Chapter 2

Technical Requirements

Washington State Department of Transportation

I-90/SR 18 I/C to Deep Creek – Interchange Improvements & Widening

Request for Proposal

August 2, 2021

Washington State
Department of Transportation

2.1 General Information

2.1.1 *General*

Design-Build Flexibility – Washington State Department of Transportation (WSDOT) intends to allow the Design-Builder flexibility in design and construction by accommodating the processes, procedures, and innovative techniques that are preferred by the Design-Builder, as long as they are consistent with the Basic Configuration, Site conditions, good engineering practices, and the standards, guidelines, and procedures identified in the Contract.

Other Agencies – WSDOT has reviewed the Project with public and private agencies. Feedback from those agencies has been incorporated into these Technical Requirements and Appendices. WSDOT does not guarantee that the agencies will not impose additional requirements after completion of their review of the Design-Builder's design, or that additional feedback from the agencies will not be incorporated. All contact with ***the Federal Highway Administration (FHWA), all environmental agencies, and tribes*** shall be coordinated through the WSDOT Engineer.

The Design-Builder shall promptly notify WSDOT of any additional agency requirements. The Design-Builder and WSDOT shall coordinate all negotiations with the appropriate agencies.

2.1.1.1 Scope

The Design-Builder shall perform all Work necessary to deliver or construct the Project unless the Work is specified to be performed by WSDOT or by others. Quality Control (QC) and Quality Assurance (QA) processes shall apply to all aspects of the Work, including, at a minimum, design, construction, environmental compliance, maintenance of traffic, public involvement, Utilities, and control of materials. These processes shall be outlined in the Quality Management Plan.

This Project is also required to meet stormwater design retrofit requirements as stated in the WSDOT *Highway Runoff Manual*. Within this project corridor, according to the I-4 Subprogram, State Route (SR) 18 is designated as a high-priority retrofit area and Interstate 90 (I-90) is a low-priority retrofit area. The WSDOT *Highway Runoff Manual* (HRM) minimum requirements guidelines state that if any segment within the project corridor is deemed a high priority retrofit area, then the whole project needs to be treated as a high priority retrofit area.

2.1.1.2 Units of Measurement

The Project shall be designed, constructed, and documented in English units of measure.

2.1.1.3 Purpose

The purpose of this Project is to ***improve traffic operations, reduce congestion, and improve safety at the I-90 and SR 18 interchange and along the SR 18 corridor and the removal of identified fish barriers on the Injunction list within the Project Limit.***

2.1.1.4 Project Description

The Design-Builder shall design and construct a four-lane Diverging Diamond Interchange (DDI) at-grade with SR18 and underneath the I-90 travel lanes without modification to the existing I-90 bridge structures, and also widen SR 18 from the interchange to a location just south of Deep Creek where the roadway shall transition to the existing three-lane configuration (westbound truck climbing lane) at approximately MP 25.41.

The scope includes the following elements:

- A four-lane DDI configuration at-grade with the SR 18 portion of the I-90/SR 18 interchange and underneath the existing I-90 bridges.
- Modify I-90/SR 18 interchange ramps in conjunction with the four-lane DDI configuration.
- Widen SR 18 to four lanes between the I-90/SR 18 Interchange and just south of Deep Creek where the roadway shall transition to the existing three-lane configuration (westbound truck climbing lane) at approximately MP 25.41.
- Extend the fiber optic lines in the median of I-90 from the vicinity of S.E. Highpoint Way (MP 19.93) to the new communication HUB in the vicinity of the I-90 SR 18 Interchange as shown in the *Conceptual Plans* (Appendix M).
- Demolish and remove the existing weigh station building in the northwest quadrant of the interchange. This shall include all ancillary infrastructure items including and not limited to foundation, pavement, utilities and meter boxes, signs, bollards, and equipment. Remove the portion of the return loop ramp as shown in the *Conceptual Plans* (Appendix M).
- Intersection improvements at SE 104th Street.
- Stormwater management and design meeting the requirements of the WSDOT *Hydraulic Manual.*
- Stormwater retrofit of existing pavement that meets the requirements of the WSDOT *Highway Runoff Manual.*
- Remove fish barrier structures and improve stream functionality at the I-90/SR 18 interchange by relocating the Lake Creek tributary (hereafter referred to as LC-G) fish bearing stream through a series of open channel structures under the existing I-90 bridges and through two new structures under the I-90 westbound off-ramp and eastbound on-ramp.
- Removal Lake Creek fish barrier structure and construct a bridge at Lake Creek that meets hydraulic opening width requirements stated in TR 2.30 *Water Crossing*.

- Install signal, intelligent transportation system (ITS), illumination, signing, and electrical systems, including construction of advance warning sign systems on the eastbound direction of SR 18 mainline at SE 104th Street. The ITS system shall include data station and camera facilities that will extend at least as far as the new Deep Creek bridge structure.
- Design and construction of buried power supply conduits and electrical vaults between the existing service meter at S.E. 104th Street vicinity and Deep Creek to power the needed ITS data station and CCTV camera systems.
- Avoid and minimize impacts to environmentally Sensitive Areas including wetlands, wetland buffers, streams, stream buffers, jurisdictional ditches, and trees.
- Develop and submit permit applications and supporting documentation for all environmental permits .
- Provide adequate mitigation for any impacts to environmentally Sensitive Areas.
- Provide off-site tree replacement.
- Construct chain-up and chain-off areas for SR 18 traffic.
- Construct pedestrian access that provides improved connections through the I-90/SR 18 interchange.
- Design and construction of a four-lane bridge spanning across Deep Creek and the associated highway embankment.
- Remove the existing Deep Creek culvert including the highway embankment and realign and restore stream function for Deep Creek as shown in *Conceptual Plans* (Appendix M).
- Design and construction approximately 1200 linear feet of wildlife exclusion fence north and south of the Deep Creek bridge on both sides of SR 18.
- Design and construct a new two-lane roadway bridge adjacent to the existing structure over Raging River.

2.1.1.4.1 Known Fish Barriers

The Project has identified fish barriers on the injunction list. Most of these barriers shall be corrected in this Project as identified in this section. Others are to be avoided and not disturbed during the construction of the Work. A list of fish barriers are tracked and shown on the WDFW -Washington State Fish Passage map at this link*:*
(*https://geodataservices.wdfw.wa.gov/hp/fishpassage/index.html***).**

The list below identifies existing fish-barriers in the I-90/SR 18 interchange vicinity that will be removed.

- 934821
- 934822

- 934823
- 934824
- 934825
- 934826
- 934827
- 934828
- 934829
- 934786
- 934820
- 934689
- 07.03960.80

There are two additional existing fish barriers under I-90 which the Design-Builder shall avoid, identified as site ID 934853 & 934855.

The Project replaces 11 existing fish barriers in the I-90/SR 18 interchange vicinity by combining the multiple existing stream flows into a combined stream that is conveyed through four new fish passable structures – new culverts under I-90 westbound off-ramp and eastbound on-ramp and open channel structures under each of the I-90 bridges. This tributary stream ultimately will flow into Lake Creek.

The Project replaces an additional fish barrier at Site ID 990236 (Lake Creek).

The structure at site ID 934852 (Raging River), which is located east of the SR18 mainline, south of Raging River is not a fish barrier. The structure is located on a non-fish bearing stream (RR-D), however this outfalls to a fish bearing stream (RR-C). Removal of this culvert will not require a new culvert (fish passable or otherwise) to be put in its place. This barrier was previously included on the injunction list but has been recently removed from that list due to reclassification agreed to between WSDOT and WDFW. Thus it is safe to remove now without need to replace it with a fish passable culvert.

There is a fish barrier crossing underneath the Washington Department of Natural Resources gate 834 access road (Deep Creek vicinity). This barrier is identified as site ID 935303, and the Conceptual Design does not require its removal. However the Design-Builder shall be responsible for any damage to this fish barrier caused by the construction work at this location. The Design-Builder shall be liable for all time and costs associated with permitting, removing, and replacing this fish barrier with a fish passable system in the event that such damage occurs.

2.1.1.5 Project Goals

For Project goals, refer to the Instructions to Proposers.

2.1.1.6 Coordination with Other Projects

The Design-Builder shall coordinate the Project Work with other WSDOT projects; with Local Agencies' projects; and with others. The following projects could occur within the immediate vicinity of, or at the same time as, the Project:

- *** I-90 Eastgate to SR 900 Improvements
- I-90/West Village Park and Schneider Creeks – Fish Passage
- I-90/Lewis and Sunset Creeks – Fish Passage
- I-90/SR202 Soderman and Tributary to Patterson Creek-Fish Passage
- I-90 - 468th Avenue SE to West Summit Road - Concrete, Deck, and Culvert Rehab
- King County 104th Fish Passage Culvert Project.***

2.1.2 *Communications*

2.1.2.1 Notification

When the Contract requires that a notification be sent to WSDOT, the Design-Builder shall send an email to the WSDOT Engineer.

