily Project reviews to verify that MOT devices are correctly placed and traffic is safely and efficiently moving through the Project. The TCS or his designate shall be available on the Site within 45 minutes of notification of an emergency situation and be prepared to positively respond to the need to repair the work zone traffic control or to provide alternate traffic arrangements. The TCS shall have the resources, ability and authority to expeditiously correct any deficiencies in the traffic control system or to demobilize any construction operation that is resulting in excessive delays to traffic or creating an unsafe condition.

The TCS shall maintain a thirty day advance schedule of all traffic control activities and a long-range schedule for all planned ramp and roadway closures. The TCS shall coordinate with the Design-Builder's Public Information Team to ensure the information is disseminated to WSDOT and the Public.

The TCS shall perform drive-through inspections each working day and immediately after any shift in MOT setup while crews are still on site to make modifications. If the Project has signalized intersections, the review shall be done prior to each AM Peak, and each signal cycle shall be reviewed. At least two of the daily inspections each week must be performed at night so that the arrangement and condition of the lights can be reviewed. The inspections shall also include assurances that pedestrians and bicyclists have a safe travel path around or through the Work site and that existing businesses have adequate access during business hours, if applicable. The results of the inspections shall be documented in a daily report that, at a minimum, lists the time frame of the drive-through inspection and the defects noted. The report shall also document any maintenance or corrective action ordered as a result of the inspection and the name and position of the Design-Builder personnel directed to provide the maintenance or corrective action. The daily report shall state that the MOT setup and all traffic control devices are in substantial conformance with the Contract requirements except as noted and shall be signed by the TCS.

2.22.4.5.3 Flaggers and Spotters

Flaggers and Spotters shall be posted where shown on approved MOT plans or where directed by WSDOT. All flaggers or spotters shall possess a current flagging card issued by the State of Washington, Oregon, Montana or Idaho. The flagging card shall be immediately available and shown to WSDOT upon request.

Flagging stations shall be shown on MOT plans at locations where construction operations require stopping or diverting public traffic. Flagging stations shall be staffed only when flagging is required. This staffing may be continuous or intermittent, depending on the nature of the construction activity. Whenever a flagger is not required to stop or divert traffic, the flagger shall move away from the flagging station to a safer location. During hours of darkness, flagging stations shall be illuminated in a manner that insures that flaggers can easily be seen but that does not cause glare to the traveling

public. Flaggers shall be equipped with portable two-way radios, with a range suitable for the Project. The radios shall be capable of having direct contact with Project management (foremen, superintendents, etc.).

The Design-Builder shall furnish the MUTCD standard Stop/Slow paddles for all flagging operations. The specification for Stop/Slow paddles in Section 9.35.1 of the Standard Specifications requires 24-inch paddles and all new paddles purchased for the Project shall conform to those provisions. Previously specified 18-inch paddles may be used at the request of the Design-Builder until December 31, 2005.

Spotting stations shall be shown on MOT plans at locations where a spotter can detect errant drivers or other hazards and provide an effective warning to other workers. Spotting stations will not be allowed at locations where the spotter will be in unnecessary danger. The Design-Builder shall furnish noise-makers or other effective warning devices for spotting operations. The duties of a spotter shall not include flagging.

2.22.4.5.4 Other Traffic Control Labor

In addition to flagging or spotting duties, the Design-Builder shall provide personnel for all other traffic control procedures required by the construction operations and for the labor to install, maintain and remove any traffic control devices shown on MOT plans.

2.22.4.6 Video Record

A drive-through video of all MOT devices shall be made each week, and immediately after each accident causing injuries, and after each shift in MOT setup. The tapes shall be maintained in a remote fireproof location, and a log of the tapes with dates and times shall be provided to WSDOT on a monthly basis. WSDOT shall have the right to review the tapes at any time with 24 hour notice to the Design-Builder.

2.22.4.7 Traffic Control Procedures

2.22.4.7.1 One-Way Traffic Control

The Project Work may require that traffic be maintained on a portion of the roadway during the progress of the Work using one-way traffic control. If this is the case, the Design-Builder's operation shall be confined to one-half the roadway, permitting traffic on the other half. If shown on an approved MOT plan or directed by WSDOT, one-way traffic control, in accordance with the MUTCD, shall be provided and shall also conform to the following requirements:

- In any one-way traffic control configuration, side roads and approaches shall be closed or controlled by a flagger or by appropriate approved signing. A side road flagger shall coordinate with end flaggers where there is line of sight and with the pilot car where the end flaggers cannot be seen.
- Queues of vehicles shall be allowed to take turns passing through the work zone in the single open lane. When one-way traffic control is in effect, Design-Builder vehicles shall not use the open traffic lane except while following the same rules and routes required of the public traffic.

As conditions permit, the Design-Builder shall, at the end of each day, leave the Work area in such condition that it can be traveled without damage to the Work, without danger to traffic, and without one-way traffic control. If, in the opinion of WSDOT, one-way traffic control cannot be dispensed with after working hours, then the operation shall be continued throughout the non-working hours.

2.22.4.7.2 Rolling Slowdown

For Work operations on multi-lane roadways that necessitate short-term roadway closures of 15 minutes or less, the Design-Builder may implement a rolling slowdown. Where included in an approved MOT plan, a rolling slowdown shall be accomplished using one traffic control vehicle with flashing amber lights for each lane to be slowed down plus one control vehicle to serve as a chase vehicle for traffic ahead of the blockade. The traffic control vehicles shall enter the roadway and form a moving blockade to reduce traffic speeds and create a clear area in front of the moving blockade to accomplish the Work without a total stoppage of traffic.

A portable changeable message sign shall be placed ahead of the starting point of the traffic control to warn traffic of the slowdown. The sign shall be placed far enough ahead of the Work to avoid any expected backup of vehicles.

The location where the traffic control vehicles shall begin the slowdown and the speed at which the moving blockade will be allowed to travel shall be calculated to accommodate the estimated time needed for closure. The chase control vehicle shall follow the slowest vehicle ahead of the blockade. When the chase vehicle passes, the Design-Builder may begin the Work operation. In the event that the Work operation is not completed when the moving blockade reaches the site, all Work except that necessary to clear the roadway shall cease immediately and the roadway shall be cleared and reopened as soon as possible.

All ramps and entrances to the roadway between the moving blockade and Work operation shall be temporarily closed using flaggers. Radio communications between the Work operation and the moving blockade shall be established and utilized to adjust the speed of the blockade to accommodate the closure time needed.

2.22.4.7.3 Lane Closure Setup/Takedown

Where allowed by the contract and where shown on approved MOT plans or directed by WSDOT, the Design-Builder shall set up traffic control measures to close one or more lanes of a multi-lane facility. When this is to occur, the following sequence shall be followed:

- Advance warning signs are set up on the shoulder of the roadway opposite the lane to be closed
- Advance warning signs are set up on the same shoulder as the lane to be closed
- A truck-mounted attenuator, with arrow board, is moved into place at the beginning of the closure taper
- Channelization devices are placed to mark the taper and the length of the closure as shown on the MOT plan
- Once the lane is closed, the TMA/arrow board combination may be replaced with an arrow board without attenuator.

If additional lanes are to be closed, this shall be done in sequence with previous lane closures using the same sequence of activities. A truck-mounted attenuator with arrow board is required during the process of closing each additional lane and may be replaced with an arrow board without attenuator after the lane is closed. Each closed lane shall be marked with a separate arrow board at all times.

Traffic control for lane closures shall be removed in the reverse order of its installation.

2.22.4.7.4 Mobile Operations

Where construction operations are such that movement along the length of a roadway is continuous or near-continuous to the extent that a stationary traffic control layout will not be effective, the Design-

Builder shall implement a moving, or mobile, traffic control scheme. Such moving control shall always be conducted in the same direction as the adjacent traffic.

Where shown on an approved MOT plan or where directed by WSDOT, mobile traffic control shall consist of portable equipment, moving with the operation. A portable changeable message sign shall be established in advance of the operation, far enough back to provide warning of both the operation and of any queue of traffic that has formed during the operation. The advance sign shall be continuously moved to stay near the back of the queue at all times. A truck-mounted attenuator, with arrow board, shall be positioned and maintained at a fixed distance upstream of the Work. A shadow vehicle, with truck-mounted attenuator shall be positioned and maintained immediately upstream of the Work.

2.22.4.7.5 Patrol and Maintain Traffic Control Measures

At all times, when temporary traffic control measures are in place, the Design-Builder shall provide for patrolling and maintaining these measures. The Work shall consist of resetting mislocated devices, assuring visibility of all devices, cleaning and repairing where necessary, providing maintenance for all equipment, including replacing batteries and light bulbs as well as keeping motorized and electronic items functioning, and adjusting the location of devices to respond to actual conditions, such as queue length, unanticipated traffic conflicts and other areas where planned traffic control has proven ineffective.

This Work shall be performed by the Design-Builder, either by or under the direction of the Traffic Control Supervisor. Personnel, with vehicles if necessary, shall be dispatched so that all traffic control can be reviewed at least once per hour during working hours and at least once during each non-working day.

2.22.4.8 Traffic Control Devices

Traffic control devices are used to visually guide drivers through work zones. Signing, channelizing devices, arrow boards and warning beacons all display a message to the driver. Work zone credibility is established through the proper use of these devices to send correct messages to drivers. Poor work zone credibility has a direct, negative, impact on work zone safety by causing driver confusion, frustration and disrespect which results in a high potential for accidents.

2.22.4.8.1 Construction Signs

All construction signs required by approved MOT plans, as well as any other appropriate signs directed by WSDOT shall be furnished by the Design-Builder. The Design-Builder shall provide the posts or supports and erect and maintain the signs in a clean, neat, and presentable condition until the need for them has ended. Post mounted signs shall be installed as shown in Standard Plans G-1 and G-4a. Sign attachment to posts shall conform to the applicable detail shown in Standard Plan G-9b. When the need for construction signs has ended, the Design-Builder, upon approval of WSDOT, shall remove all signs, posts, and supports from the Project and they shall remain the property of the Design-Builder.

No passing zones on the existing roadway, if any, that are marked with paint striping and which striping is to be obliterated by construction operations shall be replaced by "Do Not Pass" and "Pass With Care" signs. The Design-Builder shall provide and install the posts and signs. The signs shall be maintained by the Design-Builder until they are removed or until the contract is physically completed. When the Project includes striping by the Design-Builder, the signs and posts shall be removed by the Design-Builder when the no passing zones are reestablished by striping. The signs and posts will become the property of the Design-Builder. When the Design-Builder is not responsible for striping and when the striping by others is not completed when the Project is

physically completed, the posts and signs shall be left in place and shall become the property of WSDOT.

All existing signs, new permanent signs installed under this contract, and construction signs installed under this contract that are inappropriate for the traffic configuration at a given time shall be removed or completely covered with metal, plywood, or a WSDOT-approved product specifically manufactured for sign covering during periods when they are not needed.

Construction signs are divided into two classes. Class A construction signs are those signs that remain in service throughout the construction or during a major phase of the Work. They are mounted on posts, existing fixed structures, or substantial supports of a semi-permanent nature. Class A signs shall be designated as such on the approved MOT plan. "Do Not Pass" and "Pass With Care" signs are classified as Class A construction signs. Sign and support installation for Class A signs shall be in accordance with the Contract Plans or the Standard Plans. Class B construction signs are those signs that are placed and removed daily, or are used for short durations which may extend for one or more days. They are mounted on portable or temporary mountings.

Where it is necessary to add weight to signs for stability, the only allowed method will be a bag of sand that will rupture on impact. The bag of sand shall have a maximum weight of 40 pounds, and shall be suspended no more than 1 foot from the ground.

Signs, posts, or supports that are lost, stolen, damaged, destroyed, or which WSDOT deems to be unacceptable while their use is required on the Project shall be replaced by the Design-Builder.

2.22.4.8.2 Sequential Arrow Signs

Where shown on an approved MOT plan or where ordered by WSDOT, the Design-Builder shall provide, operate and maintain sequential arrow signs. In some locations, the sign will be shown as a unit with an attenuator. In other locations, the plan will indicate a stand-alone unit.

2.22.4.8.3 Portable Changeable Message Sign

Where shown on an approved MOT plan or where ordered by WSDOT, the Design-Builder shall provide, operate and maintain Portable Changeable Message Signs (PCMS). The Design-Builder shall provide a minimum of two PCMS available for use throughout the duration of the project and shall provide additional PCMS as required. These signs shall be available, on-site, for the entire duration of their projected use.

2.22.4.8.4 Barricades

Where shown on an approved MOT plan or where ordered by WSDOT, the Design-Builder shall provide, install and maintain barricades. Barricades shall be kept in good repair and shall be removed immediately when, in the opinion of WSDOT, they are no longer functioning as designed.

Where it is necessary to add weight to barricades for stability, the only allowed method will be a bag of sand that will rupture on impact. The bag of sand shall have a maximum weight of 40 pounds, and shall be suspended no more than 1 foot from the ground.

2.22.4.8.5 Traffic Safety Drums

Where shown on an approved MOT plan, or where ordered by WSDOT, the Design-Builder shall provide, install and maintain traffic safety drums.

Used drums may be utilized, provided all drums used on the Project are of essentially the same configuration.

The drums shall be designed to resist overturning by means of a weighted lower unit that will separate from the drum when impacted by a vehicle.

Drums shall be regularly maintained to ensure that they are clean and that the drum and reflective material are in good condition. If WSDOT determines that a drum has been damaged beyond usefulness, or provides inadequate reflectivity, a replacement drum shall be furnished.

When WSDOT determines that the drums are no longer required, they shall be removed from the Project and shall remain the property of the Design-Builder.

2.22.4.8.6 Barrier Drums

Where shown on approved MOT plans and as ordered by WSDOT, barrier drums shall be placed on temporary concrete barrier at the following approximate spacing:

Concrete Barrier Placement	Barrier Drum Spacing in Feet
Tangents ½ mile or less[1]	2 times posted speed limit
Tangents greater than ½ mile[1]	4 times posted speed limit
Tapers and Curves[2]	Posted speed limit

Note 1 A minimum of 3 barrier drums shall be used.

Note 2 A minimum of 5 barrier drums shall be used.

Temporary concrete barrier reflectors may be excluded when using barrier drums. Both legs of the barrier drums shall be completely filled with sand. The top oval should not be filled. Used barrier drums may be used, provided all barrier drums used on the Project are of essentially the same configuration.

Barrier drums shall be regularly maintained to ensure that they are clean and that the barrier drum and reflective material are in good condition. If WSDOT determines that a barrier drum has been damaged beyond usefulness, or provides inadequate reflectivity, a replacement barrier drum shall be furnished.

When WSDOT determines that the drums are no longer required, they shall be removed from the Project and shall remain the property of the Design-Builder.

2.22.4.8.7 Traffic Cones

Where shown on an approved traffic control plan or where ordered by the Engineer, the Design-Builder shall provide, install and maintain traffic cones. Cones shall be kept in good repair and shall be removed immediately when directed by WSDOT. Where wind or moving traffic frequently displace cones, an effective method of stabilizing cones, such as stacking two together at each location, shall be employed.

2.22.4.8.8 Tubular Markers

Where shown on an approved MOT plan or where ordered by WSDOT, the Design-Builder shall provide, install and maintain tubular markers. Tubular markers shall be kept in good repair and shall be removed immediately when directed by WSDOT. Tubular markers are secondary devices and are not to be used as substitutes for cones or other delineation devices without an approved MOT plan.

Where the MOT plan shows pavement-mounted tubular markers, the adhesive used to fasten the base to the pavement shall be suitable for the purpose, as approved by WSDOT. During the removal of pavement-mounted tubular markers, care shall be taken to avoid damage to the existing pavement. Any such damage shall be repaired by the Design-Builder at no cost to WSDOT.

2.22.4.8.9 Warning Lights and Flashers

Where shown attached to traffic control devices on an approved MOT plan or where ordered by WSDOT, the Design-Builder shall provide and maintain flashing warning lights. Lights attached to advance warning signs shall be Type B, high-intensity. Lights attached to traffic safety drums, barricades or other signs shall be Type C, steady-burning low intensity or, where attention is to be directed to a specific device, Type A, flashing low-intensity units.

2.22.4.8.10 Truck-Mounted Attenuator

Where shown on an approved MOT plan or where ordered by WSDOT, the Design-Builder shall provide, operate and maintain truck-mounted impact attenuators (TMA). These attenuators shall be available, on-site, for the entire duration of their projected use.

The TMA shall be positioned to separate and protect construction work zone activities from normal traffic flow.

During use, the attenuator shall be in the full down-and-locked position. For stationary operations, the truck's parking brake shall be set.

2.22.4.8.11 Temporary Concrete Barrier

All TCB installation and end treatments must conform to Standard Plan C-8d and to the requirements of Sections 6-10 and 8-17 of the Standard Specifications. Impact attenuators shall be used to protect the ends of barrier within the clear zone. See Sections 6-10, and 8-17 of the Standard Specifications and Chapters 710, 720, 810 and Section 830.05 of WSDOT *Design Manual* for material and construction details regarding the barrier, glare screen, attenuators, and barrier delineators. Glare screen on Temporary Concrete Barrier shall conform to the requirements in Appendix B1.

2.22.4.9 Special Provisions

WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2004) are supplemented and modified by the Amendments provided in Appendix B2, the Project Special Provisions in Appendix B1 and these Technical Specifications. The Design-Builder is responsible for developing any Special Provisions required to address work not covered by the Amendments or the Standard Specifications Project Special Provisions in Appendix B1, and the Technical Specifications. All Special Provisions developed or modified by the Design-Builder require WSDOT's approval prior to application during construction.

2.22.5 SUBMITTALS

The TMP and TIMP must be submitted and approved prior to any construction activity that has the potential to impact traffic is commenced. The MOT plans submittals are separate from the plan submittal packages outlined in Section 2.12. MOT plans for individual construction phases require a 60 percent and 90 percent submittal prior to approval for each phase of construction.

2.22.5.1 Traffic Management Plan (TMP)

The Design-Builder shall prepare a Draft TMP as part of the Proposal. WSDOT will provide comments on the Draft TMP. The Design-Builder shall respond to and incorporate all comments and submit six (6) copies of the revised Draft TMP. WSDOT will respond to the submittal within ten (10) business days.

The Design-Builder shall prepare a Final TMP for WSDOT's approval responding to all WSDOT comments. The Final TMP shall be signed and sealed by the Design-Builder's Traffic Engineering Manager. The Design-Builder shall submit six (6) copies and an electronic copy of the Final TMP to WSDOT. WSDOT will respond to the Final TMP within ten (10) business days of receipt. The TMP

must be approved prior to any construction activity that has the potential to impact traffic unless otherwise approved by WSDOT.

2.22.5.2 Traffic Incident Management Plan (TIMP)

The Design-Builder shall submit six copies of the Draft TIMP to WSDOT within thirty (30) calendar days of the date the Contract is executed. WSDOT will provide comments on the Draft TIMP within ten (10) business days of receipt.

The Design-Builder shall prepare a Final TIMP for WSDOT approval responding to all WSDOT comments. The Final TIMP shall be signed and sealed by the Design-Builder's Traffic Engineering Manager. The Design-Builder shall submit six copies and an electronic copy of the Final TMP to WSDOT. WSDOT will respond to the Final TIMP within ten (10) business days of receipt. The TIMP must be approved prior to any construction activity that has the potential to impact traffic unless otherwise approved by WSDOT.

2.22.5.3 Maintenance of Traffic (MOT) Plans

The Design-Builder shall submit MOT plans to WSDOT for review at 60 percent and 90 percent design levels. The Design-Builder may submit MOT plans separately for each phase of construction. The plans must be approved and distributed prior to implementation. The Design-Builder shall consider the review times when planning for implementation of the MOT phases.

The Design-Builder shall prepare plan sheets in Microstation format and in accordance with Section 2.12 Plan Preparation and Project Documentation, the I-405 Congestion Relief and Bus Rapid Transit Project, CADD *Standards Manual*, and WSDOT *Plans Preparation Manual* (PPM).

The 60 percent design level shall show lane configurations including typical cross sections, signing and work zones. General notes to show the intent shall also be included, however it is not required that stations and offsets be identified for all elements. The Design-Builder shall submit six (6) copies and one (1) electronic copy of the plans to WSDOT for review. WSDOT will provide comments on the 60 percent MOT plans within ten (10) business days of receipt.

The 90 percent design level shall include, at a minimum, all required details including station and offset for all elements, cross sections, temporary paving, pavement marking details, signing, traffic control devices, temporary or modified traffic signals and temporary lighting. The Design-Builder shall submit six (6) copies and one (1) electronic copy of the plans to WSDOT for review. WSDOT will provide comments on the 90 percent MOT plans within ten (10) business days of receipt.

When all comments from the 90 percent MOT plans submittal have been incorporated, the Design-Builder shall prepare MOT plans, signed and sealed by a Professional Engineer, for approval to WSDOT and, for plans impacting roadways within the City of Kirkland, to the City of Kirkland for approval. The Design-Builder shall allow for a minimum of ten (10) business days for approval. If the plans are not approved, they must be corrected and resubmitted until they are approved. Once approved, the plans may be released for construction. The Design-Builder shall provide four sets of the approved MOT plans to WSDOT.

The RFC MOT plans must be distributed to all stakeholders a minimum of ten (10) business days prior to implementation of any lane, ramp, sidewalk or roadway closures or detours to allow for public notification.

2.22.5.4 Temporary Signal Plans

Temporary signal plans, if any, shall be submitted to WSDOT for approval prior to the need to initiate construction. Temporary signal plans shall be submitted as part of the MOT plans packages for the phase in which they will be required.

2.22.5.5 Temporary Illumination Plans

Temporary illumination plans, if any, shall be submitted to WSDOT for approval prior to the need to initiate construction. Temporary illumination plans shall be submitted as part of the MOT plans packages for the phase in which they will be required.

2.22.5.6 Other Submittal Requirements

The Design-Builder shall deliver to WSDOT a list of all parties invited to take part in the MOT Task Force and the responses to all the invitations. Preliminary agendas shall be provided to all invitees a minimum of two (2) business days prior to each meeting. The Design-Builder shall take meeting minutes and distribute them to all task force members within two (2) days of the meeting in accordance with Section 1.011.4.

A copy of the MOT diary shall be submitted to WSDOT on a monthly basis. Upon completion of the Project, the MOT diaries shall be delivered to and become the property of WSDOT.

End of Section

2.23 RAILROAD

2.23.1 GENERAL

Railroad facilities belonging to the Burlington Northern Santa Fe Railway Company (BNSF) are located just north of the 116th Street interchange. The Railway Company or Railroad Company, as used in the following specifications, shall be the Burlington Northern Santa Fe Railway Company, or other railway company or companies specified in the RFP. The section provides information relating to the requirements applicable to the Work performed upon or adjacent to the Railroad right-of-way. The Design-Builder shall abide by and fulfill the requirements related to Railroads as outlined in this section and applicable standards.

The Railroad Company has indicated its willingness to accommodate WSDOT with the construction of this Project; however, the Railroad Company will dictate its own schedule for railroad-related work.

The Railroad Company operates up to 4 trains per day on the tracks in the Project vicinity at speeds up to 25 m.p.h.; this should be verified with the Railway Company by the Design-Builder, as rail traffic service levels are subject to change by the Railway Company at any time.

The Railroad Company has notified the Department that no interference with railroad operations will be allowed from MP 19 to MP 20 in any given year, this should be verified by the Design-Builder, as the Railroad Company may change this restriction to be more or less restrictive.

Contacts:

WSDOT Railroad Liaison
Railroad Engineer
P.O. Box 47329
Olympia, WA 98504-7329
Phone: 360-705-7271
Fax: 360-705-6815

The Burlington Northern and Santa Fe Railway Company (BNSF)
J. M. (Mike) Cowles
Manager Public Projects
State of WA, MT, ID and British Columbia
2454 Occidental Avenue South, Suite 1-A
Seattle, WA 98134-1451
Phone: 206-625-6146
Fax: 206-625-6115
Mike.Cowles@BNSF.com

Indalecio (Indy) Sandoval
Roadmaster
2454 Occidental Avenue South, Suite 2-D
Seattle, WA 98134-1451
Phone: 206-625-6462
Fax: 206-625-6374

Staubach Company
Julie Alexander
Property Manager
Phone: 817-230-2631
Fax: 817-306 -8265

2.23.2 PERMITS

Railroad Permits and Agreements – Any work on Railroad Company Property shall require a permit from the Railroad Company or its designated Property Manager. As of 2004, the Staubach Company is BNSF's designated Property Manager. Permits may be arranged by contacting Julie Alexander at the Staubach Company. Agreements may be arranged by contacting BNSF's Manager of Public Projects. The Design-Builder shall be responsible for acquiring any necessary rights-of-entry, permits, and/or agreements as required by the Railroad Company.

2.23.3 PERFORMANCE REQUIREMENTS

2.23.3.1 Protection of Railroad Property

The Design-Builder shall exercise care in all operations and shall, at the Design-Builder's expense, adequately protect the property of the Railroad Company and its appurtenances, property in its custody, or persons lawfully upon its right-of-way, from damage, destruction, interference or injury and shall prosecute the work to not interfere with the Railroad Company or its appurtenances, or any of the Railroad Company's trains or facilities, and shall complete the work to a condition that shall not interfere with or menace the integrity or safe and successful operations of the Railroad Company or its appurtenances, or any of the Railroad Company's trains or facilities.

The Design-Builder shall not transport equipment, machinery, or materials across the Railroad Company's tracks, except at a public crossing, without the written consent of the Railroad Company.

The Design-Builder shall keep the ditches of the Railroad Company open and clean from any deposits, and keep the right-of-way clean from debris, and shall clean and restore ballast of the Railroad Company which is disturbed or becomes fouled with dirt or materials when such deposits or damage result from the operations of the Design-Builder, except as provided elsewhere.

The Design-Builder's work shall be conducted in such a manner that there will be a minimum of interference with the operations of railroad traffic. The Railroad Company will specify what periods will be allowed the Design-Builder for executing any part of the work in which the Railroad Company's tracks will be obstructed or made unsafe for operation of railroad traffic.

With respect to the Design-Builder's operations, in carrying out the Work, the Design-Builder shall employ such security personnel as may be necessary to prevent obstruction of the railroad track and interference with train movements. Such security personnel shall cooperate with the Railroad Company's flaggers or employees to ensure the safety of train movements.

In the event that an emergency occurs in connection with the work specified, the Railroad Company reserves the right to do any and all work that may be necessary to maintain railroad traffic. If

emergency is caused by the Design-Builder, the Design-Builder shall pay the Railroad Company for the cost of such emergency work.

When, in the opinion of the Railroad Company, the services of flaggers or security personnel are necessary for the protection of the Railroad Company's facilities by reason of the Design-Builder's operations, the Railroad Company will furnish such flaggers or security personnel as may be required. The Design-Builder shall notify the Railroad Company a minimum of 72 hours in advance of whatever the Design- Builder is about to perform work adjacent to the tracks to enable the Railroad Company to provide flagging or other protective services.

The Railroad Company's contact is Indalecio (Indy) Sandoval.

No act of the Railroad Company in supervising or approving any work shall reduce or in any way affect the liability of the Design-Builder for damages, expense, or cost which may result to the Railroad Company from the construction of this Contract.

Protective services, including railroad flagging and other devices, may be required by the Railroad Company as a result of the Design-Builder's operations to protect the Railroad Company's facilities, property, and movement of its trains and engines.

In addition to flagging, other protective devices, such as crossing signals, indicators, telltales, lights, telephones, etc. may be required. Telltales may be required by the Railroad Company for any proposed restrictions of vertical clearance to less than 22.5 feet. The Railroad Company will install the telltales.

The nature and extent of protective services, personnel and other measures required will in all cases be determined by the Railroad Company. Nothing in these specifications will limit, in any way the Railroad Company's right to determine and assign the number of personnel, the classes of personnel for protective services, nor other protective measures it deems necessary. Unless otherwise provided, all personnel assigned by the Railroad Company, other than those engaged in performing work by the Railroad Company as listed under Construction Work by Railroad Company, will be considered protective personnel.

In general, the Railroad Company will furnish protective services:

- For any excavation below the elevation of the track sub-grade, if in the opinion of the Railroad Company's representative, the track or other railroad facilities may be subject to settlement or movement. For all work over or adjacent to the track, if, in the opinion of the Railroad Company's representative, said work represents a hazard to the Railroad Company.
- During any clearing, grubbing, grading, or blasting in proximity to the facilities, which in the opinion of the Railroad Company's representative may endanger or interfere with railroad facilities or operations.
- When any of the Design-Builder's operations are carried on, within or near railroad right-of-way and in the opinion of the Railroad Company's representative, could endanger railroad facilities or create a hazard to railroad operations. Communications Linemen or Signalmen may be used to protect communications and signal facilities, if deemed necessary by the Railroad Company.

Payment for all costs for services provided by the Railroad Company will be the responsibility of the Design Builder.

2.23.4 NOT USED

2.23.5 SUBMITTALS

2.23.5.1 General

If the Design-Builder will have equipment, materials, or personnel within the Railway Company's right-of-way, the Railroad Company will require that the Design-Builder provide-Liability Insurance. The Design-Builder shall submit to WSDOT an approved Contractor's Right-of-Entry Agreement with the Railroad Company prior to entering or conduction activities within the Railroad Company's right-of-way.

When performing work on the existing bridge crossing over the Railroad Company's Right-of-Way, if equipment, materials and personnel remain within the barrier limits of the existing bridge, Liability Insurance may not be required. It shall be the Design-Builders' responsibility to contact the Burlington Northern Santa Fe Railway to verify if Liability Insurance will be required.

2.23.5.2 Railroad Protective Liability Insurance

The Design-Builder shall protect the Railroad Company and any other railroad company occupying or using the Railroad Company's rights-of-way or lines of railroad against all loss and damages arising from activities of the Design-Builder or the Design-Builder's forces or any of the Design-Builder's subcontractors or agents.

The Design-Builder shall furnish for each Railroad Company the original and three certified copies of a Railroad Protective Liability Insurance Policy, naming the Railroad Company as the insured and providing for the protection to the Railroad Company in the manner and form required by the Railroad.

Said insurance shall be executed by the corporation qualified to write insurance in the State of Washington in form and substance satisfactory to the Railroad Company and shall be delivered to WSDOT. The WSDOT will submit the insurance to the Railroad Company for its approval. The Design-Builder shall not enter upon or use the Railroad Company's property until notified by the Engineer of the Railroad Company's approval. The Design-Builder shall contact the Railroad Company for the acceptable insurance forms.

All insurance specified above shall be carried until the physical completion date of the contract as described in Section 1-08.5 of the General Conditions expect as stated herein.

When all the work involving construction activities within or immediately adjacent to the railroad right-of-way is completed, the Design-Builder may make a written request to WSDOT to be relieved of the responsibility to continue all or part of the insurance specified above. If WSDOT deems the portion of the work in that area is complete, WSDOT may approve the Design-Builder's request. However, if for any reason the Design-Builder resumes or starts any new work in that area (including being ordered to do so by WSDOT), the insurance shall be reinstated by the Design-Builder before the work is started. If the insurance must be reinstated because of negligence or acts by the Design-Builder or failure of the Design-Builder to perform all the contract requirements, the costs shall be the responsibility of the Design-Builder. If the insurance must be reinstated because of charges to the contract, the costs will be considered in accordance with Section 1-04.4 of the General Conditions.

2.23.5.3 Design-Builder's Public Liability and Property Damage Insurance

The minimum coverage required during any period the Design-Builder enters upon Railroad property shall be as follows. It shall be understood by the Design-Builder that these are minimum coverages required by WSDOT. It shall be the responsibility of the Design-Builder to contact the Burlington

Northern Santa Fe Railway if higher coverage will be required.

The limits of the insurance company's liability under this policy to the insured shall not be less than $1,000,000 for all damages arising out of bodily injuries to or death of one person, and, subject to that limit for each person, a total of $2,000,000 for all damages arising out of bodily injuries to or death of two or more persons in any one accident and not less than $1,000,000 for all damages to or destruction of property in any one accident, and subject to that limit for any one accident, a total limit of $2,000,000 for all damages to or destruction property during the policy period.

A certificate of insurance providing proof of said Design-Builder's Public Liability and Property Damage Insurance, executed by a corporation qualified to write the same in the State of Washington, in form and substance satisfactory to the Railroad Company, shall be delivered to and approved by the Railroad Company prior to the entry upon or use of the Railroad Company's property by the Design-Builder.

End of Section

2.24 RIGHT-OF-WAY

2.24.1 GENERAL

It is anticipated that all construction work for the Kirkland Stage 1 Project can be completed within the existing right-of-way limits and Sundry site boundaries. Section 2.24 outlines what any proposed design outside the existing right-of-way boundaries would require for acquisition of additional property(s) for this construction project.

The Design-Builder shall verify right-of-way (ROW) boundaries prior to utilization of right-of-way areas outside of existing fence line. Survey control has been established and is identified in the ROW and Monumentation Plans. All operations of the Design-Builder, upon the portions of the site made available to the Design-Builder from time to time, (including storage of equipment and materials), shall be confined to portions of the ROW authorized or approved by the Federal Highway Administration (FHWA) through the certification process.

All acquisitions shall be performed in accordance with all Applicable Laws, including the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, as well as the Uniform Relocation Assistance and Real Property Acquisition, Washington Administrative Code (WAC) WAC 468-100 and 49 CFR Part 24.