2.1.2.2 Meetings and Coordination

2.1.2.2.1 All Meetings

The Design-Builder shall develop all meeting agendas and provide all meeting facilities. Agendas shall be sent to the invitees at least 24 hours prior to meetings.

The Design-Builder shall record minutes of each meeting and distribute copies to WSDOT attendees within 5 Calendar Days of the meeting for Review and Comment. WSDOT will return comments to the Design-Builder within 5 Calendar Days of receipt of minutes and the Design-Builder shall finalize minutes within 5 Calendar Days of receiving WSDOT comments.

2.1.2.2.2 Task Force Meetings

The Design-Builder is encouraged to maintain close communication with WSDOT throughout the design and construction of the Project. It is anticipated that this close communication will expedite Project reviews, facilitate the incorporation of innovative Project solutions, and facilitate Final Acceptance of the Project.

Task force meetings are required for specific disciplines as noted in these Technical Requirements. Should the Design-Builder choose to hold task force meetings for other disciplines, WSDOT will be available on a weekly basis to attend them ***at WSDOT's sole discretion***.

2.1.2.2.3 Orientation Meeting

Within 14 Calendar Days of Notice to Proceed (NTP), the Design-Builder shall schedule an orientation meeting between the Design-Builder and the WSDOT Engineer to address documentation requirements.

2.1.2.2.4 Kick-Off Meeting

As soon as practicable, but not more than 30 Calendar Days after NTP, the Design-Builder shall schedule a kick-off meeting with the WSDOT Engineer to discuss the Project, and to exchange information as described in the WSDOT *Construction Manual* (Appendix D). Additional topics relevant to the design phase, as identified by the Design-Builder, shall also be discussed at this meeting.

2.1.3 *Subcontracts*

2.1.3.1 General

The Design-Builder shall incorporate the provisions specified in Section 1-08 of the *General Provisions* into each Subcontract.

2.1.3.2 Communication

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

2.1.3.3 Coordination

The Design-Builder shall accept sole responsibility for scheduling and coordinating the Work of Subcontractors, suppliers, and other individuals or entities performing or furnishing any Subcontract Work.

The Design-Builder shall accept sole responsibility for the environmental performance of all Subcontractors on the Project. The Design-Builder remains the sole responsible party for all environmental compliance and commitments, and shall structure their Subcontractor agreements such that compliance by their Subcontractors is assured.

2.1.4 *Construction Office*

The Design-Builder shall provide and maintain all office and other building space, including office space for WSDOT, and all facilities, equipment, and vehicles necessary to construct the Project and to meet the requirements of the Contract. Sufficient space shall be provided in the Design-Builder's Project office for simultaneous occupancy by both construction and design personnel. The Design-Builder's Project office shall comply with all local, State, and federal health and safety laws and regulations.

The Design-Builder is encouraged to co-locate its staff with WSDOT into a single Project office, with the Design-Builder's staff and WSDOT organized in teams

that are integrated by discipline. The Design-Builder shall coordinate with WSDOT prior to securing any data or phone connection for a co-located office.

The Design-Builder shall also configure the building computer systems to be capable to allow for virtual meeting format of all meetings with WSDOT and outside agency personnel. The STATE may elect to have some personnel report to Task force meetings, comment resolution meetings and over-the-shoulder design discussions via virtual meeting format either full-time or on a defined weekly schedule depending on the needs of individual STATE and agency personnel.

2.1.4.1 WSDOT Facilities

The Design-Builder shall provide an office with space for the WSDOT Project office. The Design-Builder shall follow the Washington State Office of Financial Management State Facilities Workplace Strategies and Space Use Guidelines. Full Local Area Network (LAN) coverage shall be provided throughout this space. Each office space shall be at least 100 square feet, wired for one personal computer (unless otherwise specified) on the WSDOT network, and wired for one telephone. The Design-Builder shall provide the following office and storage spaces for WSDOT:

- ***4*** full-time, reasonably sound-proof, closed-door office spaces, two of which have a table with a minimum of four chairs
- ***10*** full-time office spaces
- One network room meeting the requirements of this Section
- Access to conference rooms
- ***23*** parking spaces
- Meeting facility at the Project office shall have conferencing capabilities.
- ***

Of the parking spaces noted above, the Design-Builder shall provide secure parking for ***8*** WSDOT construction vehicles. The Design-Builder shall provide one or more of the following:

- Motion-detected security lighting covering the entire parking area
- Fencing, including a locking gate and razor wire along the top of the fence
- Video surveillance
- Nighttime security patrols
- Other security measure(s) as approved by the WSDOT Engineer

If there is an incident of theft, vandalism, or loss, the Design-Builder shall provide additional security measures to prevent further incidents of theft, vandalism, and loss, unless otherwise approved by the WSDOT Engineer.

The Design-Builder shall also provide sufficient space for the WSDOT materials testing trailer; one 8 feet tall, 20 feet long, 8 feet wide storage container; and one parking space for the materials testing van. The parking space shall be parallel and adjacent to the trailer, on the same side as the access doors. The storage

container shall be adjacent to the WSDOT materials testing trailer. The Design-Builder shall provide a water connection, a sewer or bladder system connection to the sink drain, and connection to 200-amp electrical service. Drawings and specifications of the WSDOT materials testing trailer are included in the *Materials Trailer Specifications* (Appendix R).

2.1.4.2 Location

The Design-Builder's Project office and the office space for WSDOT shall be located ***within a 5-mile radius of the I-90/SR 18 interchange***.

2.1.4.2.1 General Requirements

In addition to the requirements described above, the office space for WSDOT that is provided by the Design-Builder shall include the following:

- One desk, chair, two-drawer locking filing cabinet, bookcase, and telephone in each office space.
- One touch-tone speaker telephone for each office space with a status indicator and access to all outside lines and conference call systems. Each telephone shall be connected to a phone service with voice mail for each extension.
- Meeting facilities for all Project-related meetings. In the event the requirements for any meeting exceed the space available, the Design-Builder shall provide meeting space at a suitable alternate location. The alternate location shall be located ***within 5 miles of the I-90/SR 18 interchange***.
- At least two exits from each building or trailer.
- A secure door lock plus a deadbolt lock on each entrance.
- Separate men's and women's restrooms, ***lighted and equipped with hot and cold running water*** plumbing.
- Trash and recycle containers for paper, clean glass containers, metal cans, and plastic containers.
- Daily janitorial service (except holidays) including trash and recycle pickup for paper, clean glass containers, metal cans, and plastic containers.
- Maintained exterior office space areas, including access to parking areas and snow removal.
- Overhead lighting that meets the requirements of the United States Occupational Safety and Health Administration, and building and electrical codes for office space, which shall include a minimum circuit capacity of 20 amps, and at least two duplex receptacles for each office space.
- Heating, ventilation, air conditioning, and cooling systems capable of maintaining temperatures between 65 and 75°F in all spaces, including the network room, throughout the year.
- One room with a lockable door for use by WSDOT as a computer server and telephone network connection room. The room shall be at least 100 square feet. WSDOT Information Technology staff shall have

unrestricted access to this room. The computer network and phone network connections for the WSDOT office spaces shall terminate in this room. This room may be common with the Design-Builder's phone and computer network service room.

- Access requirements that meet the Americans with Disabilities Act.
- An office space that meets all local building code requirements.
- A single point of contact for coordinating all facility related items.

The Design-Builder shall maintain all office space for WSDOT occupancy from 45 Calendar Days after NTP, until at least 90 Calendar Days after Physical Completion of the Project, unless otherwise agreed to in writing by WSDOT.

The Design-Builder shall provide the following items to the WSDOT Engineer within 21 Calendar Days after NTP:

- Building address
- Name of data service provider
- A walk through of the office space

Except for the Design-Builder's Project office and the office space for WSDOT, the Design-Builder shall remove all facilities and perform any required Site restoration Work related to facilities provided by the Design-Builder, prior to Physical Completion.

The Design-Builder shall remove all facilities and perform any required Site restoration Work related to the Design-Builder's Project office and the office space for WSDOT within 100 Calendar Days after Physical Completion.

*2.1.4.2.2 ***WSDOT-Owned Property****

This Section is intentionally omitted.

2.1.4.3 Information Technology

2.1.4.3.1 Personal Computer Workstations

WSDOT will furnish and install, for its exclusive use, personal computer workstations and network printers in the workspaces described above. WSDOT will connect these devices, with its own 12-foot patch cords, to wall plates furnished by the Design-Builder. Equipment and infrastructure provided by the Design-Builder shall not interfere with WSDOT's network. Network devices provided by the Design-Builder shall be on a different sub-net than WSDOT's, and shall not connect to WSDOT's hub or other devices.