WSDOT shall be responsible for the acquisition of all ROW property. WSDOT shall provide the Design-Builder copies of construction commitments (in the form of a Construction Memorandum) and, if requested any documentation of WSDOT ownership.

The utility relocation process is set forth in Section 2.10 (Utilities and Third Party Agreements) and the railroad process is found in Section 2.23 (Relations with Railroad).

2.24.2 MANDATORY STANDARDS AND PUBLICATION

2.24.2.1 Mandatory Standards

General. Conduct all ROW activities in accordance with the requirements of the standards listed by priority in Table 2.22.1. Questions regarding the applicability of Mandatory Standards and Referenced Publications will be referred to WSDOT. Current ROW Plans for the Project can be found in Appendix R.

Conflicts and Priority. If there is any conflict in standards, adhere to the standard with the highest priority. However, if the Design-Builder's Proposal has a higher standard than any of the listed standards, adhere to the Proposal standard.

Ambiguity. If there is any unresolved ambiguity in standards, obtain clarification from WSDOT before proceeding with design or construction.

Version and Date. Use the most current version of each listed standard as of the initial publication date of this RFP unless modified by addendum or change order.

- Design-Builder's Proposal
- WSDOT Request for Proposal
- Code of Federal Regulations: 49 CFR 24 Uniform Relocation Assistance and Real Property Acquisition Act of 1970
- RCW – Relocation Assistance Real Property Acquisition Policy RCW 8.26

- WAC – Uniform Relocation Assistance and Real Property Acquisition WAC 468-100
- WSDOT *Right-of-Way Manual* (M26-01)
- WSDOT *Plans Preparation Manual* (M22-31)

2.24.3 Right-of-Way Acquisition

2.24.3.1 Right-of-Way Requirements Determination

If additional right-of-way is requested by the Design-Builder, WSDOT will review the request, prepared in accordance with Section 1-04.4 and Section 2.24.2.1. All acquisition costs, such as but not limited to, property survey, appraisal, condemnation and relocation assistance, schedule delays and cost of schedule delays will be borne by the Design-Builder. Design-Builder shall determine the requirements for new right-of-way rights.

Design-Builder shall submit to WSDOT Project Director, in writing, the preliminary right-of-way needs. The submittal shall include the following:

- A letter indicating the Project name, contract number, project location, originator of report (Firm's Name), submittal date and submittal type.
- A plan of sufficient scale and detail to show the existing and proposed roadway right-of-way and proposed easements prepared according to WSDOT *Plans Preparation Manual* (M22-31).
- ROW needs include, but are not limited to, additional land ownership, airspace, corridors, access rights, and permanent or temporary easements.
- A discussion on the impacts to schedule and the proposed plan to recover the schedule.

Upon WSDOT's approval to acquire additional ROW, WSDOT will provide staff or consultants to perform the work. In order to minimize the impacts of acquisition on the property owners and expeditiously acquire the necessary property, all additional ROW, whether permanent or temporary, from an ownership, shall be acquired in a single offer. The Design-Builder may acquire permits where no permanent rights are needed, in accordance with all applicable laws.

WSDOT will provide a funding estimate to the Design-Builder who will furnish sufficient funds to perform the work. A ROW work order will be established by WSDOT with those funds. Any settlements exceeding the funding estimate will require the approval of the Design-Builder.

Design-Builder may acquire any rights or interests in real property that, in the discretion of the Design-Builder, is deemed necessary or advisable to acquire, for workspace, Design-Builder lay-down areas, material storage areas, or other convenience. WSDOT will not be obligated to exercise its power of eminent domain, will not come into title to the property, nor will it have any responsibility for the acquisition, maintenance, or disposition of additional properties or of any temporary right of interest therein.

2.24.3.2 Risk of Loss, Obligation to Maintain and Repair

Design-Builder shall be responsible for the maintenance of improvements and for providing reasonable safety and security measures relative to the preservation of the acquired ROW parcels. The Design-Builder shall establish a Property Management Plan and shall submit such plan to WSDOT prior to Notice to Proceed (Contract Execution). The Property Management Plan is subject to acceptance by WSDOT. The plan must assure that all acquired ROW is maintained in a manner, which will prevent, minimize, or correct problems such as vandalism, trespassing, rodent infestation, illegal dumping or disposal of rubble, and other debris on any ROW.

2.24.3.3 Demolition

Design-Builder shall demolish all buildings, structures, and other improvements located on the ROW. The Design-Builder shall conduct any asbestos inspections, lead-based paint inspections and any other required action in accordance with applicable Washington State regulations. All Utilities installed on or connected to the ROW shall be abandoned or removed in accordance with the requirements of the applicable Utility Owner as a part of the demolition, unless otherwise noted.

2.24.3.4 Restoration of Property and Landscape

Design-Builder shall restore, at its own cost, property and landscaping that is damaged in the course of construction, to a condition similar or equal to that existing prior to the damage occurrence by repairing, replacing in kind, rebuilding, replanting, restoring the property, or compensating the property owner.

2.24.3.5 Temporary Fencing

Design-Builder shall be required to furnish and install temporary chain link security fencing in order to contain animals, people, etc., prior to removal of any existing sound barrier or ROW fencing in place within the Project limits.

End of Section

2.25 CONTROL OF MATERIALS

2.25.1 GENERAL

The quality of materials and methods of construction and testing are essential to achieving an end product that provides the maximum benefit to the public. The Design-Builder's approach to materials sampling, testing and approval is essential in achieving an acceptable end product. The Design-Builder's process is required to meet FHWA and WSDOT requirements for sampling, testing and approval of materials used in this Project. The Design-Builder shall be responsible for the quality of construction and materials incorporated in the Project. The Design-Builder's Quality Assurance measures are to insure that operational techniques and activities provide material of acceptable quality.

2.25.2 MANDATORY STANDARDS

The Design Builder's Construction Documents shall define the Project requirements using WSDOT standards, Contract Documents, references and publications. The following general regulations, references, and publications supplement the preceding references and those specifically referenced in the RFP Scope of Work and shall be selected by the Design-Builder, as appropriate, to control the work described in the Contract Provisions. Inquiries concerning inconsistencies and conflicts shall be directed to WSDOT Project Engineer.

The following WSDOT and AASHTO Publications shall be included in the Design-Build agreement and followed for the acceptance of materials:

- WSDOT *Construction Manual* (M47-01)
- WSDOT *Standard Specifications for Road, Bridge, and Municipal Construction* (M41-10)
- AASHTO – *Standard Specifications for Transportation Materials and Methods of Sampling and Testing*
- WSDOT *Materials Manual* (M46-01)
- WSDOT *Qualified Product List*
- AASHTO *LRFD Bridge Design Specifications*
- AASHTO *LRFD Bridge Construction Specifications*

2.25.3 MATERIALS APPROVAL

Prior to use, the Design-Builder shall notify WSDOT of all proposed materials. The Design-Builder shall use the Qualified Product List or the Request for Approval of Material form.

All equipment, materials, and articles incorporated into the permanent work:

- Shall be new, unless these Technical Specifications permit otherwise
- Shall meet the requirements of the contract and be approved by the Engineer if required by the contract provisions
- May be inspected or tested at any time during their preparation and use; and
- Shall not be used in the work if they become unfit after being previously approved.

The Design-Builder will be responsible for all materials approvals and acceptance by means of testing, inspection, and documentation. A Materials Certification package as defined in 2.28.6.3.4, approved by the Design-Builder's Construction Quality Assurance Manager, shall be submitted to

WSDOT prior to acceptance of the project.

All materials shall be reviewed and approved by the Design-Builder's Construction Quality Assurance Manager prior to use. The Design-Builder may use the Qualified Product List (QPL), may submit a Request for Approval of Materials (RAM) to the Design-Builder's Construction Quality Assurance Manager for approval, or may denote approval by listing the material in the plans and specification as stamped by the Engineer-of-Record.

Qualified Products List (QPL) – The Design-Builder may use products listed on the latest edition of WSDOT's *Qualified Product List* (QPL) without submitting a Request for Approval of Materials (RAM) to the Construction Quality Assurance Manager. The Design-Builder shall follow the acceptance requirements as listed in the QPL for the product/material used.

Request for Approval of Material (RAM) - The RAM shall be used when the Design-Builder elects not to use the QPL or the material is not listed in the QPL or not shown on the sealed plans and specifications. The RAM shall be prepared by the Design-Builder and submitted to the Construction Quality Assurance Manager for approval before the material is incorporated into the work. Approval of the material does not constitute acceptance of the material for incorporation into the work.

Aggregate Source Approval – The Design-Builder can use any approved aggregate that is included in WSDOT Aggregate Source Approval System. If the Design-Builder wishes to use an aggregate source that is not on WSDOT Aggregate Source Approval System, preliminary samples will have to be evaluated for the quality tests including degradation and LA Abrasion in addition to the acceptance testing.

Materials Acceptance – All material that the Design-Builder wishes to use shall be tested, field verified, and or documented. All materials have to be approved prior to use. The materials acceptance program shall be as defined in WSDOT *Construction Manual, Materials Manuals, Standard Specifications*, or other contract provisions defined in the design build agreement.

Visual Inspection – The acceptance of certain types of materials may be based on visual inspection prior to incorporating the materials into the Project. Product documentation shall be provided in the form of a manufacturer's catalog cut or product data sheets. For details regarding specific instructions for field acceptance see Chapter 9-04 of WSDOT *Construction Manual*.

Certificate of Compliance – The acceptance of certain types of materials shall be based on receipt of a Certificate of Compliance prior to incorporating the materials into the Project. This process is intended to speed the materials approval process and insure the correct material is being used on the Project. The Certificate of Compliance shall meet the requirements of Section 2.25.4.3.

Field Verification – All materials permanently incorporated into a contract shall be field verified and documented by the Design Build inspector. The field verification or visual inspection shall occur prior to or during initial placement of materials. Field verification documentation should contain sufficient information to identify what was used including quantities. The field verification documentation needs to be initialed or signed and dated by the inspector at the time of verification. The field verification information should be the link between what was placed and paid for to what was specified by the Design-Builder's Design Engineer or approved on the RAM or QPL and its proper acceptance criteria.

WSDOT Oversight – The Design-Builder shall distribute copies of all approval and acceptance documents to WSDOT for their use. These documents need to be distributed to WSDOT in a timely manner. The WSDOT will use these documents to verify what is being used.

2.25.3.1 Fabrication Inspection

The Design-Builder is responsible for the QA inspection and approval of Project specific fabricated items. The Fabrication Inspector's will work under the direction of the Construction Quality Assurance Manager. WSDOT will manage the Quality Verification (QV) of the fabrication items. The Design-Builder will promptly notify WSDOT of the intended fabricator, fabricator inspector, and provide a copy of the "Approved" Shop Drawings. The Design-Builder's Fabrication Inspector(s) shall provide a certification of compliance as appropriate for the type of material being inspected, and Stamp or Tag each approved item similar to WSDOT requirements in section 9-1.5D of the *Construction Manual*. The qualifications for the Fabrication Inspector are covered in Section 2.28 of this RFP.

The fabricated items to be inspected include but are not limited to the following:

- Treated timber and lumber except guardrail post and blocks
- Treated piling
- Epoxy coated rebar
- Anchor bolts shipment
- Type 1 raised pavement markers
- Bridge bearings
- Miscellaneous items that are shop welded
- Miscellaneous galvanized steel items
- Concrete and metal culvert pipe over 27 inches in diameter
- Precast concrete panels
- Prestressed concrete girders
- Permanent precast concrete median barrier
- Steel for bridges
- Traffic signal, ITS, CCTV Pole and Illumination Standards
- Utility vaults
- Metal drainage castings
- Precast Concrete Catch Basins, Manholes and Inlets. This includes all sections and risers 6 inch and above
- Three sided Structures
- Metal Bridge Rail
- Sign Structures and Sign Mounting Hardware

2.25.4 ACCEPTANCE OF MATERIALS

2.25.4.1 General

All field and laboratory materials testing by the Design-Builder will follow methods described in Contract Provisions Documents or those listed in Section 2.25.2 or other recognized standards. The following provisions will apply when the Design-Builder uses the specifications or methods from the sources named below:

ASTM — American Society for Testing and Materials. The ASTM designation number refers to this society's latest adopted or tentative standard. The standard or tentative standard in effect on the bid advertising date will apply in each case.

Design-Builder will consider any revisions to become effective on December 1 of the year they are adopted.

Copies of any separate ASTM specifications or testing method may be obtained from: the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA.

AASHTO — American Association of State Highway and Transportation Officials. An AASHTO number refers to that organization's currently published (1) "Standard Specifications for Highway Materials and Methods of Sampling and Testing" or any adopted revisions, or (2) "Interim Specifications and Methods of Sampling and Testing Adopted by the AASHTO Subcommittee on Materials."

Any standards, revisions, and interim standards in effect on the bid advertising date will apply. Standards, revisions, and interim standards will be considered as becoming effective on December 1 of the year which they are adopted.

Copies of "Standard Specifications for Highway Materials and Methods of Sampling and Testing" may be obtained from the American Association of State Highway and Transportation Officials, 917 National Press Building, Washington, D.C.

Federal Specification — U.S. Government Federal Stock Catalogue. The specification number refers to the most recent revision adopted by the General Services Administration. Revisions in effect on the bid advertising date will apply.

Design-Builder will consider any revision as in effect 60 calendar days after its adoption.

Copies of separate specifications listed in the Federal Stock Catalogue may be obtained at the prices indicated from the Business Service Center, General Services Administration, Regional Office Building, Seventh and D Streets, Washington, D.C.

Other Publications — Any other publication referred to in these Specifications or the special provisions will mean its latest edition. Requirements, and any revisions, in effect on the bid advertising date will apply. Design-Builder will consider them as in effect 60 calendar days after publication.

Copies may be obtained from the publishing organizations. For example, copies of standard grading and dressing rules may be obtained from: West Coast Lumber Inspection Bureau in Seattle, Washington or Portland, Oregon, and from the Western Wood Products Association, Portland, Oregon.

WAQTC — Western Alliance for Quality Transportation Construction. The WAQTC designation number refers to this alliance's latest adopted or tentative standard. The standard or tentative standard in effect on the bid advertising date will apply in each case. Design-Builder will consider them as in effect 60 calendar days after publication.

Copies of any separate WAQTC testing method may be obtained from: WSDOT Quality Systems Manager, State Materials Laboratory, PO Box 47365, Olympia, Washington 98504-7365.

2.25.4.2 Acceptance by F and t Test Analysis

The Construction Quality Assurance Manager shall be responsible for statistically evaluating the QA test data and WSDOT QV test data to determine the acceptability of the material tested. This evaluation will be performed by using the F and t Test analysis as described in Section 2.28 of this RFP.

The acceptance decision will consider results of Design-Builder Quality Assurance sampling and testing and WSDOT's or their agent's verification sampling and testing, and any dispute resolutions to resolve discrepancies between the verification sampling and testing and the Design-Builder Quality Assurance sampling and testing.

2.25.4.3 Manufacturer's Certificate of Compliance

The Construction Quality Assurance Manager may accept certain materials on the basis of a Manufacturer's Certificate of Compliance as an alternative to material inspection and testing. When a Manufacturer's Certificate of Compliance is authorized by these Specifications or the special provisions, the certification shall be furnished prior to use of the material.

The Manufacturer's Certificate of Compliance must identify the manufacturer, the type and quantity of material being certified, the applicable specifications being affirmed, and the signature of a responsible corporate official of the manufacturer and include supporting mill tests or documents. A Manufacturer's Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lot so certified shall be clearly identified in the certificate.

All materials used on the basis of a Manufacturer's Certificate of Compliance may be sampled and tested at any time. Any material not conforming to the requirements will be subject to rejection whether in place or not. The Construction Quality Assurance Manager reserves the right to refuse to accept materials on the basis of a Manufacturer's Certificate of Compliance.

The Manufacturer's Certificate of Compliance shall meet the requirements of this Section. In lieu of placing the material without a proper Manufacturer's Certificate of Compliance the Design-Builder may request that the Construction Quality Assurance Manager sample and test the materials prior to incorporating them into the Project. For details regarding sample size and other requirements see Chapter 9-4 of WSDOT *Construction Manual*.

2.25.5 Statistical Acceptance of Materials

2.25.5.1 General

See Chapter 1-06 General Conditions for acceptance of Statistical and Non-Statistical Materials.

2.25.6 Acceptance of Small Quantities of Materials

The Design-Builder may request the acceptance of small quantities of materials based on this provision.

Upon the request of the Design-Builder, the Construction Quality Assurance Manager may elect to accept small quantities of materials without normal sampling and testing frequencies. The determination to accept materials using this provision rests solely with the Construction Quality Assurance Manager. Structural Concrete will not be considered under the small quantity definition.

An item can be accepted as a small quantity if the proposed project quantity for a specific material is less than the one sublot as defined in General Conditions Table 6 or less than one-half of a sublot as defined in said Table 6 for mainline paving.

Questions that the Design-Builder shall and WSDOT will consider prior to use of small quantity acceptance are:

- Has the material been previously approved?
- Is the material certified?
- Is there a current mix design or reference design?
- Has it been recently tested with satisfactory results?
- Is the material structurally significant?

Small quantity acceptance may be accomplished by visual, certification, or other methods. Acceptance of small quantities of materials by these methods must be fully documented. Documentation of materials under these methods must be provided by the Design-Builder accepting the material. For visual acceptance, the Construction Quality Assurance Manager shall have written documentation, such as and entry made in the Inspectors Daily Report, or noted on field records, with a statement as to the basis of acceptance of the material and the approximate quantity involved.

Small quantity acceptance may be used for any proposal quantity of the following uses:

- Driveways
- Road approaches
- Paved ditches and slopes

2.25.7 Handling and Storing Materials

In storage and handling, the Design-Builder shall protect materials against damage from careless handling, from exposure to weather, from mixture with foreign matter, and from all other causes. The Construction Quality Assurance Manager will reject and refuse to test materials improperly handled or stored.

The Design-Builder shall repair, replace, or make good all WSDOT provided materials that are damaged or lost due to the Design-Builder's operation or while in the Design-Builder's possession, at no expense to WSDOT.

2.25.8 Portland Cement Concrete Mix Design and Batch Plant

The Design-Builder, or their designee, shall develop the concrete mix design in accordance with the standard specifications. The Design-Builder's Construction Quality Assurance Manager will certify that the concrete mix design conforms to the contract provisions and the Standard Specifications.

The concrete batch plant that the Design Builder uses for the production of Portland cement concrete shall be a National Ready Mix Concrete Association (NRMCA) approved plant.

2.25.8.1 HMA Mix Design and Asphalt Concrete Plant

The asphalt concrete plant(s) that the Design-Builder uses for the production of asphalt concrete shall meet all of the requirements as specified in the Standard Specifications. The Design-Builder's Quality Assurance Manager shall inspect the asphalt concrete plant(s) and document that it meets all requirements. (See Section 2.7.4 for Mix Design Requirements).

2.25.9 State Inspected and Tested Items

Certain items have been identified by WSDOT which are considered as critical to the everyday operations of the project. These items will be inspected and tested by State forces to ensure that they meet state and federal requirements. These items include:

- Highway Traffic Signs: All traffic signs will be inspected at the point of fabrication by WSDOT. All signs so inspected will be tagged by WSDOT Fabrication Inspector prior to shipment with a Sign Acceptance Report sent to the Design-Builder.
- Traffic Signal Controllers: Traffic Signal Controllers will not be required for this Project. In the event that traffic signals controllers will be required that are to be supplied by the Design-Builder, the following will be required:
    - Traffic signal controller will be tested by WSDOT in accordance with WSDOT SOP 429 at the State Materials Laboratory in Tumwater, WA. The Design-Builder is advised that the time necessary to test a controller is dependent upon the quality of the product submitted and the response time of the vendor in correcting deficiencies in the programming or circuitry. Typically it will take approximately fourteen (14) business days for testing if everything is correct. Only controllers tested by WSDOT shall be installed. The Design-Builder shall be responsible for delivery and pick up of controllers for testing and upon completion of signal control testing.
- ITS Systems: All ITS systems will be tested by WSDOT according to the requirements stated in the RFP.

End of Section

2.26 AS-BUILT DOCUMENTS

The As-Built Documents shall include:

- Plans.
- Shop drawings.
- Design calculations.
- Reports/Project documentation.
- Specifications and Special Provisions.
- As-Built Documents shall include all base mapping (topography), design plans (including shop drawings), design calculations, design reports, specifications, electronic CADD data.
- The Design-Builder shall ensure that all title blocks of calculation sheets include the calculation title, file number, page number, initials of the designer and the checker, and dates of design and checking.
- The Design-Builder shall ensure t hat all calculations indicate the design requirement, the assumptions made, the methods used, the source of the information, and the cross-reference for the applicable design drawings.
- The Design-Builder shall ensure that all Structure calculations and Bridge rating calculations performed using software are independently checked by a Professional Engineer with three years minimum experience and licensed in the State of Washington. The Design-Builder shall ensure that hand calculations are verified.
- The Design-Builder shall ensure that all calculations are readily accessible, clear, understandable, concise, complete, and accurate.
- The Design-Builder shall ensure that all calculations are bound and numbered with a table of contents.
- The Design-Builder shall ensure that all calculations identify the code or standard utilized and indicate the specific section referenced in the right hand column.
- The Design-Builder shall reference in the calculations the computer programs used.
- The Design-Builder shall ensure that all manual calculations are printed, neatly and legibly, on 8 ½-inch x 11-inch or 11-inch x 17-inch standard computation sheets.
- The Design-Builder shall ensure that the As-Built Documents reflect the actual condition of the constructed work.

End of Section

2.27 NOT USED

2.28 DESIGN-BUILD QUALITY MANAGEMENT PLAN REQUIREMENTS

2.28.1 GENERAL

The Design-Builder's Quality Management Plan (QMP), consistent with the Summary Information submitted with the Design-Builder's proposal, must be approved by WSDOT. No design or construction Work activities may proceed until the Design-Builder's QMP has been approved in writing by WSDOT.

The plan shall detail how the Design-Builder will provide quality control (QC) and quality assurance (QA) for both the design and construction elements of the Project, obtain samples for Design-Builder quality control testing, perform tests for Design-Builder quality control, and obtain samples for Design-Builder quality assurance testing, perform tests for Design-Builder quality assurance, provide inspection, and verify that all environmental and permit commitments are met to ensure that work conforms to the contract requirements. The appropriate WSDOT and AASHTO publications listed in this RFP, and environmental requirements in Section 2.8 should be consulted in preparing the Design-Build Quality Management Plan.

The Design-Build QMP shall include a description of the quality control and quality assurance organization, including the number of full-time equivalent employees with specific Quality Control and/or Quality Assurance responsibilities and including a chart showing lines of authority and reporting responsibilities. The persons and organizations performing Quality Control and Quality Assurance functions shall have sufficient authority and organizational autonomy to identify quality problems, and to initiate, recommend, and verify implementation of solutions. Persons performing Quality Assurance functions shall be at an organizational level which ensures that they are not influenced by the impact of implementation of Quality Control and Quality Assurance measures on the Project schedule, performance or cost. To ensure the above organizational independence, at the very least, the Quality Assurance organization shall be established as a separate entity operating under a separate profit center from the design and production organization. All key personnel performing Quality Assurance functions shall be exclusively designated to such and shall not be assigned to perform conflicting duties.

2.28.1.1 Partnering and Disputes Resolution

Partnering shall be considered an integral part of the QMP. The WSDOT must approve any partnering facilitator used. The Design-Builder is responsible for all partnering meeting arrangements and costs, except for WSDOT's staff time. A partnering agreement is recommended to handle disputes. In addition, a separate procedure for conflict resolution shall be developed and agreed to by the partnering participants. The procedure shall include, but is not limited to, the following elements:

- Disputes shall be delegated to the lowest appropriate level of authority on the Project team to resolve within a specified timeframe.
- A timeframe for each level of authority shall be established before the Project begins for a list of typical disputes that could occur on a Project.
- If the dispute is not resolved to the satisfaction of both parties within the specified time frame, the dispute shall be automatically escalated to the next level of authority on the Project team.

- If left unresolved, the process shall then continue to escalate to the highest level of authority where a final resolution shall be arbitrated by an unbiased third party, whose selection would be agreed upon in advance as part of the QMP.
- A written report prepared by the Design-Builder and signed by both the Design-Builder and WSDOT, describing the dispute, all subsequent actions, and final disposition of the dispute shall be submitted to the Project records.
- If subsequent disputes arise on the same issue, the written report shall be included as a resource during the resolution process.

Disputes not resolved informally through the partnering process may be brought by either party to the Disputes Review Board.

2.28.1.2 Management Representative

The QMP shall describe the Quality Manager's accountability for ensuring the effective implementation and maintenance of the QMP.

2.28.1.3 Management Review

The Design-Builder's executive management shall review the QMP at least quarterly, and more frequently if necessary, to ensure its continuing suitability and effectiveness in satisfying the requirements of this Contract and the Design-Builder's stated quality policy and objectives.

The Design-Builder shall invite WSDOT to participate in the management reviews.

The management reviews shall, at a minimum, review the results of internal audits, WSDOT audit results, corrective actions taken, trends in nonconformance, and time to resolution. Comments made as a result of the management reviews shall be responded by the Design-Builder within fourteen (14) calendar days.

The outputs of management reviews shall be incorporated into the Quality System within fourteen (14) calendar days.

2.28.1.4 Quality System

2.28.1.4.1 General

The Design-Builder shall prepare a QMP that encompasses all Contract requirements. The Project *Quality Manual* shall be approved and endorsed by the Design-Builder's senior management.

The QMP shall be in effect until all requirements of the Contract have been fulfilled and the Project is accepted.

The Design-Builder shall revise its QMP and its implementation when WSDOT advises the Design-Builder of a systemic problem.

The hierarchical structure of the QMP shall follow the structure of the ISO 9001 standard.

The precedence of the documents describing the Quality System shall be: Quality Policy (for the entire system), quality objectives, policies (for each element of the QMP), procedures, and Work instructions.

The QMP shall graphically show, via flow chart, the processes and their relationships to each other, the inspection and test controls, and a narrative for each process.

2.28.1.4.2 Quality System Procedures

All written procedures shall clearly describe the purpose of the process, overview of the process, responsibilities, steps of the process, and records resulting from the process.

2.28.1.4.3 Quality Planning

The QMP shall include an Inspection and Test Plan describing all of the proposed inspections and tests to be performed throughout the construction process:

- The Inspection and Test Plan shall describe all of the incoming, in-process, and final Inspections and tests to be undertaken.
- The Inspection and Test Plan shall show what products or services are to be subcontracted.
- The Inspection and Test Plan shall be controlled through the provision of document control and be updated when new subcontractor or supplier contracts are implemented.
- The Inspection and Test Plan shall identify hold points at which Work shall be formally accepted by independent quality personnel prior to proceeding to the next stage of the Work.
- The Inspection and Test Plan shall describe verification of suppliers' and subcontractor compliance with requirements.
- The Inspection and Test Plan shall define the activity to be tested/inspected, the agency/laboratory to perform the test/inspection, the frequency of test/inspection, the test/inspection procedure or reference standard, the specified requirement reference, and the record that documents the results.
- The Inspection and Test Plan shall be linked to the Project schedules.
- The Quality Manager shall approve the Inspection and Test Plan.

2.28.1.4.4 Applies to Other Project Plans

The QMP shall describe how it is applied to other project plans for their development and modification during the life of the Project. The plans included shall include, but not be limited to:

- Safety Management Plan
- Public Information Plan
- Environmental Compliance Plan
- Temporary Erosion and Sediment Control (TESC) Plan
- Spill Prevention Control and Countermeasures (SPCC) Plan
- I-405 Kirkland Stage 1 Project Commitments Database
- Fugitive Dust Plan
- Utility Management Plan
- Vegetation Management Plan
- Visual Quality Management Plan
- Traffic Management Plan
- Traffic Incident Management Plan, and
- Maintenance Management Plan.

2.28.2 Design-Builder Quality Control and Quality Assurance Staff

At a minimum, Design-Builder Quality Control and Quality Assurance staff shall include the following:

2.28.2.1 Design Quality Assurance Manager

The Design-Builder Design Quality Assurance Manager is the individual with overall responsibility for the Design portion of the Design-Build Quality Control and Quality Assurance plan. This individual will report directly to the person or group with overall project management responsibility and not to someone exclusively with design production responsibilities. This individual shall meet the minimum experience and qualification requirements as specified in the ITP.

2.28.2.2 Construction Quality Assurance Manager

The Design-Build Construction Quality Assurance Manager is the individual with overall responsibility for the Construction portion of the Design-Build QC/QA Plan. This individual will be responsible for implementing, monitoring and, as necessary, adjusting the processes to assure acceptable quality. This individual will report directly to the person or group with overall project management responsibilities, and not to someone exclusively with construction production responsibilities. This individual shall meet the minimum experience and qualification requirements as specified in the ITP.

In addition, the Construction Quality Assurance Manager or designated representative shall be available or on the Project within four hours of being notified of a problem regarding the quality assurance of any work being done by the Design-Builder, or any of its subcontractor or agents.

2.28.2.3 Environmental Compliance Manager

See Section 2.8.

2.28.2.4 Quality Testing Supervisor

The Quality Testing Supervisor may be an employee of the Design-Builder's Quality Assurance laboratory, and shall be on the site during testing. The Quality Testing Supervisor shall meet one of the following requirements:

- Professional Engineer, licensed in the State of Washington, with at least one year of highway materials testing experience, or
- An Engineer-In-Training, certified by the State of Washington, with at least two years of highway materials testing experience, or
- A Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology, Construction, or related experience; and at least three years of highway materials testing experience, or
- Certification by the National Institute for Certification in Engineering Technologies (NICET) in the Construction Materials Testing field as an Engineering Technician (Level III) or higher in the appropriate subfield in which sampling and testing is being performed, or
- Certification by NICET in the Transportation Engineering Technology field as an Engineering Technician (Level III) or higher in the Highway Materials subfield, or
- Certification by NICET as an Engineering Technician, or higher, in Civil Engineering Technology with at least five years of highway materials testing experience, or
- An individual with at least eight (8) years of highway materials testing and construction experience.

In addition to the above, technicians and inspectors shall be employed when necessary. The Testing Technicians and Inspection Technicians shall have the following qualifications:

2.28.2.4.1 Testing Technicians

The Design-Builder shall have all acceptance testing performed by qualified testers. The testers shall be qualified as defined in the requirements in AASHTO R-18. A testing technician currently qualified in concrete testing by the American Concrete Institute (ACI) (Level I) will be considered qualified in those concrete tests. The qualifications of the laboratory technicians employed by an AASHTO Accreditation Program (AAP) will be accepted for AASHTO test methods only when confirmed by the laboratory's training and evaluation records. The competency of the tester shall be re-evaluated at least annually in all tests they perform. The testing technicians performing the field and laboratory QA sampling and QA testing shall be employed by the Design-Builder or agents laboratory and supervised by the Quality Testing Supervisor.

2.28.2.4.2 Inspection Technicians

The Design-Builder's QC/QA Inspection Technicians shall have a minimum of three years roadway construction inspection experience in the work activity being inspected. Final inspection of electrical systems for acceptance will be conducted by WSDOT electrical inspectors. The Design-Builder's testing technicians and construction inspectors may attend the instructional courses WSDOT provides its personnel on a space available basis.

2.28.2.4.3 Fabrication Inspector

The fabrication inspectors that are responsible for acceptance of structural steel shall be qualified as follows:

- The Inspector shall be an AWS Certified Welding Inspector (CWI) qualified and certified in accordance with the provisions of AWS QCI, Standards for Qualification and Certification of Welding Inspectors
- or, the Inspector shall be qualified by the Canadian Welding Bureau 9CWB) to the requirements of t he Canadian Standard Association (CSA) standard W178.2, Certification of Welding Inspectors, level II or the level III requirements.
- and, the Inspector shall, prior to performing any inspections, have documented training on all applicable codes and specifications applicable to this specific Project for t he inspections to be performed. This training shall include evidence that the inspector is competent with the Project specific specifications and requirements.

2.28.3 Design Quality Control and Quality Assurance Plan/Manual Requirements

2.28.3.1 General

The QMP shall specify all aspects of the Design Quality Control and Quality Assurance Plan. The quality control and quality assurance procedures for each type of Design Document and Construction Document shall be organized by engineering discipline (such as structural, civil and utilities). These procedures shall specify measures to be taken by the Design-Builder (1) to ensure that appropriate quality standards are specified and included in the Design Documents and Construction Documents and to control deviations from such standards, it being understood and agreed that no deviations from such standards shall be made unless they have been previously approved by WSDOT at WSDOT's sole discretion, and (2) for the selection of suitability of materials, and elements of the Work that are included in the Project.

The Design Quality Control and Quality Assurance plan shall include the following:

- Quality control and quality assurance procedures for preparing and checking all plans, calculations, drawings and other items submitted, to ensure that they are independently

checked and back-checked in accordance with generally accepted architectural and engineering practices, by experienced architects and engineers, respectively. The originator, checker and back-checker shall be clearly identified on the face of all submittals. Specific procedures for verifying computer programs used shall also be included. Plans, reports and other documents shall be stamped, signed and dated by the responsible Professional Engineer or Architect licensed in the State of Washington where required under the Contract Documents, under generally accepted architectural or engineering practices or by applicable laws.