2.1.4.3.2 Network Communications

The Design-Builder shall ensure the office has access to data services designated for the exclusive use of WSDOT. The Design-Builder shall ensure that this data service is equal to or faster than 50Mbps. Telco demarcation shall be extended into the Main Distribution Frame computer room of the suite or room of the

facility WSDOT occupies. Data service shall be ready to use by WSDOT within 30 Calendar Days after NTP. WSDOT will arrange for installation and will pay for the connection charges to the circuit. Category 6 Ethernet network LAN cabling shall be installed from each WSDOT closed-door office, on-site conference room(s), three printer locations, and office space to the wiring closet. The wall plates shall be located to permit the use of 12-foot patch cords provided by WSDOT. In addition to the 12-foot patch cords, WSDOT will provide its own hub, router, and Channel Service Unit/Data Service Unit (CSU/DSU) to connect its computers to the internet. The Design-Builder infrastructure shall not interfere with WSDOT's infrastructure.

The Design-Builder shall provide rack space in the network room to accommodate the hub, router, and CSU/DSU. The WSDOT equipment may be in the same network room as the Design-Builder's equipment. The Design-Builder shall submit a wiring and office floor plan to the WSDOT Engineer for Review and Comment within 21 Calendar Days of NTP.

2.1.5 *Project Documentation*

2.1.5.1 General

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

The Design-Builder shall maintain in good order, in a secure and protected place at the Project Site, one record copy of all drawings, specifications, addenda, written amendments, Change Orders, change directives, field orders, and written interpretations and clarifications required for the Work. The Design-Builder shall annotate the record documents to show changes made during design and construction. The Design-Builder shall make these record documents, together with all approved samples and approved Working Drawings, available to WSDOT for reference.

2.1.5.2 Format

The Design-Builder shall maintain all files indicated in this Section as electronic files.

2.1.5.3 Communications Distribution

At a minimum, the Design-Builder shall prepare and circulate to WSDOT and meeting attendees, as either hard copies or electronic files, all correspondence, minutes of meetings, and other documents developed as a result of all communications with the following:

- WSDOT
- Utility Owners
- Communities
- Agencies

- ***Tribes***
- The general public

The Design-Builder shall accept sole responsibility for ensuring that all communications are distributed to the appropriate parties.

2.1.5.4 Electronic Files

2.1.5.4.1 Backups

The Design-Builder shall backup all electronic files that have been revised every Calendar Day, backup all electronic files every week, and store all backup media in a secure off-site area in accordance with this Section.

2.1.5.4.2 Data Backup and Recovery

The Design-Builder shall develop and implement data security and a backup and recovery plan for Project information maintained by the Design-Builder.

2.1.5.5 Design Documentation

2.1.5.5.1 Communication and Submittal Documentation

Throughout the course of the Project, the Design-Builder shall maintain in the Design-Builder's Project office and make available for WSDOT review, at a minimum, one complete set of the following documents:

- Contract
- Calculations
- Reports
- Studies and investigations
- Preliminary Design Submittal and Final Design Submittal documents
- Design QC documentation
- Released for Construction (RFC) documents and revised RFC documents
- Communications
- Minutes of meetings
- Review comments and responses
- Permits and other environmental agreements
- Easement agreements

2.1.5.6 Construction Documentation

2.1.5.6.1 Communication and Submittal Documentation

Throughout the course of the Project the Design-Builder shall maintain in the Design-Builder's Project office and make available for WSDOT review, a

complete, orderly set of the documents listed below. These files shall be electronic files:

- Subcontracts
- Change Orders
- Working Drawings
- Pay invoices
- Field directive changes
- Claims
- Calculations
- Reports
- Tests
- ***Requests for Information, internal and external (RFIs)***
- RFC
- Notice of Design Changes (NDCs)
- Nonconforming Issues (NCIs)
- Nonconformance Reports (NCRs)
- ***Cumulative quantities for all active (and past) lots of materials permanently placed as part of the Project as required in accordance with Section 2.25, *Control of Materials****

2.1.5.7 Document Control Requirements

2.1.5.7.1 General

Document control is an integral part of WSDOT's proactive Project management process for all WSDOT Projects. The Design-Builder shall use an electronic Document Control System (DCS) to track and manage all Project documentation. The Design-Builder shall ensure that all incoming and outgoing Project documentation is electronically and physically accounted for and filed. Design and construction Submittals are filed electronically and physically prior to implementation.

The Design-Builder shall work with WSDOT to ensure that the WSDOT and Design-Builder systems and processes are compatible. The Design-Builder's DCS shall be subject to WSDOT Review and Comment.

The Design-Builder shall establish and maintain a collaborative website DCS, accessible to both the Design-Builder and to WSDOT from the Project office and remote locations, to exchange, organize, list, store, record, and track correspondence, drawings, technical reports, specifications, Submittals, calculations, control of materials, Inspector Daily Reports, meeting minutes, administrative, and other Project documents. The Design-Builder shall also establish document routing, filing, control, and retrieval methods that are compatible with WSDOT's DCS. Document control, storage, and retrieval

methods shall include the use of electronic records. The Design-Builder's DCS shall manage all of the documents. The Design-Builder's DCS shall be established and operational prior to the first design submittal to WSDOT and no later than 30 Calendar Days after NTP.

The Design-Builder shall provide DCS access, training, and system support to all WSDOT employees and WSDOT representatives who require access to the collaborative website DCS, including all reviewers of Project documents and other Project stakeholders as directed by WSDOT without stipulations on legal agreements outside of this Contract. If applicable, the Design-Builder shall provide all licenses for WSDOT and other Project stakeholders' use.

2.1.5.7.2 Personnel Requirements

The Document Control Manager (DCM) shall prepare the Document Control Work Plan and be responsible for management of Project documents from NTP through Physical Completion. The Design-Builder shall provide a DCM with a minimum of 2 years of experience managing collaborative web-based electronic DCS. At least 1 year of this experience shall be experience with the specific collaborative web-based DCS that the Design-Builder will utilize on this Project. The DCM shall have experience auditing systems and processes to ensure compliance with the Contract.

2.1.5.7.3 File Format

Graphics shall be submitted in TIF, GIF, JPG, or PDF file formats (compressed image formats only). These formats are intended for photos, conceptual sketches, and other uses.

Data files contained in a database or a spreadsheet shall be in one of the following formats:

- Microsoft Access
- Microsoft SQL
- Microsoft Excel

All links between non-graphical data and graphic elements, relationships between database tables, and report formats shall be maintained. The Design-Builder shall provide the database file in the preferred file format as designated by the WSDOT Engineer.

All documents such as reports, photographs, and manuals that use a variety of file formats shall be submitted as PDFs, in addition to being submitted in the base file format.

2.1.5.7.4 Submittals

2.1.5.7.4.1 Document Control Work Plan

The Design-Builder shall submit a Document Control Work Plan within 30 Calendar Days of NTP or prior to the first design Submittal, whichever occurs first. This plan shall include the following:

- ***File structure and numbering in accordance with the *Contract File Index* (Appendix O).***
- Naming convention and resubmittal naming convention
- DCS document deletion procedure
- Flow charts depicting the routing and processing of documents
- A plan to ensure the most current RFC drawings, pre-activity plans, meeting minutes and Technical Specifications are in the hands of the construction manager, superintendents, foreman, QC personnel, and QA personnel
- Persons involved and their responsibilities

- Incorporation of electronic documents into the DCS
- Site map illustrating the electronic file structure within the DCS
- DCS backup and recovery
- Submittal log in DCS

2.1.5.7.4.2 Format

All documents sent to WSDOT shall contain the following information at the top or on the first page of the document being sent:

- WSDOT Project name and Contract number
- Document type, such as letter, letter of transmittal, deliverable, and Submittal
- Document number, unique for the type of document

If any revisions are made to the original document, the same unique number shall be used with a revision number added. At a minimum, all submittals shall be electronic copy. Unless otherwise specified, the Design-Builder shall send a PDF of the document. WSDOT may also require the Design-Builder to send the file in other formats as requested by the WSDOT Engineer.

2.1.5.7.4.3 Project Completion

Prior to Physical Completion of the Project, the Design-Builder shall deliver to WSDOT a full and complete backup of the DCS. This backup shall include all documents in electronic format. The Design-Builder shall also deliver a copy of the DCS software in the version that the electronic documents and databases were created in.

The Design-Builder shall provide a final file structure and index for the electronic archived documents. Written instructions and procedures for use of the Design-Builder's software pertaining to the archived documents shall also be provided.

2.1.5.7.4.4 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

2.1.6 *Software*

2.1.6.1 General

The Design-Builder shall acquire, use, and maintain all software for the Project.

Version – The Design-Builder shall use the current version of the specified software in effect as of NTP, unless otherwise specified in this Section.

Updates – The Design-Builder shall update software programs throughout the Contract within 6 months of release of a software update, or earlier, if mutually agreed upon with WSDOT. WSDOT will similarly update its software.

File Server – The Design-Builder shall store all data files for the software programs on, or have them accessible through, the Design-Builder's central file server.