- The plan shall set forth the level, frequency and methods of review of the adequacy of the design of the Project, including the methods by which all final Design Documents and Construction Documents shall be independently reviewed and verified for adequacy of design and back-checked in accordance with generally accepted design and engineering practice by experienced architects and engineers not involved with the preparation of such Documents.
- The plan shall set forth the procedures for coordinating Work performed by different persons in the same area, or in adjacent areas or in related tasks to ensure that conflicts, omissions or misalignments do not occur between drawings or between the drawings and the specifications and to coordinate the review, approval, release, distribution and revision of documents involving such persons.
- The plan shall identify those elements of the Contract Provisions, Design Documents or Construction Documents, if any, requiring special Quality Control and/or Quality Assurance attention or emphasis, including applicable standards of quality or practice to be met, level of completeness and/or extent of detailing required.
- The plan shall identify by discipline, the name, qualifications, duties, responsibilities and authorities for all persons proposed to be responsible for Quality Control and Quality Assurance.
- The plan shall state any requirement for, and the name, qualifications, duties, responsibilities and authorities of, external technical experts necessary to ensure the quality of the design of the Project, the anticipated timing of use of, the expected availability of, and any coordination required with respect to any such experts.
- The plan shall describe the required design quality control and assurance functions, including scheduled activities for Design Quality Control and Quality Assurance identifying the Design Documents and Construction Documents to be delivered to WSDOT for its review at each stage of the design or work phase of the Project.
- The Design-Builder shall maintain an accessible, centrally controlled manual, database, or list that contains all relevant design inputs or reference to design inputs to be used by design personnel to incorporate into the design.
- The Design-Builder shall ensure that the design inputs are communicated to, and accessible by, the relevant designers responsible for incorporating design inputs into the design outputs.

The QMP shall describe procedures for the release of Final Design and Released for Construction Documents. The procedure shall indicate how the Design-Builder will complete all quality reviews with architects and engineers experienced in the appropriate disciplines(s). It shall verify that the Design Documents and Construction Documents were prepared in such a manner as to ensure that they will be acceptable to WSDOT, as well as the Design-Build Team. The criteria used in such review shall include (1) conformity of the Final Design documents and Construction Documents with the Contract Documents; (2) assurance that all materials, equipment and elements of the Work provided for in such documents which shall be incorporated into the Project have been provided for

and designed to perform satisfactorily for the purpose intended; (3) the appearance, organization, technical and grammatical accuracy of such documents; (4) verification that such documents have been checked and signed by the drafter, designer, checker and reviewers; (5) where required under the Contract, generally accepted architectural or engineering practices or applicable law, verification that such documents have been stamped, signed and dated by the responsible Washington licensed civil engineer or architect; and (6) assurance that such documents fully provide for constructability, compatibility of materials and conformity to acceptance criteria for inspections and tests as provided in the Contract. The QMP shall require a written certification signed by the Design Quality Assurance Manager that all quality procedures have been completed in accordance with the QMP.

2.28.3.2 WSDOT Review of work

The QMP shall define the timing, content, and format of all design reviews. WSDOT design reviews shall be conducted on all construction documents at the 30 percent, 60 percent, 90 percent and Final completion levels, unless specified otherwise in this RFP. WSDOT will promptly review all on schedule submittals and return comments to the Design-Builder within ten (10) business days of the receipt of each submittal.

The QMP shall also identify the use of regular (weekly) coordination meetings between WSDOT and the Design-Builder's designers. These Over-the-Shoulder reviews shall be an integral part of the plan to discuss and resolve as many design issues as possible outside of the formal review process.

Following receipt of WSDOT's comments, the Design-Builder shall review and prepare a response to all comments. He shall schedule a resolution meeting with the appropriate WSDOT staff to explain and resolve his response to the comments. It is intended that all comments will be resolved at this meeting. If agreement is not reached on any specific comment, it shall be resolved as described in the Partnering and Disputes Resolution Section above. All comments and resultant actions have been agreed to by both WSDOT and the Design-Builder.

WSDOT will not officially approve Design Work after initial acceptance of the Design-Builder's Proposal, except as noted (i.e. requests for deviations, right-of-way plans, permit documents, non-pre-approved wall designs, etc). If WSDOT, at any time, determines that Design Work is proceeding which does not conform to the Contract Documents, WSDOT reserves the right to suspend work for cause until resolution of the issue.

The Design-Builder shall schedule design reviews with WSDOT during the course of the development of each design package. The design reviews are not hold points that restrict the progress of design. They are simply reviews of the design as it progresses and opportunities for WSDOT to provide comments and feedback on the design. Except for Early Construction items (see Section 1-011.10) all design reviews must be held with all WSDOT comments resolved to WSDOT's satisfaction prior to issuance of Released for Construction documents.

2.28.3.2.1 30 Percent Design Review Objective

The main objective of the 30 percent design review is to assess the constructability of the project following the development of the project's primary geometric features. It is anticipated that this is the 30 percent point in the development of the design. In this review, geometric details are completed and initial plans for all other major components are complete.

2.28.3.2.2 60 Percent Design Review Objective

The 60 percent design review will be at the most critical stage of design and construction plan development. The objective of this review is to focus on specific design features and details in addition to addressing all items that are or will be critical to the completion of a constructible and maintainable project. The review is to include an evaluation and discussion of such items as the

bridge plans and details, traffic requirements, special drainage structures, and any other special design features included in the project. It is intended that all major design calculations are complete and checked, and all drawings are at least 60 percent complete.

2.28.3.2.3 90 Percent Design Review Objective

The main objective of the 90 percent design review is to review the design and special provisions as the project design stage is being completed and the project is being made ready to go to construction. The 90 percent review of the design and contract plans should coincide with the 100 percent completion point in the design stage. The purpose of the review is to review the design prior to being released for construction, and should not be used as an opportunity to complete the final project designs. It is anticipated and assumed that all major decisions have been made, and that the proposed plans and specifications for the project has been completed and checked and meet the respective project goal, the project's scope of work and contract requirements. Only minor details, omissions, or design problems not previously addressed, should materialize or be identified at this review. If the review is successful, no further check should be needed. If there are no other changes or revisions to be made, the final plans and specifications should be ready for completion and Final Design Submittal.

2.28.3.2.4 Final Design Submittal

The Final Design objective is to document the completed design of the project. It is anticipated that the design, specifications and all related documents shall be at the 100 percent completion level, with the exception of the Design Documentation Package. This review is only to verify that comments made at the 90 percent review have been properly incorporated into the design. No additional revisions or changes should be anticipated at this stage. All quality control/assurance reviews and certifications shall be completed, and all plans, specifications and reports shall be stamped and signed by the appropriate engineer. With the satisfactory completion of this submittal, the design is complete, and WSDOT will issue a "Design Review Completion" notice, after which the documents may be released for construction.

2.28.3.3 Plan Approvals by WSDOT

Right-of-way plans and permit drawings shall be developed to WSDOT standards as described in the *Plans Preparation Manual* (M 22-31). WSDOT shall approve these drawings after a thorough review for completeness and conformance to standards. WSDOT will return all non-conforming drawings to the Design-Builder for corrective action.

2.28.3.4 QC/QA of Design Changes

The QMP shall describe how changes, including field changes, in the design of the Project or any portion thereof as shown on the Design and Construction Documents, shall be subject to design Quality Control and Quality Assurance measures and procedures commensurate with those applied to the original design of the portion of the Project being changed. Furthermore, all changes shall be approved in writing by the organization that performed the original design, with the written approval of WSDOT.

2.28.3.5 Released for Construction Documents

The QMP shall describe how the Design-Builder will ensure that the Released for Construction Documents have successfully completed all quality control, quality assurance and design reviews as required by the QMP and the Contract Documents. It shall also describe the written certification process to be used to verify to WSDOT that all reviews have been completed and the documents are ready to be issued for use in constructing the project.

2.28.3.6 As-Built Documents

The QMP shall describe how the Design-Builder will ensure that the As-Built Documents accurately represent the as-constructed conditions in the field and meet the requirements of the Contract Documents.

2.28.3.7 Document and Data Control

The QMP shall describe the procedures to be used in managing and documenting all project files. The Design-Builder shall establish and maintain its own document control system (DCS) to store and record all correspondence, design inputs, drawings, progress reports, technical reports, specifications, contract documents, submittals, calculations, test results, inspection reports, nonconformance reports, administrative documents, and other documents generated under the Contract:

The QMP shall describe the routing, filing, control, and retrieval methods for all documents.

The Design-Builder shall ensure that its DCS is compatible with the DCS to be used by WSDOT.

The Design-Builder's document control storage and retrieval methods shall include the use of both hardcopies and electronic records.

The Design-Builder's DCS shall handle all documents.

The QMP shall describe the methods by which all documents issued and received by the Design-Builder will contain a unique serialization, date issued or received, Project name, Contract name, Contract number, specific subject or content of the correspondence, name of sender or recipient, and reference information to which the correspondence relates to, such as prior correspondence.

The Design-Builder shall maintain separate incoming and outgoing correspondence logs.

All documents shall be maintained by the Design-Builder for the duration of the Contract and shall be organized, indexed and delivered to WSDOT (1) upon Final Acceptance unless required to be delivered earlier pursuant to the Contract Documents, or (2) even if incomplete, within seven days of receipt of request from WSDOT. These documents should include but not be limited to the following items: design criteria, reports and notes, calculations, drawings, schematics, supporting materials, etc.

2.28.3.7.1 Document and Data Approval and Issue

The QMP shall require that all deliverables include a signed and dated certification by the originator of the deliverable that the deliverable is complete and meets the Contract requirements.

2.28.3.7.2 Document and Data Changes

The QMP shall require that any changes to documents provided to WSDOT are in a format that can enable changes to be readily apparent and trackable (e.g., documents use the redline/strikeout method).

2.28.3.7.3 Design Subconsultants

The QMP shall describe the measures to be taken to ensure that subconsultants meet the quality requirements.

2.28.3.8 Design Validation

The QMP shall describe all verification, validation, monitoring, inspection, and activities to be carried out for the purposes of demonstrating that the Work is Acceptable.

2.28.4 MATERIALS QUALITY ASSURANCE PLAN REQUIREMENTS

2.28.4.1 General

The QMP shall specify all aspects of the Materials Quality Control and Quality Assurance Plan. This Plan shall include as a minimum the following items to verify conformance of all materials to all contract requirements.

2.28.4.2 Design-Builder Responsibilities

The Design-Builder shall be responsible for the quality of construction and materials incorporated into the Project. The Design-Builder's Quality Control measures are to insure that operational techniques and activities provide material of acceptable quality. Design-Builder sampling and testing shall be performed to control the processes and determine the degree of material compliance with the Contract Documents.

2.28.4.3 Materials Testing Quality Program

The Design-Builder shall monitor and measure the characteristics of all work activities to verify that all Project requirements have been met. This monitoring and measurement will be carried out at appropriate stages of construction in accordance with the planned work and minimum frequencies for sampling and testing.

The Design-Builders Quality Assurance test data will be used for acceptance provided it can be statically verified by WSDOT's Quality Verification test data. In the event of test result discrepancies between WSDOT and the Design-Builder where resolution cannot be resolved, the Materials Quality Assurance Team shall determine the test data to be used for acceptance.

The five levels of quality management provided by the Design-Builder where testing is being used for acceptance are:

Quality Control (QC): The Design-Builder shall be responsible for Quality Control; defined as activities performed by the Design-Builder, the producer or the manufacturer to ensure that a product is of uniform quality meeting the requirements of the contract. Components of QC may include checking materials handling and construction procedures, calibration and maintenance of equipment, production process control, and any sampling and testing done for these purposes.

Quality Assurance (QA): The Construction Quality Assurance Manager will be responsible for the QA materials sampling and testing program. QA testing encompasses all those planned and systematic actions necessary to ensure that all materials incorporated in the work meet the requirements for the material being used, and will perform satisfactorily for the purpose(s) intended. All QA materials sampling and testing will be performed by a statistically valid, random sampling method, utilizing testing methods and minimum frequencies defined in Section 1-06 of the General Conditions, the *Materials Manuals*, or in accordance with the WSDOT/Design-Builder agreement.

Quality Verification (QV): Materials Quality Verification will be performed by WSDOT, or its agent, to validate the Design-Builder's sampling and testing QA program. All verification sampling and testing will be performed by a statistically valid, random sampling method, utilizing testing methods defined in WSDOT *Construction Manual*, the *Materials Manuals*, or in accordance with WSDOT /Design-Builder agreement. The testing rate typically will be at one verification test to every five of the Design-Builder's acceptance testing. More frequent testing during initial startup may be necessary to verify the process is under control. When QV and QA results do not compare or have wide variances, additional testing may be needed to validate the results.

Independent Assurance (IA): The IA activity is an independent verification performed by WSDOT and is an observation of all sampling and testing procedures, review of the qualifications of the tester and verification of the testing equipment used to perform acceptance testing activities. This program will validate both the Design-Builder QA processes and WSDOT QV processes. This work includes auditing acceptance testing records, observing the Design-Builder's technician testing, taking split samples on a randomly sampled basis and checking verification of Design-Builder's testing equipment.

Quality spot checks: Non-scheduled spot checks of work performed by WSDOT representative. This sampling and testing effort is not scheduled and is performed solely for the benefit of the owner.

2.28.4.4 Materials Quality Assurance Team

The Design-Builder and WSDOT will jointly form and participate in a Materials Quality Assurance Team. The Construction Quality Assurance Manager will be responsible for setting the meeting schedule, agenda, and documenting the meeting attendees and minutes. The meetings will be held as needed to address all quality issues on the Project. It is suggested that meetings occur every 10 business days or more often if it is determined that a problem exists concerning materials.

The purpose of the meetings will be to discuss any issues of poor quality, processes that are unstable or out of good control, evaluation of disagreement between QA and QV test data, future quality concerns, and any issues that WSDOT or the Design-Builder may have about the materials quality of the Project. The quality team will address materials sampling, testing and acceptance of materials that are not addressed within the section Control of Materials to determine the acceptable method for the acceptance of those materials.

The Design-Builder shall assign, at a minimum, the following disciplines from the Design-Build team to the Materials Quality Assurance Team: personnel in charge of QC and QA activities, superintendents, and any others the Design-Builder acknowledges in having quality related concerns. WSDOT will assign similar personnel related to the Project or others having quality concerns on the Project.

2.28.4.5 Materials Testing Laboratory

All QA testing will be performed by a WSDOT approved laboratory reporting directly to the Design-Builder's Construction Quality Assurance Manager. The Design-Builder, or a subcontractor, may employ the laboratory personnel. The materials testing laboratory that is used for QA testing shall not be owned, operated, equipped, or staffed by material suppliers. The laboratory shall meet the requirements of AASHTO R-18 for qualified testers and calibrated/verified equipment and be able to accomplish the testing according to the test procedure they are performing.

The Design-Builder shall develop and maintain a *Laboratory Quality Systems Manual*. The Manual shall include:

- Staff qualifications, position description, and qualification process
- Listing of test procedures used
- Equipment, including verification and calibration procedures and inventory
- Test reports, worksheet, and forms
- Sample management
- Diagnostic and corrective action
- Quality systems review.

WSDOT approval of the laboratory will be required. WSDOT will perform an on-site evaluation of the facility to ensure all work is being performed according to the contract standards. The evaluation includes both audit and inspection functions, including reviewing training records, reviewing equipment calibration and verification records, and witnessing testers performing the test procedures.

The laboratory shall be properly equipped, staffed, and fully operational for WSDOT inspection a minimum of ten (10) business days prior to start of work. The Design-Builder will be advised in writing of any deficiencies noted during WSDOT inspection and shall take immediate action to correct the noted deficiencies. Work will not be permitted to proceed until the laboratory and staff is inspected and has received written approval from WSDOT Materials Engineer.

The test equipment for the following test procedures shall be as shown so that proper correlation between the QA and QV test results may be established.

- WSDOT FOP for AASHTO T308 Asphalt Content by Ignition Method (Barnstead Thermolyne Model F85938 or other approved ignition furnace with internal balance).
- AASHTO T-310 and WAQTC TM8 In-place Densities by Nuclear Method (Troxler 3430 Series Moisture/Density Gauge)

2.28.4.6 Materials Tracking System

The Design-Builder shall develop a materials tracking system to track the quantities of material placed, number of acceptance tests performed and the acceptance status. The tracking system shall be kept up-to-date on a daily basis. The tracking system shall be kept on the jobsite and be available for WSDOT review.

2.28.4.7 Materials Testing Frequencies and Random Sampling

Materials Quality Assurance, (QA), sampling and testing frequency will be performed in accordance with Section 1-06 of the General Conditions of this RFP or other Contract Documents defined in the Design Build Agreement.

Materials Quality Verification, (QV), sampling and testing will typically be performed at a rate of one (1) verification test to every five of the Design-Builder's acceptance testing. During production, startup testing may be required on a more frequent basis until the process is established to be under good control. When QV testing reaches 25 samples, and the QA and QV testing can be statically validated, the frequency of the QV tests can be reduced to 1 in 20. If at any time the QA and QV testing can not be validated, then the QV testing frequency shall be increased to 1 in 5 until 25 samples are reached again with satisfactory statistical validation.

For all materials that are not addressed by WSDOT standards, the material testing specifications, testing procedures and frequencies will be determined by the Materials Quality Assurance Team with concurrence of the Design-Builder's Design Engineer.

All acceptance and verification sampling and testing shall be randomly obtained, at the location and frequency stated in the Contract Documents. The Design-Builder shall provide to WSDOT a testing plan for each material. The testing plan shall identify the frequency, location for testing, the testing procedure to use, the attributes to test, the material acceptance requirements, and be developed using a Random Numbers Table, and reflect the estimated Project quantity. The testing plan shall be submitted prior to the beginning of production or placement of the material.

When small quantities of materials are to be used, they can be accepted without sampling and testing when the quantity of materials proposed for use by the Design-Builder are less than the minimum sampling and testing frequencies. Structural Concrete will not be considered under the small quantity definition. The Construction Quality Control and Quality Assurance Manager shall follow the

procedure for acceptance of small quantities found in Section 2.25 of this RFP.

Design-Builder Sampling and Testing

Design-Builder field and laboratory sampling and testing shall be performed as specified in the *Standard Specifications and the Material Manual* (M46-01). Sampling and testing shall be performed by qualified testing personnel defined in this specification. Representative samples shall be randomly obtained by the Design-Builder at specified frequencies and locations as shown in Section 1-06, Table 6. The Design-Builder shall furnish copies of all test results to WSDOT within 24 hours of acquiring the sample or the next day of business. For concrete cylinders, the test results shall be furnished within 24 hours after cylinder break.

Independent Assurance Inspection (IAI)

The Design-Builder's laboratory shall participate in WSDOT's Independent Assurance Sampling and Testing Program as described in Chapter 9-5 of WSDOT *Construction Manual* (M47-01). Findings of all Independent Assurance observations and test results will be provided to the Design-Builder's Quality Assurance Manager by the Engineer. The Design-Builder shall immediately take corrective action for any noted deficiencies.

2.28.4.8 Materials Quality Control and Quality Assurance Requirements

The Design-Builder shall be responsible for the quality of construction and materials incorporated into the project. The Design-Builder's Quality Assurance measures are to insure that operational techniques and activities provide material of acceptable quality.

Design-Builder sampling and testing shall be performed to control the processes and determine the degree of material compliance with the Contract Documents.

The Design-Build Quality Management Plan shall include a description of the process for quality control, and quality control originations which shall be defined as a separate entity from the QA organization. The Design-Builder, their supplier, or subcontractor shall perform the Project quality control (QC), to provide process control for design, construction and materials being produced for use on this Project.

The Quality Assurance (QA) organization(s) and personnel shall have sufficient authority and organizational autonomy to identify quality problems, and to initiate, recommend, and verify implementation of solutions. Persons performing Quality Assurance functions shall be at an organizational level which ensures that they are not influenced by the impact of implementation of the Quality Assurance measures on the Project schedule, performance or cost. The Construction QA Manager and his staff shall not work under the direction of the Construction Superintendent for the Project and shall work directly for the Design-Builder's Project Manager. All key personnel performing Quality Assurance functions shall be exclusively designated to such and shall not be assigned to perform conflicting duties.

The plan must at a minimum address the following:

- Describe the Design-Builder's quality assurance organization, including the number of full-time equivalent employees with specific Quality Assurance responsibilities and including a chart showing lines of authority and reporting responsibilities;
- List by discipline the name, qualifications, duties, responsibilities and authorities for all persons proposed to be responsible for Construction Quality Assurance;
- Quality assurance sampling, testing, and analysis plan with frequencies, location and methods;

- Load testing and integrity testing required to verify adequacy of the foundation capacity, soil reinforcement elements, or adequacy of ground stabilization;
- Identify properly equipped, staffed, and fully operational laboratory(s) to be used
- Specify documentation for QA activities, including control charts
- Identify requirements for corrective action when quality acceptance criteria are not met; and
- Identify activity meetings that include discussions relating to what materials will be used, how the work will be accomplished, by whom it will be performed, and where, when, and how the work will be done.

The Contract Documents may also require specific quality assurance measures for certain materials. When so required the Design-Builder shall provide all personnel, equipment, supplies, and facilities necessary to perform quality assurance, obtain samples, and perform tests required in the Contract Provisions.

2.28.4.9 Materials Quality Analysis Program

The Design-Builder sampling and testing results may be used for acceptance provided that they are validated by WSDOT's quality verification (QV) for sampling and testing.

Both the Design-Builder QA and WSDOT's QV test results will be recorded in the Statistical Analysis of Materials (SAM) software that will be provided by WSDOT to statistically evaluate the test data to determine the acceptability of the material tested. This evaluation will be performed by using the F and t Test analysis. The Construction Quality Assurance Manager shall be responsible for performing the evaluation. Any test data that is found to be outside the normal F and t distribution will have to be reviewed by the Quality Assurance Team and a determination be made to why the test data is outside the normal distribution.

The Quality Assurance Team shall be a cooperative effort by the Design-Builder and WSDOT to identify the cause of discrepancies in test results. The Quality Assurance Team will need to generate a report defining what the problem was, the cause of the problem, and the solution to prevent the problem from happening again. As a minimum, the review should include the following actions:

- A check of test data, calculations and results
- Observation of the sampling and testing by the Independent Assurance Inspector
- Check of test equipment by the Independent Assurance Inspector

If the Quality Assurance Team fails to identify the cause of discrepancies in test results, then WSDOT's test results shall be used for acceptance.

2.28.4.10 Materials Documentation Review

The Design-Builder shall make regular documentation reviews to ensure that all materials documentation and certifications are complete prior to the material being installed. WSDOT Project office personnel will audit the Design-Builder's documentation reviews for conformance to the contract provisions.

WSDOT will perform formal materials documentation reviews at approximately 25 percent and 75 percent completion of construction. Items to be reviewed are randomly selected by the documentation reviewer. These reviews are to ensure the Design-Builder is maintaining all the necessary materials documentation and records. A separate review will be performed at the completion of the Project to review all materials documentation.

In addition to the formal reviews, WSDOT on-site personnel will perform materials documentation

checks. Examples of these checks include materials approval, materials acceptance, and field verification that the approved material was placed.

2.28.5 Construction Quality Control and Quality Assurance Plan Requirements

2.28.5.1 General

The QMP shall specify all aspects of the Construction Quality Control and Quality Assurance Plan. This Plan shall include as a minimum, the following items to verify conformance of all construction activities to the contract requirements:

- Describe the Design-Builder's quality control organization, including the number of full-time equivalent employees with specific Quality Control and/or Quality Assurance responsibilities and including a chart showing lines of authority and reporting responsibilities
- List by discipline the name, qualifications, duties, responsibilities and authorities for all persons proposed to be responsible for Construction Quality Control and/or Quality Assurance
- Project progress schedule
- Submittal schedule
- Inspection requirements
- Instrumentation and survey monitoring for verification of the performance of the project geotechnical features
- Specify documentation for Quality Control and Quality Assurance activities, including control charts; and
- WSDOT requirements for corrective action when quality control and/or acceptance criteria are not met.

Weekly Scheduling Notice to Department

Notify WSDOT in writing by Friday noon of each week of planned construction activities, including fabrication. In this notification, describe the anticipated construction activities for the following week (Monday through Sunday) to allow WSDOT to schedule its resources. For activities (fabrication etc.) occurring beyond 60 miles of the Project, give the notification at least ten (10) business days before the planned work.

Construction Activities

The QMP shall address a program for inspections of all Work, including examinations, measurements, and tests of material or elements for each Work operation, where appropriate, to verify quality. Do not limit such inspections to those required for quality testing purposes. If the design documents specify mandatory inspection points that require witnessing or inspection by the Construction Quality Assurance Manager and approval of the designated representative before Work proceeds, indicate the specific inspection points in all appropriate documents.

2.28.5.2 Activities Meetings

Prior to the start of any work activity, the Design-Builder shall hold an Activity Meeting to ensure that all project personnel have a thorough understanding of work to be done. Work activities generally correspond to the sections of the Standard Specifications, such as clearing and grubbing,

earthwork, aggregate base, and hot mix asphalt, or a definable feature of work such as pre-paving conference, pre-pour conferences for bridge decks. The Activity Meeting should include discussions relating to what will be accomplished, by whom it will be performed, and where, when, and how the work will be done. The Activity Meetings are to ensure that all parties have the same understanding of the design intent, have the appropriate plans, specifications and any special details, and are aware of safety regulations and procedures that need to be followed. At this time, the QC inspection checklist for this activity should be reviewed. Activity Meetings shall be scheduled several days in advance of the actual work beginning on an activity to allow for additional preparation if necessary. The Activity Meetings shall be planned and conducted by the Design-Builder Construction and Quality Assurance Manager. Minutes of the meeting shall be taken to document any clarifications and understandings related to the construction of the item that are not documented elsewhere. Activity Meetings are classified as hold points and shall be identified in the Design-Builder's Quality Assurance plan.

Typical Activity Meeting Content

Item
Scope (Design Criteria and Intent, Constraints)
Applicable Documents
Work Activity Outline and Schedule (What, Where, Who, When, and How)
Staking Plan
Safety Regulations and Procedures
Maintenance of Traffic Plan
Coordination and Utilities
Inspection Plan/Quality Control Procedures
Status of Submittals
Acceptance Criteria
Basis of Payment
Examination of Work Area
Examination of Stored Material
Open Discussion

2.28.5.3 Coordination and Notification

The Design-Builder's Construction Quality Assurance Manager shall designate a primary point of contact for notifications for inspection at hold points and witness points. An alternate individual may be designated to function in this capacity in his/her absence. WSDOT will also designate one individual to handle responses to the Design-Builder with written reports or releases for hold and witness points.

The time necessary to respond to the notification for inspection at hold and witness points shall be

stated in the Design-Builder's Quality Control plan and mutually agreed to by both the Design-Builder and WSDOT.

2.28.5.4 Hold Points

Hold Points are to be established where notification of WSDOT is required for WSDOT's option of observing or visually examining a specific work operation or test. Hold Points are mandatory verification points identified in the Design-Builder's WSDOT approved Quality Management plan beyond which Work cannot proceed until verification is performed and a written release is granted by the Design-Builder's Quality organization. Hold Points should be identified in the construction process where critical characteristics are to be measured and maintained, and at points where it is nearly impossible to determine the adequacy of either materials or workmanship once work proceeds past this point. All Activity Meetings shall be included in the Design-Builder's QMP as Hold Points.

As a minimum, the Quality Assurance Manager shall establish hold points at the stages listed below. The QMP shall identify any additional hold points necessary to certify compliance. The following hold points are not intended to limit or diminish the Design-Builder's responsibility to inspect all construction work.

Temporary Erosion and Sediment Control (TESC)

- After completion of placement of TESC devices and prior to any construction operations.

Embankments

- After completion of drainage embankment and utility installations and before backfill.
- At intervals of embankment construction of every five feet vertical feet.

Structures (Bridge, retaining walls, noise walls, curtain and end walls)

- At completion of bridge embankment and before the start of structure foundation
- Before pile driving or drilled shaft operations
- After completion of the first piling drove at each structure support, then at the completion of each pile group, for each structure support
- After completion of each drilled shaft along with CLS test and then at the completion of each drilled shaft group, for each structure support
- Before concrete placement of any subsurface element including concrete for cast in place piles and drilled shafts
- After girder and diaphragm placement
- Before concrete placement of bridge deck, approach slabs, diaphragms, traffic barrier and parapet walls (with formwork, inserts, reinforcement in place)
- After completion of excavation and prior to box culvert construction
- Before concrete placement for cast-in-place box culverts with formwork, inserts and reinforcement in place
- Prior to installation of post tensioning strands or bars
- Prior to jacking operations for post tensioning with hydraulic jack on jobsite
- After completion of b ridge deck grinding and deck repair.

Retaining Wall

- After completion of soil foundation and before the placement of the leveling pad of a mechanically stabilized earth (MSE) wall or the foundation of any other type retaining wall
- For single-stage MSE walls at the ½ point of height
- Panel tolerances after completion of placement of panels for each MSE wall, prior to beginning of coping placement
- Before concrete placement for cast-in-place retaining walls with formwork, inserts and reinforcement in place

Noise Wall

- After completion of soil foundation and before the placement of footing formwork
- For pre-cast panels after placement of 10 or less continuous panels

Drainage

- After placement of pipe or box culvert and prior to backfilling

Subgrade, Surfacing and Pavement

- Completion of subgrade and prior to surfacing placement
- Completion of surfacing placement and prior to ATB, HMA and reinforcement for approach slab placement

Electrical

- Prior to removal of existing lighting, new system in place and operational
- Prior to removal of existing CCTV cameras, new CCTV cameras in place and operational
- As required by WAC 296-46B-040, inspection of electrical and traffic management systems will be performed by WSDOT.

2.28.5.5 Traffic Electrical Inspection

Electrical inspection and acceptance of traffic management systems will be performed by WSDOT as required by WAC 296-46B-040.

2.28.5.6 Performance Verification of Project Geotechnical Elements/Features

The Design-Builder's Quality Control and Quality Assurance plan shall include inspection and verification tests to determine the integrity of foundation structures and elements and to verify that their performance is as anticipated from the design. For drilled shaft foundations, see Section 2.13 Bridges and Structures for Cross-hold Sonic Logging Tests.

Walls shall be designed for expected total and differential settlements based on site geotechnical analyses. The Design-Builder's Quality Control and Quality Assurance plan shall include inspection, wall face tolerance and deflection measurements, and verification and proof tests for anchors and soil nails, to determine the integrity of foundation structures and wall elements, and to verify that the wall performance is as anticipated from the design.

The Design-Builder shall utilize geotechnical instrumentation as necessary and as recommended in the Geotechnical Report to verify the performance of areas of significant cuts or fills regarding deformation and stability, in particular where soft or otherwise unstable ground is present, or to control filling or cutting rates to maintain stability. An instrumentation and monitoring plan, including criteria which will be used to determine acceptance, shall be included in the Design-Builder's Quality Control and Quality Assurance plan.

If soil densification or other foundation soil stabilization techniques are used, the Design-Builder's Quality Control and Quality Assurance plan shall address how the integrity and success of the soil densification technique will be investigated, monitored, and compared to the intended design.

2.28.5.7 Department Oversight

WSDOT's oversight staff will periodically review the Field performance of the Quality Assurance staff, testing frequencies and acceptance testing results. WSDOT shall have the right to conduct oversight inspection to verify the adequacy of the Design-Builder's inspection activities and testing procedures.

If WSDOT finds nonconforming work, a nonconformance report can be submitted to the CQA Manager. See section title "Nonconforming Work".

2.28.5.8 Quality Control Inspection

The Quality Control plan shall contain inspection plans for each construction work item included in the Project, whether performed by the Design-Builder or a subcontractor or vendor. Work items may be definable features or items of work defined by the Standard Specifications.

2.28.5.9 Work Activities

The Design-Builder shall provide inspection for all work activities for conformance with the construction requirements in the Contract Provisions. The work activities to be inspected include, but are not limited to, the following types of work:

Activity	Activity
Clearing, Grubbing and Roadside Cleanup	Hydrants
Removal of Structure and Obstruction	Service Connections
Roadway Excavation and Embankment	Sanitary Sewers
Haul	Side Sewers
Subgrade Preparation	Sewer Cleanouts
Watering	BMP's for Erosion and Sediment Control (Installation and Maintenance)
Structure Excavation	Roadside Planting
Ditch Excavation	Irrigation System
Trimming and Cleanup	Curb, Gutter and Spillways
Construction Geotextiles	Integral Cement Concrete Curbs
Stockpiling Aggregates	Precast Traffic Curbs and Block Traffic Curbs
Site Reclamation	Raised Pavement Markers
Gravel Base	Guide Posts

Activity	Activity
Ballast and Crushed Surfacing	Guardrail
Asphalt Treated Base	Chain Link and Wire Fence
Subsealing	Monument Cases
Bituminous Surface Treatment	Cement Concrete Sidewalks
Asphalt Concrete Pavement	Riprap
Concrete Structures	Concrete Slope Protection
Steel Structures	Impact Attenuator System
Piling	Mailbox Support
Bridge Railing	Redirectional Land Form
Painting	Illumination, Traffic Signal System, Intelligent Transportation Systems (ITS) and Electrical
Waterproofing	Permanent Signing
Cribbing	Pavement Marking
Concrete Barrier	Temporary Pavement Markings
Precast Concrete Retaining Wall Stems	Rock Wall
Drains	Glare Screens
Culverts	Rock Protection Fence
Structural Plate Pipe, Pipe Arch, Arch and Underpass	Wire Mesh Slope Protection
Storm Sewers	Material Quality Controls ➢ Aggregates ➢ Hot Mix Asphalt ➢ Portland Cement Concrete
Manholes, Inlets, Catch Basins and Drywells	Ecology Berms
Cleaning Existing Drainage Structures	High Visibility Construction Fencing (Installation and Maintenance)
Pipe and Fittings for Water Mains	Water Quality Monitoring
Trench Excavation, Bedding, and Backfill for Water Mains	Avoiding Sensitive Areas
Pipe Installations for Water Mains	Dewatering

The Design-Builder's Quality Control plan shall use the inspection procedures outlined in WSDOT *Construction Manual* (M47-01).