2.1.6.1.1 Required Project Software

In addition to any other software specified in the Contract, the Design-Builder shall use the following software programs:

2.1.6.1.1.1 Roadway

InRoads (by Bentley) – The same version WSDOT is using at NTP.

2.1.6.1.1.2 CADD Files

MicroStation (by Bentley) – The same version WSDOT is using at NTP.

2.1.6.1.1.3 Word Processing and Spreadsheets

The Design-Builder shall use the following software:

- Microsoft Word for word processing
- Microsoft Excel for spreadsheets
- Microsoft Access for databases

End of Section

2.2 Mandatory Standards

Certain Sections of this Request for Proposal (RFP) list mandatory manuals and publications that the Design-Builder shall use for the design and construction described in those Sections. The Design-Builder shall use the current mandatory manuals and publications as of the RFP issue date unless otherwise specified in this Contract.

The Mandatory Standards Section in each RFP Section shall be followed for all design and construction related to that Section. These Mandatory Standards are listed in hierarchical order, where the Mandatory Standards listed higher in the list shall take precedence over those listed below them. If a Mandatory Standard contains a reference to another document that is not listed and states that the referenced document shall be used, the referenced document shall also be considered to be a Mandatory Standard with the same hierarchal precedence as the source publication. These are not comprehensive lists; other applicable standards may be required to complete the design and construction. If the Design-Builder becomes aware of ambiguities or conflicts relating to the Mandatory Standards, the Design-Builder shall immediately notify the WSDOT Engineer.

If there are updates to the mandatory manuals or publications between the RFP issue date and 14 Calendar Days prior to the Proposal Due Date, WSDOT may issue an addendum to the RFP to account for those updates.

Changes resulting from updates to the mandatory manuals and publications that are not included in the Contract will be administered in accordance with Section 1-04 of the *General Provisions*.

End of Section

2.3 Vacant

2.4 Vacant

2.5 Surveys and Mapping

2.5.1 *General*

The Design-Builder shall perform all Work necessary to complete the land surveying and survey mapping. This Work includes at a minimum, records of surveys, permits to destroy and remove monuments, replacing or resetting monuments, land corner records, and all other land surveying services necessary to complete the Project.

2.5.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all Work related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Highway Surveying Manual* M 22-97 (Appendix D)
4. WSDOT *Design Manual* M 22-01 (Appendix D)
5. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
6. Standard Plans M 21-01(Appendix D)

2.5.2.1 Reference Documents

WSDOT has provided mapping for the Project using ***topographic surveys***. Primary and secondary survey horizontal and vertical controls were established by WSDOT in the Washington State Coordinate System, ***North*** Zone. Horizontal controls are based on the North American Datum of 1983 ***(North American Vertical Datum 83/91),*** and vertical controls are based on North American Vertical Datum of 1988 and as specified as < 0.005M (± linear uncertainty).

WSDOT has provided an electronic digital terrain model (InRoads format) and 2D MicroStation.dgn files comprised of photogrammetric, ***lidar,*** and topographic survey data in project datum coordinates converted from State Plane Coordinates using a combined factor of ***0.99995303***.

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

2.5.3 *Performance Requirements*

2.5.3.1 General

The Design-Builder is responsible for the accuracy of content and completeness of all survey information used in the design and construction of the Project. WSDOT does not warrant the accuracy of the survey information provided in the Request for Proposal except as described in this Section.

The Design-Builder shall verify the location, accuracy, and datum of all survey data and survey information, regardless of the source.

2.5.3.2 Survey Manager

The Design-Builder shall designate a Survey Manager for the Project. The Survey Manager shall ensure all survey work is performed by or under the supervision of persons licensed to practice surveying in the State of Washington. The Survey Manager shall be the single point of contact for all survey activities.

2.5.4 *Design Requirements*

2.5.4.1 General

The Design-Builder shall prepare field survey Work so it meets the Technical Requirements of the Contract and the Washington State Board of Registration for Engineers and Land Surveyors.

2.5.5 *Construction Requirements*

2.5.5.1 General

The Design-Builder shall maintain detailed survey records, including a description of the Work performed on each shift, and the methods and control points used. The survey records shall include the following:

- Adequate detail to allow the survey to be reproduced
- Graphic notes depicting control points used and relationship to other control points or reference points
- Description
- Coordinates
- Location description

Benchmarks and temporary benchmarks shall also have graphic notes depicting description, elevation, coordinates, and location. A data collector printout of the day's activities shall not be considered an acceptable record. When requested, the Survey Manager shall provide a copy of each day’s record to the WSDOT Engineer within 5 Calendar Days.

All permanent secondary control points shall be shown on a *Report of Survey Mark Form* (Appendix F) and shall be tied to the Right of Way (ROW) centerline alignment labeled on a post-construction record of survey. Permanent secondary

control points shall be established in accordance with the WSDOT *Highway Surveying Manual*.

The Design-Builder shall provide staking and layout to adequately locate, construct, and check all types of construction work.

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

2.5.5.2 Monumentation

2.5.5.2.1 General

Except for WSDOT geodetic primary control monuments, the Design-Builder shall document all WSDOT and governmental monumentation and property corners that will be modified, disturbed, or destroyed during the Contract. The Design-Builder shall follow the procedures as set forth in Chapter 16 of the WSDOT *Highway Surveying Manual* relating to the destruction and replacement of monumentation. Consistent with Chapter 16 of the WSDOT *Highway Surveying Manual*, the Design-Builder shall reference or reset all existing General Land Office corner monuments that will be disturbed by construction activity.

2.5.5.2.2 WSDOT Monumentation

The Design-Builder shall note all WSDOT geodetic and highway alignment monuments found within the Project limits on a record of survey or monumentation map. The Design-Builder shall notify the WSDOT Engineer prior to any Work that may cause WSDOT geodetic or highway alignment monuments to be disturbed or destroyed. The WSDOT Engineer will determine the monuments to be replaced within 14 Calendar Days.

The Design-Builder shall complete all permits required by the Washington State Department of Natural Resources (DNR) and submit them to the WSDOT Engineer and shall allow 7 Calendar Days for Review and Comment. The Design-Builder shall submit and process forms to DNR, as required by DNR, for any WSDOT geodetic or highway alignment monuments that are disturbed, destroyed, or relocated. Before any survey monument is removed or disturbed, an approved DNR Application to Remove or Destroy a Survey Monument, together with an exhibit map of all found survey monuments, shall be provided to the WSDOT Engineer. Monuments removed or disturbed without an approved DNR Application to Remove or Destroy a Survey Monument and exhibit map will be replaced by WSDOT at the Design-Builder's cost.

WSDOT will replace any WSDOT geodetic monument within the Project that may be disturbed or destroyed. The Design-Builder shall replace all highway alignment monuments and ROW monuments disturbed or destroyed unless written approval is obtained from the WSDOT Engineer. The Design-Builder shall label all monuments removed, replaced, or set on the post-construction record of survey described in this Section, and a copy shall be sent to DNR to complete the permit process.

The Design-Builder shall work with the WSDOT Engineer to determine the best location, as near as possible to the original location, so that WSDOT may reset the geodetic monument.

Existing property corners within the Project limits that are verified by a recorded document shall be replaced at the intersection of the property line and the new ROW line.

2.5.6 *Submittals*

2.5.6.1 Survey Records and Submittals

The Design-Builder shall deliver an electronic file of the survey records to the WSDOT Engineer within 30 Calendar Days of Substantial Completion.

2.5.6.2 Traffic Control Plan Submittal

The Design-Builder shall prepare a Traffic Control Plan whenever a survey crew, or a survey crew's vehicle, will be working within any roadway clear zone.

2.5.6.3 Monumentation Submittal

The Design-Builder shall submit the monumentation permits that are required for the removal, disturbance, and resetting of monuments to the WSDOT Engineer 14 Calendar Days prior to any removal, disturbance, or resetting to allow the WSDOT Engineer to monitor survey work to preserve monuments.

2.5.6.4 As Builts

The Design-Builder shall produce reports documenting the location of all constructed elements. These include, at a minimum, the As Built alignments, profiles, stormwater management facilities i.e. drainage structures, ponds, treatment and detention facilities, and permanent BMP's, utilities, walls, bridges, and placement of the survey control monument. These reports shall include descriptive statements for the survey methods used to determine the As Built location of the feature being surveyed. Where WSDOT has provided data to the Design-Builder in x, y, z coordinate format, the Design-Builder shall provide the WSDOT Engineer with data in x, y, z coordinate format. Where WSDOT has provided data to the Design-Builder in x, y coordinate format only, or z coordinate format only, the Design-Builder shall provide the WSDOT Engineer with data in x, y coordinate format only, or z coordinate format only.

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

The Design-Builder shall provide the WSDOT Engineer with an As Built survey basemap file in State Plane.

The Design-Builder shall deliver all As Built survey files to the WSDOT Engineer for the Project within 30 Calendar Days of Substantial Completion.