The inspection of electrical items by the Design-Builder shall be limited to the inspection of: foundation for luminaires, signal poles, and service and controller cabinets; erection of the luminaires

and signal poles; underground conduit placement; and detector loop placement. The inspection of the electrical circuitry will be accomplished by WSDOT's Electrical Inspectors.

During the design of the project, each items of work shall be reviewed to determine what significant characteristics of the items need to be monitored during the construction phase to ensure that the completed Project will function in accordance with the design intent over its expected lifetime. The inspection plans shall include the appropriate criteria, tests, and inspection requirements identified in WSDOT's *Standard Specifications, Construction Manual* and *Materials Manual*. The following elements are to be addressed within each items inspection plan:

- Identification – Work items included in the plan
- Characteristics – What characteristics of the item will be inspected
- Acceptance Criteria – Directly or by reference, provide sufficient information for the inspector to use to determine if the item or activity is conforming or nonconforming. Maximum use of checklists shall be made for this purpose.

2.28.5.10 Inspection Guidelines

Inspections shall be performed during all phases of the Project from start to completion in order to assure that the work meets, and is being performed in accordance with the Contract Provisions, plans, specifications, approved submittals, and any requirements of local jurisdictions.

An examination of the quality of workmanship shall also be conducted to confirm that all work is being performed in accordance with all construction documents and any understandings reached at the Activity Meeting for that item.

Appropriate follow-up inspections, and sampling and testing of materials shall be performed continuously as each item of work progresses to assure consistency in workmanship, compliance with contract requirements and design and construction documents, and to assure satisfactory performance of the work in service.

2.28.5.11 Inspection Documentation

Each of the Design-Builder's Quality Control inspectors shall summarize their daily inspections, tests and material sampling activities in a daily report. WSDOT's Inspectors Daily Report or a similar form shall be used for maintaining a written record of inspection results. Copies of the inspector's diaries shall be provided to WSDOT daily. The report shall consist of the following key points of record:

- Work performed by the firm, subcontractor, or material supplier
- Weather conditions
- Inspections performed and their results. Identify any corrective actions taken
- Communications
- Type, location, and results of all tests performed
- Delays encountered
- Identify any safety related problems and corrective action taken
- Identify all non-conforming work and the corrective action taken
- Signature of inspector

2.28.5.12 Construction Inspection Checklists

The Design-Builder's Quality Control and Quality Assurance plan shall include inspection checklists for all anticipated construction operations and/or processes. These checklists are to be used by the Design-Builder's inspection personnel and others with responsibility for quality control such as foreman and individual workers.

The individual checklists shall be approved by WSDOT as part of the overall approval of the Design-Builder's Quality Control and Quality Assurance plan. The checklist for each work activity shall include the construction requirements stated in the Standard Specifications or Contract Provisions for that work activity. As a minimum, each checklist shall address the following:

Date	
Time	
Location	➢ Pier or structure component ➢ Drainage code # ➢ Compaction Report (referenced to centerline station and subgrade elevation, etc.)
Type of Inspection	Completion of drainage code, final check, pre-pour check, etc.
Specification Requirement	List of applicable specifications for this item
Frequency	Indicated test or inspection frequency if any (see Section 1-06 of General Conditions for material test requirements)
Items Inspected	List elements or items inspected (i.e., rebar, chair placement or pipe size and type, grate box, pipe bedding, etc.)
Conformation to Specifications	Check that work and materials meet the appropriate specifications
Deficiencies Noted	Note any deficiencies to specifications
Individual Noted	Individual notified for corrective action
Corrective Action Noted	What form of corrective action is recommended to bring item into conformance with specifications

Action Taken	What corrective action was taken
Material Documentation	List and attach a copy of all required documentation (test reports – such as compaction test, aggregate gradation; mill tests; manufacturer's certificates of compliance: (catalog cut or product specifications, etc.)
Responsible Party Notified	Name of foreman or worker responsible for work
Signature of Inspector	

2.28.5.13 Nonconforming Work

The Construction Quality Assurance (CQA) Manager shall identify and document in a nonconformance report (NCR) all elements of the Work that have not, or are believed to have not, been constructed in accordance with the approved drawings and specifications. The NCR shall be submitted to WSDOT in writing within 24 hours of identification, and a copy sent to the Design Engineer.

2.28.5.14 NCR Remediation

In the NCR, the CQA Manager shall clearly describe the element of Work that is nonconforming and the reason for nonconformance. The Design Engineer (or a designated designer with equivalent experience and Washington State Professional Engineer's License) who signed and stamped the drawings for the Work shall evaluate and determine whether a nonconformance exists; and the effect of the nonconformance on performance, safety, durability, long-term maintenance, and the life of the item. Document remedial actions and have them stamped by a Professional Engineer licensed in the State of Washington. The CQA Manager must also sign the NCR, stating the remedial actions to be employed have undergone the same level of inspection and testing as required by the original design.

The NCR remediation report shall also state what actions were or will be instated to prevent the type of nonconformance from occurring again.

2.28.5.15 Work with NCR

If WSDOT does not agree with the remedial actions set forth in the NCR, it has the authority to call for removal of the nonconforming Work or can have Work stopped within that area until remedial actions have been accepted.

2.28.5.16 Biweekly NCR Reporting

The CQA Manager shall maintain a log of all NCRs and submit it biweekly to WSDOT. The CQA Manager shall number each NCR sequentially; give a brief description and status of the nonconforming Work, and, if the NCR has not been closed, an expected closure date. WSDOT will not grant acceptance for any portion of Work that has an outstanding NCR.

2.28.5.17 WSDOT NCR's and Audit Findings

WSDOT shall retain the right to write its own NCRs and Audit Findings based on its observance of Work. WSDOT generated NCRs and Audit Findings require the same review and ultimate closure as

NCRs generated by the CQA Manager.

2.28.5.18 Right to Stop Work

If there is evidence that QMP procedures are not adequate, or if a problem is encountered during the oversight inspections or becomes evident during construction, WSDOT may, at its sole discretion, stop Work until appropriate quality procedures have been established and implemented. In addition, WSDOT retains authority to stop Work without liability wholly or in part, if the Design-Builder fails to:

- Correct conditions that is unsafe for Project personnel or the general public
- Correct unacceptable construction practices

2.28.6 SUBMITTALS

2.28.6.1 Quality Management Plan

The Proposer shall submit six (6) hardcopies and one electronic version on CD of the *Draft Quality Management Plan* (*QMP*) for evaluation. The WSDOT will provide comments to the Design-Builder on the Draft QMP. Following resolution of the comments, and receipt of a written approval on the *QMP* from WSDOT, the Design-Builder shall submit six (6) hard copies and six (6) electronic on CD copies of the *Final QMP*.

Modifications to the *Final Approved QMP* shall be approved in writing by WSDOT. When approved, the Design-Builder shall correct the supplied six hard copies of the *Final Approved QMP*, and will submit six copies of the revised *QMP* on CD Each hardcopy or CD shall be clearly marked which revision has been included in that copy.

2.28.6.2 Management Reviews and Internal Audits

The Design-Builder shall provide a hardcopy of its records of management reviews to WSDOT within fourteen (14) days of the review.

The Design-Builder shall provide a hardcopy of its internal audits to WSDOT within fourteen (14) days of completion of the audit.

2.28.6.3 Design Documents Review

WSDOT will review as many design packages as it can within the limitations of its staff with on schedule submittals having priority. However, at WSDOT's sole discretion, it may limit the number of reviews, design submittals, and design resubmittals in a given week.

2.28.6.3.1 Review Documents

Prior to every review, the Design-Builder shall provide WSDOT with six hardcopies and a complete set of electronic files on CD-ROM of each design element to be the subject of the review.

2.28.6.3.2 Preliminary Bridge and Structure Plans

The Design-Builder shall submit four (4) copies of Preliminary Bridge Plans for all temporary and permanent bridges to WSDOT for acceptance and signature by the State Bridge Engineer before Released for Construction Documents will be accepted. A copy of the bridge foundation recommendations, and the bridge hydraulics design recommendations, shall accompany each Preliminary Bridge Plan. WSDOT will respond to the Preliminary Bridge Plan submittals in ten (10) business days or less.

2.28.6.3.3 Released for Construction (RFC) Documents

The Design-Builder shall provide WSDOT with two hardcopies and one set of electronic files on CD-

ROM of all Released for Construction Documents.

The Design-Builder shall provide the Released for Construction Documents to WSDOT prior to the documents being provided to the Design-Builders' forces responsible for constructing the Work. WSDOT will return them for resubmittal within seven (7) business days of receipt of the Released for Construction Documents if they are found to be not in conformance with the requirements of the Contract, the previously agreed upon review comments, or the requirements of the *Final Approved QMP*. For structure plans, the Design-Builder shall prepare and include "Bill of Reinforcement" tables for structure components in accordance with WSDOT *Bridge Design Standard Practices*, except the quantity of bars for each bar mark is not required to be shown. The Design-Builder does not have to conform to "Bridge Pay Items" requirements or need to provide "Summary of Quantity" tables in the plans.

2.28.6.3.4 Materials Certification Package

The Design-Builder shall submit a final materials certification package to WSDOT. The Design-Builder may use DOT Form 350-115, Contract Materials Checklist or develop one of its own with the same information. This package shall include all necessary supporting documentation. This documentation shall consist of a summary of all documentation practices utilized for material acceptance and an explanation of any deficiencies noted on the checklist. The summary should be organized in the order similar to Division 9 of the Standard Specifications for Road, Bridge, and Municipal Construction.

The Design-Builder will also submit to WSDOT the final materials records, temporary final records, and Final Record Book 1 as defined in Chapter 10-3 of WSDOT *Construction Manual*. The temporary final records are comprised of all relevant materials records not included in the final records. Copies of these records must be submitted to WSDOT to be retained for a seven (7) year period following acceptance of the Project as required by RCW 40.14. All of these records shall be submitted to WSDOT within ninety (90) calendar days of physical completion.

The Design-Builder shall submit a Materials Testing Plan as described in Section 2.28.4.9.

2.28.6.3.5 As-Built Documents

The Design-Builder shall submit to WSDOT for acceptance two complete hardcopies of all As-Built Documents and one set of electronic files on CDROM of all As-Built Documents available in a digital format. They shall be assembled as a complete package in sequence as defined as a final design package in WSDOT *Plans Preparation Manual*. WSDOT will advise the Design-Builder of the status of their Acceptance of the As-Built Documents within fourteen (14) days of receipt of same.

The Design-Builder shall collect, properly identify, and deliver to WSDOT all original diaries, logs, notebooks, accounts, records, reports, and other documents prepared in the performance of the Contract upon completion or termination of the Contract.

2.28.6.3.6 Product Data

The Design-Builder shall submit to WSDOT, for their Acceptance, two hard copies of all manufacturers' warranties, guarantees, instruction sheets, parts lists, and other product data within twenty (20) days of installation of the items to which they relate, and in any event prior to Final Acceptance. WSDOT will advise the Design-Builder of the status of this product data within fourteen (14) business days of receipt of same.

The Design-Builder shall submit to WSDOT two hard copies of all inspection and test reports prior to Final Acceptance. WSDOT will advise the Design-Builder of the status of this product data within fourteen (14) business days of receipt of same.

The Design-Builder shall ensure that the product data cited in this section are organized and indexed in a manner to allow easy retrieval of information.

End of Section

2.29 MAINTENANCE DURING CONSTRUCTION

2.29.1 GENERAL

The Design-Builder shall operate, maintain and repair the existing facilities and facilities constructed under this contract beginning on the day construction work begins, and ending on the day of final acceptance, at which time the Warranty Agreement will govern such work.

For the purpose of Maintenance During Construction, the project limits will be the north curb line of NE 85th Street in the south, the north bridge pavement seat of the Bridges 405/56E and 405/56W in the north and the right-of-way limit on the east and west. The only maintenance that will be performed by WSDOT inside the project limits will be removal of disabled vehicles, snowplowing, applying deicing agents and/or abrasives on the roadways open to use by the general public. (See also Section 2.29.4 titled Snow and Ice Operations).

The Design-Builder's maintenance work includes routine maintenance, emergency and operational response, and inspections and repairs required on an "as needed" basis throughout the life of the Contract in a manner acceptable to WSDOT. If WSDOT deems the Design-Builder has failed to provide adequate routine maintenance, emergency and operational response, inspections and repairs, WSDOT will issue an oral notification of said failure.

This oral notification will be followed by a written notification to commence and continue correction of such failure with diligence and promptness. Failure by the Design-Builder to correct the stated deficiency within 24 hours of the oral notification may result in WSDOT performing such work with WSDOT forces without prejudice to other remedies WSDOT may have. In such case, WSDOT shall deduct from payments then or thereafter due to the Design-Builder, the cost of correcting such deficiencies. If payments then or thereafter due are not sufficient to cover such amounts, the Design-Builder shall pay the difference to WSDOT upon demand.

Work done under the Agreement shall be performed in conformance with the most current WSDOT standards in effect at the time that the work is being performed.

The Design-Builder shall perform the operations and maintenance portions of the Project in a safe, reasonable, and prudent manner and shall employ good business practices and appropriate management techniques. The Design-Builder shall furnish all labor, materials, equipment and necessary services (such as highway safety controls) in connection with the operation, maintenance, and/or repair.

2.29.2 MAINTENANCE OF THE RIGHT-OF-WAY

2.29.2.1 General

This Section, 2.29.2, addresses the maintenance of highway vegetation outside the limits of vegetation disturbed by the Design-Builder's operations. The work includes nuisance vegetation control, noxious weed control, tree and brush control, turf and grass care, and maintenance of Park and Ride lots. Refer to Section 2.15 for requirements related to Roadside Restoration performed by the Design-Builder.

2.29.2.2 Nuisance Vegetation Control

The Design-Builder shall remove or cut to within 6 inches of ground line scotchbroom and blackberry bushes that are within 30 feet from the edge of the paved shoulder. Scotchbroom shall be cut prior to the blooming of any flower on the plant.

2.29.2.3 Noxious weed control

The Design-Builder shall apply an herbicide to any noxious weed identified by WSDOT within 8 days of being notified. The Design-Builder shall use an herbicide at legal rates that is approved for use on the target vegetation. The herbicide shall be applied by a person(s) that is licensed to apply that herbicide. A copy of the application record shall be submitted to WSDOT.

2.29.2.4 Tree and Brush Control

The Design-Builder shall remove or trim any tree(s) or brush that may obscure any roadway sign or cause a reduction in the sight distance. The WSDOT will identify and notify the Design-Builder of any tree(s) and brush that falls within this section. The Design-Builder shall remove any downed trees that have fallen and are within 30 feet of the edge of pavement or may be a safety concern for public travel. Any fallen tree(s) shall be removed within 24 hours.

2.29.2.5 Turf and Grass Care

The Design-Builder shall mow existing turf or grasses from the edge of pavement to a point 16 feet from the edge. The grass or turf shall be mowed when the average grass height reaches 30 inches to a height of no less than 6 inches but no higher than 12 inches. The Design-Builder shall not scalp the ground within sensitive areas. Mowing will not be required on slopes steeper then 2:1.

2.29.3 Maintenance of Roadways

2.29.3.1 General

The Design-Builder shall complete all components of the work required to allow for unrestricted traffic access to lanes and shoulders in accordance with Section 2.22.

2.29.3.2 Roadway Sweeping

The Design-Builder shall maintain all paved areas within the Project limits to prevent the accumulation of dirt, gravel and other debris. The Design-Builder shall periodically, and when directed by WSDOT, perform street sweeping or other best management practices to remove debris from the roadway and shoulders.

The Design-Builder shall take care to prevent spillage on haul routes. The Design-Builder shall remove spillage immediately and clean the area.

The tracking of dirt and gravel from the work zone is prohibited. The Design-Builder shall complete a Stormwater Site Plan, Temporary Erosion and Sediment Control Plan and a Fugitive Dust Control Plan in accordance with Section 2.8.

2.29.3.3 Existing Pavement

The Design-Builder shall maintain all existing pavement including pothole repair. Any pothole greater than 36 square inches and 4 inches in depth shall be repaired within 24 hours. Pothole repair material shall be of the same type and depth of adjacent pavement type.

2.29.3.4 Roadway Debris

Failure to maintain the Project free from accumulation of waste and rubbish as set forth above or otherwise failure to comply with use of site and clean-up procedures required by the Contract Documents, and failure within a 24 hour period after receipt of oral notice, subsequently confirmed in writing, to commence and continue correction of such failures with diligence and promptness, WSDOT may after such twenty-four (24) hour period, immediately, without prejudice to other remedies WSDOT may have, correct such deficiencies. In such case, WSDOT shall deduct from

payments then or thereafter due, the cost of correcting such deficiencies. If payments then or thereafter due are not sufficient to cover such amounts the Design-Builder shall pay the difference to WSDOT on demand.

2.29.3.5 Pavement Markings

The Design-Builder shall maintain existing and new pavement markings within the Project limits until Final Acceptance. WSDOT will indicate the location where existing markings require being refreshed. Temporary Pavement Marking Paint shall be in accordance with Standard Specifications Section 9-34.2(4). Design-Builder shall anticipate that, at a minimum, existing markings will need to be refreshed once per calendar year.

WSDOT will maintain the existing striping until the Design-Build begins construction work for the Project.

2.29.3.6 Animal Carcasses

Animal carcasses that would present a traffic hazard such as damage to vehicles, blocking a lane or cause traffic to slow below the posted speed limit shall be removed from the travel lanes by the Design-Builder with one hour of notification. The carcass shall be removed from the Project Limits and disposed of by proper means at an approved location.

2.29.3.7 Traffic Control Devices

The Design-Builder shall be responsible for maintaining the travel way such that it is open to traffic free from fugitive traffic barrels, cones and other devices that are within the open lanes.

All traffic control devices such as but not limited to traffic barrels and cones shall be placed behind barrier or guardrail away from traffic when not in use. In areas where no traffic control devices can be placed behind barrier or guardrail, the devices shall be placed off the shoulder of the roadway when the shoulder width is less than 6 feet in width.

2.29.3.8 Guardrail, Concrete Barrier and Attenuators

The Design-Builder shall replace or repair any guardrail, concrete barrier and attenuators that become damaged by the motoring public or by the Design-Builder's operations. Attenuators shall be replaced in kind or if repairable meet applicable SHRP standards. Payment for any damaged guardrail, concrete barrier or attenuators caused by the motoring public will be paid in accordance with Section 1-04.4 of the General Conditions, except for temporary devices installed by the Design-Builder.

2.29.3.9 Traffic System Signs

The maintenance of existing permanent signs shall be the responsibility of the Design-Builder. Maintenance of the permanent signs includes cleaning, repairing, replacing damaged signs and posts. Cleaning will only be required when directed by WSDOT. Payment for repairing permanent signing damaged by graffiti and by the motoring public will be in accordance with Section 1-04.4. Repair of damage caused by the Design-Builder's operations shall be at the Design-Builder's expense.

2.29.3.10 Drainage

The Design-Builder shall maintain and provide adequate drainage on the Project until Final Acceptance of the Work. Maintenance shall include the repair of riprap, cribbing, cleaning of ditches, channels, culverts, cross drains, drainage structures and gutters.

2.29.3.11 Access to Public Facilities

The Design-Builder shall maintain uninterrupted access to all public facilities, as affected by the Project. Access shall mean providing a clear and easily understood route into and out of an existing facility or business. The Design-Builder shall provide all necessary signing to convey that the route

to the facility or business is open to traffic. WSDOT will determine whether the signing is adequate. The Design-Builder shall provide access for all types of vehicles, including trucks needed for deliveries.

2.29.4 Snow and Ice Operations

2.29.4.1 Public Travel Way

The WSDOT will perform snowplowing, application of deicer and/or abrasives for lanes of traffic open for public travel. The snowplowing will be done as part of the normal course of plowing the public roadways within and the vicinity of the Project, and WSDOT, when plowing inside the Project Limits will take no special measures. The Design-Builder shall maintain any channelization devices that may be displaced or damaged by plowing operations.

2.29.4.2 Work Zone

The Design-Builder shall perform any snow and ice removal for the Design-Builder's operations within the work zone. The Design-Builder shall not allow any snow and ice removal from their operations to be placed within the traffic lanes opened to the general public.

2.29.5 Electrical

2.29.5.1 Signals

2.28.1.1.1 Existing Signals

See Section 2.17.4.2.4 and Section 2.17.4.2.5 for maintenance of signals.

2.29.5.2 ITS

All ITS equipment within the project limit shall be maintained by the Design-Builder. See Section 2.18 for further details.

2.29.5.3 Luminaries:

The Design-Builder shall maintain and operate all lighting systems until Final Acceptance of the entire Project. Maintenance and operation will include, but not be limited to, the following:

- Replacement of lamps, as required
- Replacement or repair of any damaged equipment or underground cable
- Maintenance concerning a public safety issue (including exposed wires and knockdowns), within 1 hour of notice
- Routine maintenance and other maintenance not of a public safety nature, within 24 hours of notice

Payment for repairing damaged permanent luminaries by the motoring public will be in accordance with Section 1-04.4 of the General Conditions.

2.29.6 Hazardous Spills Response

2.29.6.1 Public Travel Way

Cleanup of hazardous spills within the lanes of traffic open to the general public will be the responsibility of WSDOT and the Washington State Department of Ecology. The Design-Builder shall allow access to the Project and work zone for response to any spill. The Design-Builder shall

make personnel and equipment available to respond to all emergencies, except when such emergency is life-threatening to the personnel.

2.29.6.2 Work Zone

Any hazardous spills within the Design-Builder's work zone shall be the responsibility of the Design-Builder. The Design-Builder shall complete a Spill, Prevention Control and Countermeasures Plan in accordance with Section 2.8.3.5.2.

2.29.7 STRUCTURES

2.29.7.1 Existing Bridges

The Design-Builder shall maintain drainage structures on and off the bridges within the Project. Free draining of water through any drainage structure shall be maintained.

2.29.8 EMERGENCY RESPONSE

2.29.8.1 Cooperation

The Design-Builder shall cooperate with law enforcement and other emergency response agencies in their response to accidents, fires, spills, or other emergencies in any area affected by the Project, including those on the construction site and on traffic lanes open to the public. The Design-Builder shall cooperate in all of WSDOT investigations of accidents and other incidents within the Project corridor.

2.29.8.2 Emergency Access

The Design-Builder shall work with emergency service providers to address their concerns about emergency access to and in the corridor. This may include installing gates to allow emergency personnel to access the Project area.

2.29.8.3 Notification

The Design-Builder shall notify WSDOT, the Washington State Patrol (WSP), and all emergency service providers in the affected area in writing of any access closures at the construction site.

- Notification shall include the names, pager numbers, telephone numbers (business, residence, and cellular) of personnel to contact in case of emergencies along the Project. This contact list shall be updated as necessary.

2.29.8.4 Use of Design-Builder Resource

The Design-Builder shall make personnel and equipment available to respond to all emergencies, except when such emergency is life-threatening to the personnel. See Section 2.22.4.4.8, Traffic Incident Management Plan.

2.29.9 MAINTENANCE OF PROPERTY

2.29.9.1 General

The Design-Builder shall preserve public and private property at all times in accordance with Section 1-07.16 of the General Conditions.

The Design-Builder shall witness or reference land monument and property marker locations by a licensed Land Surveyor licensed in the State of Washington before moving, disturbing or damaging. Refer to Section 2.5 for additional requirements regarding monumentation and surveying.

2.29.10 MAINTENANCE OF AESTHETIC TREATMENT

2.29.10.1 General

The Design-Builder shall monitor the appearance of the aesthetic treatments on any walls or bridges for any defects, flaws, or vandalism during the construction period. The Design-Builder shall note and bring to WSDOT's attention defects, flaws and vandalism.

Defects and flaws shall be corrected in accordance with Section 1-05.7 of the General Conditions.

The Design-Builder shall be responsible for cleaning up and restoring property impacted by vandalism on the Project until Final Acceptance. The use of paint and/or permanent marking of any type on permanent barrier, railing and walls will not be allowed except as required by the Contract Documents.

End of Section

2.30 PRODUCT WARRANTY PROVISIONS

The Design-Builder shall warrant the new bridge approach slabs, pavement sections for the mainline and ramps.

2.30.1 GENERAL

The Design-Builder shall furnish, as part of the Best and Final Proposal (BAFP), a letter signed by an authorized representative stating that the Design-Builder shall warrant materials, work, and performance as described by this specification. The Design-Builder shall be responsible for the pavement performance and warranty work for a period of five years following final acceptance of the Project by WSDOT. The term Final Acceptance as used in this specification does not include the warranty period.

Upon final acceptance of the Project, the necessary warranty bond for the pavement item(s) shall be in effect for the total five year warranty period. The warranty bond shall be in the amount of $200,000. The bond shall insure the proper and prompt completion of required warranty work following completion of the pavement, including payments for all work performed, equipment and materials used in accordance with this specification. The extent of warranty work and the Design-Builder's liability for the work that may be required by these warranty provisions is not limited by the warranty bond amount.

The warranty bonds shall be one of the following:

- A single term five year warranty bond that will be in effect for the entire warranty period.
- Certification from the Design-Builder and its bonding agency that the contract bond for the Project will remain in effect for a period of one year beyond final acceptance of the Project and will include warranty work as described herein. Warranty bonds extending beyond that period will be supplied by the Design-Builder. The Design-Builder will provide a two year renewable, non-cumulative warranty bond for two consecutive terms. Failure on behalf of the Design-Builder or its surety to renew this warranty bond will result in a 20 percent payment of the face amount of the contract bond to WSDOT and the Design-Builder shall be considered in default.

2.30.2 PERFORMANCE

The parameters that will be used by WSDOT to evaluate performance of all constructed pavements for this Project are ride quality, pavement friction, pavement surface condition, structural capacity and material quality. These parameters will be measured and evaluated by WSDOT on an as needed basis during the warranty period.

At least sixty (60) business days prior to the expiration of the warranty or at any time deemed necessary by WSDOT, WSDOT will notify the Design-Builder in writing if the approach slab and pavement distress exceeds the criteria outlined in Tables 2 and 3 below, as applicable. The Design-Builder will not be held responsible for distresses that are caused by factors beyond the control of the Design-Builder. A finding that the distress is due to factors outside the control of the Design-Builder shall be based on evidence submitted by the Design-Builder to WSDOT. If WSDOT does not agree with the Design-Builder then the Dispute Resolution provisions as outlined in Section 1-09.11 of the General Conditions will be followed.

Within forty-five (45) business days of receiving notice, the Design-Builder shall commence to

undertake the warranty work, submit a plan for completing the work within the following nine months, and/or provide written objection if the need for warranty work is contested. Disagreement between the Design-Builder and WSDOT shall be resolved in accordance with the dispute resolution provisions as outlined in Section 1-04.5 of the General Conditions. If the Design-Builder fails to undertake warranty work within forty-five (45) business days after receiving written notice from WSDOT or Dispute Resolution Team, WSDOT will complete the warranty work or contract to have it completed and the Design-Builder shall be responsible for the total cost of the warranty work.

Coring, milling, or other destructive procedures may not be performed by the Design-Builder, without prior consent of WSDOT. The Design-Builder will not be responsible for damages as a result of coring, milling or other destructive procedures conducted by WSDOT, utility companies or other entities not under the control of the Design-Builder.

All repair, maintenance, and warranty work performed as part of this warranty provision, except as excluded elsewhere in this provision, shall be covered by the warranty provision for the remainder of the warranty term.

During the warranty period, the warranty work shall be performed at no cost to WSDOT. Maintenance (elective and preventative action) work that the Design-Builder elects to perform during the warranty period shall be at no cost to WSDOT. If corrective action needs to be taken, the Design-Builder shall coordinate all such activities to minimize disruption to the traffic, with prior approval of WSDOT.

Maintenance or Warranty work that requires a resurfacing of the pavement shall not be performed later than October 15 without written approval from WSDOT. In addition, HMA shall not be placed on any wet surface, or when the average surface temperatures are less than those specified in Table 1, below, or when weather conditions otherwise prevent the proper handling or finishing of the bituminous mixtures:

TABLE 1. HMA Placement

Compacted Thickness (ft)	Surface Course Temperature	Sub-Surface Course Temperature
Less than 0.10	55°F	55°F
0.10 to 0.20	45°F	35°F
0.21 to 0.35	35°F	35°F
More than 0.35	DNA	25°F*

*Only on dry subgrade, not frozen and when air temperature is rising.

2.30.2.1 Material Quality

Material quality shall be evaluated prior to and during construction through the Design-Builder's approved Quality Management Plan. Materials specified in the design and meeting the requirements outlined in the Standard Specifications shall be evaluated to meet or exceed requirements. Materials not meeting these specifications shall be removed immediately and replaced with acceptable material.

2.30.3 HOT MIX ASPHALT

2.30.3.1 Ride Quality

Baseline measure of the International Roughness Index (IRI) will be conducted using WSDOT's South Dakota Type Profiler and as follows:

- The requirement for final acceptance will be an IRI value of less than 60 inches per mile. If this limit is exceeded the Design-Builder shall replace the defective pavement (minimum depth of 0.15 ft.) for the full lane width over the section at the Design-Builder's expense.
- The ride quality value at the end of five years following Project completion shall not exceed and IRI value of 90 inches per mile. If this criterion is not met, the Design-Builder shall take corrective action as indicated above to bring this parameter within the limits.

2.30.3.2 Pavement Friction

Pavement friction shall meet the following performance criteria:

The friction value at the end of five years after the Project has been completed shall be no less than 40. Pavements with a friction number less than 40 will require corrective action within six months.

If at any time during said five-year period WSDOT determines, in accordance with ASTM E274-90, that this criterion is not met, upon receipt of notice to such effect from WSDOT, the Design-Builder shall take corrective action to provide values that meet or exceed 40, within six months after receipt of the notice.

2.30.3.3 Pavement Surface Condition

Pavement surface condition shall meet the following performance criteria:

Final acceptance will permit no identifiable distress as defined by WSDOT *Pavement Surface Condition Rating Manual*. If these criteria are not met, the Design-Builder shall take corrective action as outlined in Table 2.

Distress types exceeding the allowable level of severity at the end of five years after Final Acceptance shall require corrective action as outlined in Table 2.

2.30.3.4 Structural Capacity

The structural capacity (thickness, strength) of pavement sections shall be evaluated during the construction phase through the Design-Builder's approved Quality Control and Quality Assurance program. The parameters that will be evaluated include thickness, strength, and quality of materials. The strength, thickness, and quality of materials will be evaluated to ensure compliance with the approved design.

The requirements for final acceptance shall be to meet or exceed the design criteria. If the structural capacity is determined to be deficient by WSDOT, the Design-Builder shall take corrective action to rectify the deficiency.

2.30.4 Required Corrective Actions

TABLE 2. Hot Mix Asphalt Pavements

Distress Type	Allowable Level of Severity	Allowable Extent of Severity	Corrective Action
Rutting and Wear	Less than ¼ inch average	No individual 100 lane-foot section greater than 3/8 inch	Mill and fill with 0.15 feet of HMA pavement full lane width
Alligator Cracking	Less than ¼ inch in width	Less than 0.1 percent of total pavement surface	Pavement repair
Longitudinal Cracking	Less than ¼ inch in width	Less than 1 percent of the Project length	Crack sealing
Transverse Cracking	Less than ¼ inch in width	Less than one (1) crack per 2000 lane-feet	Crack sealing
Systematic Density Defects	0 percent detected	None	Mill and fill with 0.15 feet of HMA pavement full lane width

2.30.5 Approach Slabs

2.30.5.1 **Pavement Surface Condition**

2.30.5.2 Pavement surface condition shall meet the criteria as outlined in Table 3 at any time during the five (5) years following project completion. Distress types exceeding the allowable level of severity at the end of five years after Final Acceptance, shall require corrective action as outlined in Table 3.

TABLE 3. Approach Slab

Distress Type	Allowable Level of Severity	Allowable Extent of Severity	Corrective Action
Spalling or delamination	1 inch deep and 6 inch square maximum area	One per lane	Partial depth repair
Settlement	¾ inch or less at the approach slab/pavement joint	Per lane of approach slab	Repair settlement with tapering HMA to maintain grade profile and smooth ride. Transition from approach slab with a max. 1 inch diamond grind to the roadway
Wear	Less than 1/8 inch	Length of Approach Slab	Diamond grinding back to zero tolerance without compromising pavement section. If the structural integrity of the pavement section is compromised, full depth Approach Slab replacement
Joint Seal Damage	Hardening, adhesive failure, cohesive failure, complete loss of sealant	Less than 2 percent of joint length per Approach Slab width	Reseal joint entire joint length

End of Section