2.5.6.5 Post Construction Record of Survey

The Design-Builder shall provide the WSDOT Engineer with an electronic file of the post construction record of survey. A draft copy shall be submitted to the WSDOT Engineer for Review and Comment 7 Calendar Days prior to recording with the county where the survey was performed. A copy that includes the county's recording numbers, and an electronic file shall be delivered at the time of Substantial Completion. The electronic format shall be compatible with WSDOT's format. The Post Construction Record of Survey shall include, but is not limited to, the following:

- All monuments that have been removed by construction activities, with an indication showing if they have been replaced or not.
- All permanent secondary and tertiary horizontal and vertical control points established by the Design-Builder by State Plane Coordinates (x, y, and z), and by station and offset to the ROW centerline alignment.
- Report of Survey Mark documents or data sheets for all permanent control points.
- All monuments, remaining undisturbed and set during this Contract, defined by station and offset to the ROW centerline alignment.

2.5.6.6 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.6 Geotechnical

2.6.1 *General*

The Design-Builder shall perform all of the Geotechnical Work necessary to design and construct the Project. Elements of the Work at a minimum, shall include the following:

- The Design-Builder shall evaluate the geotechnical requirements and perform all geotechnical explorations, geotechnical analyses, and laboratory testing that is necessary to design and construct the Project.
- All geotechnical elements of the Project that are Released for Construction (RFC) shall be fully supported with Geotechnical Recommendations, supporting geotechnical data, calculations, plans, and specifications for construction following the requirements set forth in this Section and the WSDOT *Geotechnical Design Manual*.
- The Design-Builder shall provide a Final Geotechnical Documentation Package that documents all the geotechnical findings, Geotechnical Recommendations, calculations, and design completed for the Project in accordance with this Section.
- ***Geotechnical exploration and effects from construction of geotechnical design features shall be done in due consideration of all necessary environmental permit acquisitions or updates, and all National Environmental Policy Act (NEPA)/ State Environmental Policy Act (SEPA) documentation completion or updates, including those listed in Section 2.8, *Environmental*.

Sections 2.13, *Bridges and Structures,* and 2.14, *Hydraulics*, contain design and monitoring requirements that will require geotechnical input and, at a minimum, review by the Design-Builder's geotechnical engineer.***

2.6.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all work related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-01 (Appendix B)
3. WSDOT *Geotechnical Design Manual* M 46-03 (Appendix D)

4. WSDOT *Bridge and Structures Office Design Memoranda* (Appendix D)
5. WSDOT *Bridge Design Manual LRFD* M 23-50 (Appendix D)
6. WSDOT *Design Manual* M 22-01 (Appendix D)
7. WSDOT *Highway Runoff Manual* M 31-16 (Appendix D)
8. WSDOT *Materials Manual* M 46-01 (Appendix D)
9. WSDOT *Construction Manual* M 41-01 (Appendix D)
10. Standard Plans M 21-01 (Appendix D)
11. *AASHTO Guide Specifications for LRFD Seismic Bridge Design*
12. *AASHTO LRFD Bridge Design Specifications*
13. *AASHTO Manual on Subsurface Investigations*
14. *AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing*
15. *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 1st Edition, 2015 and all interims*
16. *FHWA Technical Manual for Design and Construction of Road Tunnels – Civil Elements (Publication No. FHWA-NHI-10-034)*
17. ***WSDOT *Utilities Manual* M 22-87.10***
18. ****Geotechnical Aspects of Landfill Design and Construction* by Xuede Qian, Robert Koerner, and Donald Gray, Prentice Hall. September 2001***

2.6.2.1 Design-Build Modifications to the Geotechnical Design Manual

When the WSDOT *Geotechnical Design Manual* refers to an activity that "shall" be done or that "is" done, those activities are mandatory. When the WSDOT *Geotechnical Design Manual* refers to an activity that "should" be done, those activities are mandatory unless approved by the WSDOT Engineer. All references to the Bridge and Structures Office, Geotechnical Office, Structural Designer, Structural Engineer, Project Designer, Construction Project Engineer, Geotechnical Engineer, Field Exploration Manager, Field Exploration Supervisor, and Geotechnical Designer shall mean the Design-Builder. Where the WSDOT *Geotechnical Design Manual* requires approval by the State Geotechnical Engineer, the Design-Builder shall be responsible to request in writing approval from the WSDOT Engineer. Work completed without the necessary approvals will not be accepted.

No changes have been made to provisions in the WSDOT *Geotechnical Design Manual* that do not apply to design-build contracts, (e.g., descriptions of WSDOT

divisions and their duties, descriptions of legal authority, or descriptions of internal WSDOT procedures or policies); however, in some cases it may not be clear whether rights or responsibilities in the WSDOT *Geotechnical Design Manual* are applicable to the Design-Builder. If it is unclear whether specific provisions in the WSDOT *Geotechnical Design Manual* apply to the Design-Builder, the Design-Builder shall request clarification from the WSDOT Engineer. WSDOT will make that determination at its sole discretion. WSDOT has identified the following provisions of the WSDOT *Geotechnical Design Manual* that do not apply to design-build contracts:

- Section 1.2.2, Geotechnical Functions Delegated to the Regions
- Section 1.2.3, Coordination between HQ and Region Regarding Emergency Response
- Section 1.3, Geotechnical Support within the WSDOT Project Management Process
- Section 1.6, Geotechnical Consultant Administration
- Chapter 20, Unstable Slope Management
- Chapter 21, Material Source Investigation and Report
- Chapter 22, Geotechnical Project Development, Reports, and Support for Design-Build Projects

2.6.2.2 Subsurface Investigation Modifications to the Geotechnical Design Manual

In addition to the requirements of the WSDOT *Geotechnical Design Manual*, the Design-Builder shall perform geotechnical investigations in accordance with the WSDOT *Highway Runoff Manual* at locations of stormwater infiltration, treatment detention ponds, wetlands, ecology embankments, Compost Amended Vegetated Filter Strips, infiltration ditches, and structures.

Where new foundations will be constructed for signals, strain poles, illumination systems, cantilever signs, sign bridges, toll gantries, variable message signs (VMS), toll rate signs (TRS), intelligent transportation systems (ITS), and ramp meters,*** only a Site review is required if the new foundation will be entirely within new or existing embankments known to be constructed of gravel borrow or select borrow and compacted in accordance with Method B or C of the Standard Specifications. Otherwise, subsurface conditions shall be investigated in accordance with the WSDOT *Geotechnical Design Manual*. ***New explorations shall be performed for the foundations identified in this Section if existing explorations are more than 100 feet from the foundation.***

WSDOT may allow the Design-Builder to waive subsurface explorations under certain conditions, at WSDOT's sole discretion. The Design-Builder shall submit a memorandum stamped and signed by the Geotechnical Group Manager (GGM)

including the justification for the request for WSDOT's Review and Comment. For all foundations where subsurface investigations are waived, the soil conditions at the foundation shall be observed during construction by the Geotechnical Special Inspector. The engineer of record shall certify and document in the Final Records that the observed conditions meet the design requirements. If conditions are not adequate, the foundation shall be redesigned or the soil conditions shall be improved until the soils meet the design requirements. Explorations shall not be waived for bridges, culverts, noise walls, or retaining walls.

2.6.2.3 Geotechnical Data

A *Geotechnical Baseline Report* (Appendix G) and a *Geotechnical Data Report* (GDR) (Appendix G) have been prepared for the Project. The soil conditions and groundwater levels provided in the GDR are known only at each specific ***exploration*** location at the time of the ***exploration***.

WSDOT has gathered and assembled geotechnical Reference Documents that may be relevant to the Design-Builder's Work. This information is provided in Appendix G.

2.6.3 *Personnel Requirements*

2.6.3.1 Geotechnical Group Manager

The Design-Builder shall provide a Geotechnical Group Manager to manage and review all aspects of the geotechnical design and construction Work completed for the Project. The GGM shall ensure that all geotechnical Work for permanent Project elements is completed in accordance with the Request for Proposal (RFP) and that Work by others for temporary elements is coordinated and compatible with the permanent Work. The GGM shall coordinate the geotechnical Work activities with the Project Quality Manager to ensure that all geotechnical Work is completed in accordance with the Contract, RFC Documents, and the Quality Management Plan (QMP).

The GGM shall have a minimum of 10 years of supervisory experience in geotechnical design and construction. The GGM shall be a Licensed Professional Engineer.

2.6.3.2 Design Professionals – Civil Engineers, Engineering Geologists, Hydrogeologists, and Geologists

All Geotechnical Recommendations, calculations, field design changes, plans, and specifications shall bear the seal of the design professional responsible for the Work in accordance with Section 1-02.3 of the *General Provisions*.

2.6.3.3 Peer Reviewer

The Peer Reviewer shall be selected by the Design-Builder. The Design-Builder shall provide a submittal for Review and Comment to the WSDOT Engineer demonstrating how the Peer Reviewer meets the required qualifications. The Peer Reviewer shall be a Licensed Professional Engineer and have a minimum of 15 years total of design and construction experience in the areas of:

- Structural and geotechnical seismic design
- Total and effective stress Site response analysis
- Dynamic soil testing, soil liquefaction, and lateral spreading
- Seismic ground motions
- Soil structure interaction

2.6.3.4 Geotechnical Field Personnel

Geotechnical field personnel shall have a minimum of 2 years of experience with the specific type of field Work they will be performing ***or work under the daily supervision of geotechnical staff with a minimum of 5 years of experience with the specific type of field Work they will be performing***.

2.6.3.5 Instrumentation Personnel

The Design-Builder's personnel responsible for the installation and monitoring of instrumentation such as inclinometers, piezometers, wells,***and*** settlement devices shall have a minimum of 2 years of experience with the specific type of instrumentation they will be operating unless approved by the WSDOT Engineer.

2.6.3.6 Geotechnical Special Inspector

The Design-Builder shall provide Geotechnical Special Inspectors (GSIs). A GSI shall have a minimum of 5 years of experience of geotechnical inspection experience or be the Engineer of Record (EOR) for the Project element being inspected. GSIs shall report to the GGM and shall not be employed by, or be a member of a Subcontractor, crew, or individual's performing the Work being inspected. GSIs shall report their findings to the Project Quality Manager, the GGM, and EOR.

2.6.3.7 Non-Destructive Shaft Testing Personnel

Personnel providing non-destructive shaft testing and reporting services shall be a Licensed Professional Engineer, shall have a minimum of 1 year of experience in testing and interpretation of the method utilized, and shall have performed similar tests on a minimum of three deep foundation projects in the last 2 years.

2.6.4 *Subsurface Investigation*

The Design-Builder shall review the available information in the GDR and perform subsurface investigation to meet the requirements of applicable laws, permits, and the Contract.

2.6.4.1 Subsurface Investigation Plan

The Design-Builder shall prepare Subsurface Investigation Plan(s) (SIP). The SIP shall be submitted to the WSDOT Engineer for Review and Comment prior to beginning subsurface investigation Work including earthwork needed to provide access for the exploration.

The Design-Builder may supplement the SIP at any time, provided the supplements are submitted to the WSDOT Engineer for Review and Comment.

The Design-Builder shall determine the specific locations for explorations and scope of exploration in the SIP. The Design-Builder shall secure all rights of entry, permits, and environmental and archeological clearances necessary to perform the Work. All subsurface investigation shall be conducted in accordance with the WSDOT *Geotechnical Design Manual* and the exploration requirements identified in this Contract. Field tests shall be conducted in accordance with WSDOT, American Association of State Highway and Transportation Officials (AASHTO), and American Society for Testing and Materials (ASTM) testing procedures, in that hierarchal order.

Geotechnical instrumentation used for Site characterization purposes such as piezometers, pore pressure transducers, and slope inclinometers shall be included in the SIP, and do not need to be included in the Geotechnical Instrumentation Plan (GIP).

2.6.4.2 Subsurface Investigation Surveying

All geotechnical borings, resource protection wells, hand holes, test pits, and cone penetrometer locations shall be surveyed. All geophysical lines shall be surveyed. The survey shall determine station and offset, elevation, and State Plane Coordinates, which shall be included on the boring logs, Cone Penetration Test (CPT) logs, hand hole logs, test pit logs, and geophysical data.

2.6.4.3 Subsurface Investigation Samples

The Design-Builder shall retain, store, and protect all soil and rock samples from field explorations performed as part of the Work. These samples shall be retained until Completion, after which time, the Design-Builder shall dispose of the samples. If requested, the Design-Builder shall deliver samples to the WSDOT State Materials Laboratory at 1655 S. 2nd Ave. SW, Tumwater, before Completion at no additional cost to WSDOT.

2.6.4.4 Subsurface Investigation Decommissioning

Prior to Physical Completion, all geotechnical explorations shall be decommissioned, unless otherwise directed by the WSDOT Engineer. The Design Builder shall decommission all geotechnical explorations completed by the Design Builder. WSDOT will decommission all geotechnical explorations shown in the GDR. The Design-Builder is responsible for contacting and coordinating with the WSDOT Engineer for decommissioning. If the Design Builder encounters an undocumented well, they shall leave it undisturbed and notify the WSDOT Engineer.

All decommissioning shall be completed in accordance with the Mandatory Standards. The Design-Builder shall provide the WSDOT Engineer with ***all*** Washington State Department of Ecology validated forms, ***including Notice of Intent, well logs, and decommissioning logs*** for the construction and decommissioning of new wells and wells decommissioned in the course of their Work.

2.6.4.5 Subsurface Investigation Field Notes, Daily Drill Reports, Final ***Exploration*** Logs

The Design-Builder shall prepare field exploration notes, inspector daily drill reports, ***and*** final exploration logs in accordance with the WSDOT *Geotechnical Design Manual* for all field explorations. Final boring logs, ***cone penetration test (CPT) logs,*** and final test pit logs, with a plan showing their locations relative to the Work, shall be included with all Final Design and RFC submittal calculation packages and Geotechnical Recommendations prepared by the Design-Builder. Draft boring logs, ***draft CPT logs,*** and draft test pit logs shall be marked as draft and may be included with Preliminary Design submittals.

2.6.5 *Geotechnical Analysis and Documentation*

2.6.5.1 Field and Laboratory Testing Requirements

Field and laboratory tests shall be conducted in accordance with the WSDOT *Geotechnical Design Manual*.

All test results shall be included in the Design-Builder's calculations, where appropriate, and the Final Geotechnical Documentation Package.

2.6.5.2 Geotechnical Analysis

Geotechnical engineering and analyses shall be based on the findings from subsurface field investigation explorations and laboratory tests performed by the Design-Builder and information contained in the GDR. All geotechnical calculations using spreadsheets or math software shall be checked with hand

calculations to verify logic, look-ups, formulae, and calculations ***and shall be summarized in a verification calculation package***. Off-the-shelf, commercially available, geotechnical software will not require a hand calculation validation.

2.6.5.3 Geotechnical Recommendations

Prior to the preparation of any Geotechnical Recommendations, the Design-Builder shall provide an outline or numbering system for the Geotechnical Recommendations and their supporting calculation packages so that the Geotechnical Recommendations can be easily cross referenced to the supporting calculation packages and incorporated into the Final Geotechnical Documentation Package.

The Design-Builder shall provide a Final Geotechnical Documentation Package including all RFC Geotechnical Recommendations and their supporting calculation packages in accordance with this Section.

2.6.6 *Design Criteria*

2.6.6.1 Seismic Design

Retaining walls supporting other structures shall be designed for liquefaction conditions regardless of the individual wall heights.

A Peer Review shall be performed if the Design-Builder implements any of the following design procedures in the geotechnical seismic design:

- Site-specific hazard analysis
- Total and effective stress site specific response analysis
- Selection of seismic ground motions used for site specific response
- Effective stress analysis to determine the number of cycles or elapsed time for the onset of liquefaction
- Dynamic soil structure interaction modeling for geotechnical seismic design
- Any other proposed analysis methods that are not addressed in the Mandatory Standards or in the Contract

The Peer Reviewer shall at a minimum review the following aspects of the seismic design and analysis:

- Geotechnical data collected and reasonableness of the assumptions made by the Design-Builder to develop the geologic and geotechnical models used in the analyses.
- Soil and structure input parameters used by the Design-Builder in the ground response and soil-structure interaction response analyses.

- Computer software used by the Design-Builder for ground response and soil-structure interaction with respect to the ability of the software and constitutive models to incorporate non-linear soil effects, pre- and post-liquefaction stress-strain-strength relations, non-linear structure effects, and modeling methodology.
- Interpreted results and conclusions used by the Design-Builder for design.
- Appropriate combination of seismic inertial loading, kinematic inertial effects, and liquefied/reduced soil strength.

The Design-Builder shall transmit the following information to WSDOT as they are developed for all Peer Reviews:

- Documents sent to the Peer Reviewer for a Peer Review
- The Peer Reviewer's comments
- Comment responses and resolution of the Peer Reviewer's comments
- Geotechnical Recommendations carrying the Peer Reviewer's Professional Engineer's stamp and signature stating the Peer Reviewer's comments have been resolved. The Geotechnical Recommendations shall also list the documents, including the document date, reviewed by the Peer Reviewer

The Design-Builder shall be responsible for addressing all comments made by the Peer Reviewer. The WSDOT Engineer shall be invited to attend all meetings between the Design-Builder and the Peer Reviewer. The Peer Review comments shall be resolved prior to the Geotechnical Recommendations being RFC. The Geotechnical Recommendations from the Peer Reviewer shall be included as an appendix in all the RFC Geotechnical Recommendations that were subject to the Peer Review.

For structures identified as essential or critical in the Contract, the Geotechnical Engineer shall perform the geotechnical design necessary to support two level seismic structural design as detailed in the WSDOT *Bridge Design Manual*, Chapter 4.

2.6.6.2 Foundation Design

The Design-Builder shall meet the structure foundation design and performance requirements described in Section 2.13, *Bridges and Structures*.

2.6.6.3 Retaining Wall and Noise Wall Design

The Design-Builder shall be responsible for design of walls, except for Standard Plan walls. The Design-Builder will not be responsible for internal design or structural design of Standard Plan walls.

All Standard Plan retaining walls are designed for specific design parameters, including soil strengths, ground conditions, surcharges, and geometry. The

parameters used are defined by the Standard Plans, WSDOT *Geotechnical Design Manual*, WSDOT *Bridge Design Manual*, and this Section. The Standard Plans should only be used if all parameters are met.

Standard Plan retaining and noise walls have not been designed for liquefaction or liquefaction effects. If liquefiable soils are present, the Design-Build shall not use Standard Plan retaining or noise walls unless the liquefaction is mitigated.

Policies and requirements regarding liquefaction for retaining walls are contained in the WSDOT *Geotechnical Design Manual*. Liquefaction policies for noise walls are not specifically addressed in detail within the WSDOT *Geotechnical Design Manual* or WSDOT *Bridge Design Manual*. The Design-Builder shall mitigate for liquefaction if liquefiable soils are present at a noise wall.

Noise walls contained in the Standard Plans, with two exceptions, were designed following the 2007 edition of the *AASHTO Standard Specifications for Highway Bridges* using 475-year event earthquakes with maximum peak seismic ground acceleration coefficient (As) equal to 0.35 g. Current seismic design standards in the *AASHTO Mandatory Standards* for 975-year events will likely result in ground acceleration coefficients that exceed the 0.35 g value used for the Standard Plans. Standard Plan noise walls shall not be used if the Project peak seismic ground acceleration coefficient (A_s) exceeds the value in the Standard Plans.

Noise walls D-2.36 (Type 11) and D-2.46 (Type 14) were designed following the *AASHTO LRFD Bridge Design Specifications,* 6th Edition, 2012 and interims through 2013. Accordingly, the seismic design accelerations used in the design for the Type 11 and Type 14 noise walls are based on 975-year events.

All specially designed noise walls and retaining walls, including proprietary walls, nonstandard walls, and temporary walls, shall meet the requirements in the *AASHTO LRFD Bridge Design Specifications* including the provisions of the current *AASHTO Guide Specifications for LRFD Seismic Bridge Design*, the WSDOT *Geotechnical Design Manual*, and the WSDOT *Bridge Design Manual*.

2.6.6.3.1 Structural Earth Retaining Walls

If the Design-Builder selects Structural Earth (SE) Walls, they shall be pre-approved proprietary walls in conformance with the WSDOT *Geotechnical Design Manual*. If pre-approved proprietary walls as detailed in Chapter 15 and the Chapter 15 appendices of the WSDOT *Geotechnical Design Manual* cannot be used, special designed SE walls may be used. Special designed proprietary SE walls of the same pre-approved systems do not require special approval from the WSDOT Engineer. However, if the Design-Builder wants to use wall systems other than those that have been pre-approved in the WSDOT *Geotechnical Design Manual*, the Designer-Builder shall request approval from the WSDOT Engineer.

The Design-Builder shall obtain approval before using a non-pre-approved system.

SE wall manufacturer submittals shall be reviewed by the GGM for consistency with the Geotechnical Recommendations for the wall.

2.6.6.3.2 Nonstandard, Nonproprietary Walls and Temporary Walls

The Design-Builder shall be responsible for all geotechnical and structural design of nonstandard, nonproprietary noise walls; nonstandard, nonproprietary retaining walls; and temporary walls including shoring and cofferdams.

2.6.6.4 Slope Design and Rock Cuts (Temporary and Permanent)

All temporary and permanent slopes, including reinforced slopes and rock cuts, shall be designed in accordance with the WSDOT *Geotechnical Design Manual*.

2.6.6.5 Foundation Design ***for Signals, Strain Poles, Illumination Systems, Cantilever Signs, Sign Bridges, Toll Gantries, Variable Message Signs, Toll Rate Signs, Intelligent Transportation Systems, Traffic Signals, and Overhead Sign Structures, and Ramp Meters***

All foundations for ***the following illumination, ITS, traffic signal, and overhead sign structures*** shall be designed in accordance with the WSDOT *Geotechnical Design Manual*:

- ***Light standards
- ITS Closed Circuit Television (CCTV) standards
- Cantilever traffic signal standards (for both traffic signal and ITS applications)
- Strain poles for span wire traffic signal systems
- Overhead sign structures (cantilever and bridge type). These include support structures for ITS, VMS, and tolling equipment.***

The standard foundation designs provided in the Standard Plans may be used if the minimum applicable soil and slope conditions are present at the Site. If soil/rock or ground conditions are not suitable for Standard Plan foundations, or if nonstandard loadings are present at the Site, site specific analysis and special foundation design shall be completed. Design of these foundation elements shall be performed in accordance with the ***WSDOT *Bridge Design Manual* and the*** *AASHTO ***LRFD*** Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*.

2.6.6.6 Ground Improvement

The ground improvement or ground replacement design shall include a monitoring and testing program to be implemented during construction to confirm the performance of the ground improvement and to verify ground replacement design parameters are achieved during construction. Differential settlement between areas of improvement ***or replacement*** and areas without improvement ***or replacement*** shall be monitored to confirm that differential settlement tolerances are not exceeded.

2.6.6.7 Settlement

The Design-Builder shall evaluate and quantify primary and secondary settlement for all embankments, bridge approach embankments, Structures, and Utilities as part of the design process. The Design-Builder shall ensure that Structures, WSDOT-owned lines (stormwater pipes, ITS conduit, etc.), and Utilities are designed to tolerate the anticipated settlements and satisfy all settlement requirements and limits contained in the Mandatory Standards and the Contract.

The following settlement criteria shall be met over the 75-year design life of the Project:

- For bridge approach embankments, new embankments, and widening of existing embankments:
  - ***Post-construction total settlement, including both primary and secondary settlement, shall not exceed 4 inches.
  - Post-construction settlement, including both primary and secondary settlement, shall not exceed 2inches over a distance of 100 feet longitudinally
  - Post-construction differential settlement, including both primary and secondary settlement, shall not exceed 1 inch measured between the centerline of the roadway embankment and the shoulder of the new embankment.
- For all new construction where transitions between different wall types, different fill material, rapid changes in soil stratigraphy and/or transitions from ground improvement to no ground improvement exist:
  - Post-construction settlement, including both primary and secondary settlement, shall not exceed 1 inch over 20 feet.***

The limits required herein are to meet geotechnical design requirements. More stringent settlement limits may be necessary to meet performance requirements for other Project elements as required elsewhere in the Contract or as required by the Design-Builder.

2.6.6.8 ***Pond Liner Stability***

The design of pond liner systems shall consider erosion, veneer stability, global slope stability (including seepage forces where below the seasonal high groundwater), permeability, and resistance to internal erosion or piping. The pond liner system shall include all the components, including but not limited to cushion layer(s), drainage layer(s), low-permeability material, cover soil or ballast, and erosion control materials. Design for stability shall follow the mechanisms presented in *"Geotechnical Aspects of Landfill Design and Construction"* by Xuede Qian, Robert Koerner, and Donald Gray, Prentice Hall (September 2001).

2.6.6.9 ***Annular Backfill Between Casing and Carrier Pipe***

For all casings of any type below the seasonal high groundwater elevation and storm drainage or water lines, regardless of elevation, the requirements of Section 120.15 (4)(b) of the WSDOT *Utilities Design Manual* shall be modified such that only pressurized grout is allowed as backfill of the annular space between casing and carrier pipe.

2.6.7 *Construction Criteria*

2.6.7.1 Performance Criteria

Criteria for allowable settlement and horizontal deformation of the retaining wall structures and bridge foundations are provided in Section 2.13, *Bridge and Structures*, the WSDOT *Geotechnical Design Manual*, and the WSDOT *Bridge Design Manual*. If any ground settlement occurs that is in excess of allowable limits, the Design-Builder shall cease all activities in the immediate area until the situation is fully assessed by the Design-Builder. The Design-Builder shall immediately contact the WSDOT Engineer informing them of the situation. Before the Design-Builder returns to work in the immediate area of ground settlement, the Design-Builder shall implement stabilization measures to ensure further settlement is minimized. The Design-Builder shall provide a submittal of the ground stabilization measures with supporting calculations to the WSDOT Engineer for Review and Comment. The submittal shall include an assessment of the impact of the settlement upon the structures and repair procedures.

2.6.7.2 Slope Stability and Protection

The Design-Builder shall be responsible for slope stability throughout the Project. If any landslides develop during construction, or if indicators of potential landslide activity appear, such as ground cracking, leaning trees, or slumping, as well as other descriptors included in the referenced documents and in Chapter 13 of the WSDOT *Geotechnical Design Manual*, 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. Before the Design-Builder

returns to work in the immediate area of unstable ground, the Design-Builder shall implement temporary slope stabilization measures directed by the EOR to ensure the safety of the public and the Design-Builder's personnel, and to limit damage to WSDOT facilities and adjacent properties. The Design-Builder shall immediately contact the WSDOT Engineer informing them of ***all observed landsliding or development of indicators of potential landsliding within or adjacent to the Project*** and the temporary stabilization measures the Design-Builder plans to implement. The design of the permanent slope stabilization shall be submitted to the WSDOT Engineer for Review and Comment. The Design-Builder shall resolve all comments prior to implementation of the permanent slope stabilization measures.

2.6.7.3 Pre-Condition Survey

Damage to structures may be caused by vibrations, embankment-induced settlement, ***dewatering-induced settlement,*** physical impact, and other construction-related activities. Before construction operations that may cause damage to sensitive facilities commence, the Design-Builder shall identify locations of sensitive facilities, zones of influence, instrumentation types, critical readings, and frequency of readings in a GIP. For buildings not owned by WSDOT, and other sensitive facilities including private residences, businesses, streets, and Utilities within the Project area, the Design-Builder shall conduct a pre-condition survey. This survey shall include video or photographic documentation of ***structure conditions, pavement conditions, utility conditions, and*** internal and external building walls and foundations. The pre-condition survey and GIP shall be submitted to the WSDOT Engineer prior to Work beginning in an affected area.

2.6.7.4 Fills, Retaining Walls, and Reinforced Slopes

Embankment fills, bridge approach embankments, retaining walls, and reinforced soil slopes shall be monitored for settlement as required by this Section and Section 2.13, *Bridges and Structures*. All estimates of primary consolidation settlement made during the design phase shall be field verified with instrumentation. The settlement monitoring data shall be provided to the GGM, the EOR, and to the WSDOT Engineer for Review and Comment. The EOR shall review the settlement monitoring data and provide final approval prior to the placement of the final wearing course pavement located within the footprint and the zone of influence of the new fills, retaining walls, reinforced soil slopes, ground improvement, and lightweight fill transitions. The final approval shall be in the form of a memorandum sealed and stamped by the EOR.

2.6.7.5 Geotechnical Instrumentation Plan

The GIP is not intended to cover geotechnical instrumentation used for Site characterization work (subsurface investigation). A GIP shall be developed, used, and followed when geotechnical instrumentation is required to monitor structures, facilities, utilities, other Project elements, or when Quality Assurance (QA) monitoring is required. When the EOR requires instrumentation and monitoring of the Work for construction purposes, the instrumentation shall be included in the GIP by supplement.

The GIP and all supplements to the GIP shall be prepared and submitted to the WSDOT Engineer for Review and Comment before deploying geotechnical instrumentation. Survey points to monitor deformations shall be considered to be geotechnical instrumentation. At a minimum, the Design-Builder shall install geotechnical instrumentation to monitor the following:

- ***Existing Bridge 90/78S and Bridge 90/78N as described in Section 2.13, *Bridges and Structures*.***
- Temporary shoring
- Settlement and settlement rates of embankments and structures where settlements are predicted to be greater than 2 inches
- Differential settlement and settlement rates at transitions less than 20 feet in length between different wall types, different fill material, rapid changes in soil stratigraphy, and/or transitions from ground improvement to no ground improvement
- Pore water pressures for staged embankment construction
- Groundwater levels, ***at the stream LC-G walls beneath Bridge 90/78S and Bridge 90/78N and at other locations where*** dewatering systems are used
- Ground and structure vibrations when impact or vibratory methods are used for the installation of ***ground improvement***, shaft casings, or driving piling
- Vibration levels for freshly placed concrete in conformance with Section 6-02.3(6)D of the Standard Specifications

Instruments that are damaged or fail for any reason of nonperformance shall be replaced immediately. If the instrumentation cannot be replaced immediately, construction activities within the zone of influence which were monitored by the instrumentation shall cease until the instrumentation is replaced and fully operable. New instruments shall be correlated with the previously acceptable data from the replaced instruments to develop continuous plots of instrumentation data, but with an arrow and note indicating the date of replacement on each instrument plot and data table. Instrument serial numbers and calibrations shall be

provided in the GIP. If serial numbers and calibrations are not available at the time of GIP preparation, they shall be added to the GIP prior to being implemented in the field.

2.6.7.5.1 Alert Levels, Action Levels, and Corrective Action Plans

The Design-Builder shall identify alert and action levels for the instrumentation readings unless WSDOT has included specific alert and action levels in the Contract. ***Specific levels are included for the existing Bridge 90/78S and Bridge 90/78N structures in Section 2.13, *Bridges and Structures.****

- Alert levels represent the reading where increased scrutiny of the element is warranted and when the frequency of readings shall be increased.
- Action levels represent the reading where corrective actions shall be implemented by the Design-Builder or the level where Work shall stop.
- Corrective Action Plans are measures that can rapidly be implemented by the Design-Builder to decrease or stop detrimental stresses, strains, or vibrations.

Alert and action levels shall be identified in the GIP for each instrument. The analysis performed by the Design-Builder to determine the alert and action instrumentation reading levels shall take into account the allowable limits for all of the existing structures and Utilities in the vicinity of the proposed construction.

Corrective Action Plans shall be developed and included in the GIP. Corrective Action Plans shall identify the steps to be taken if instrument readings reach an action level. These steps at a minimum shall include the following:

- Identify where Work operations contributing to the action level shall be stopped
- Notify the EOR
- Revise the Work plan
- Provide revised Work plan to the WSDOT Engineer for Review and Comment
- Require the Work that resulted in the critical instrument readings shall not resume until receiving the EOR approval of the revised Work plan
- Identify circumstances where corrective actions may require modification of design or construction procedures
- Require that if the approved revised Work plan does not reduce the value below the critical instrument readings, all related operations contributing to the critical instrument reading shall cease and the process of developing a revised Work plan shall be repeated

If the recorded data from geotechnical instrumentation meets or exceeds the alert or action levels identified, the Design-Builder shall notify the WSDOT Engineer

in writing within 24 hours that an alert or action level has been measured by instrumentation. The Design-Builder shall notify the WSDOT Engineer in writing within 24 hours of implementing the Corrective Action Plan identified in the GIP.

2.6.7.5.2 Geotechnical Monitoring of Sensitive Facilities and Structures

WSDOT has identified the following facilities and structures as being sensitive to potential damage by the Work:

- Facilities: None
- Structures: See Section 2.13, *Bridge and Structures*

The Design-Builder shall prepare a GIP to monitor the facilities and structures identified by WSDOT as being sensitive.

The Design-Builder shall also identify facilities and structures in addition to those identified by WSDOT that have the potential to be damaged by the Work and shall prepare a GIP to monitor those facilities.

2.6.8 *Special Inspection*

2.6.8.1 General

The Design-Builder shall perform special inspections and provide documentation during construction of the geotechnical types of Work listed in this Section. Documentation, requirements, and the frequency of special inspections shall be in accordance with the requirements of this Section and the Mandatory Standards. Inspections shall be performed by a GSI unless otherwise noted herein. Special inspections performed by a QA Inspection Technician shall be under the direct supervision of the GSI. QA Inspection Technicians providing special inspection for geotechnical works shall meet the requirements of Section 2.28.2.7.2. In addition, QA Inspection Technicians shall have a minimum of 2 years of geotechnical experience with the specific type of inspection they will be performing or shall be trained by the GGM or GSI to perform the necessary inspections.

Inspection documentation prepared by a QA Inspection Technician shall be submitted to the GSI. The GSI shall review the inspection documentation and finalize it with the QA Inspection Technician within 1 Calendar Day. Inspection documentation shall be compliant with the inspection documentation requirements in Section 2.28, *Quality Management Plan*. All inspection documentation prepared by the GSI or QA Inspection Technician, shall be provided within 2 Calendar Days to the GGM, Project Quality Manager, the EOR, the Construction Quality Assurance Manager (CQAM), and the Design Quality Assurance Manager (DQAM). All non-conforming Work shall immediately be

reported in accordance with the QMP to the CQAM, the DQAM, the GGM, WSDOT, and the EOR.

2.6.8.1.1 Responsibilities

The GSI shall review the RFC Documents and Design Documents, including pertinent Geotechnical Recommendations prior to the Work activity beginning. The GSI shall attend pre-construction meetings for all Work requiring geotechnical special inspection. The GSI shall monitor construction, provide special inspection for compliance with the Mandatory Standards, the Geotechnical Special Inspection Plan (GSIP), RFC Documents, and for Project elements identified in this Section. The GSI shall provide the inspection and documentation duties described in this Section and Section 2.28, *Quality Management Plan*, during the construction of geotechnical features and elements in accordance with the GSIP.

2.6.8.1.2 Changing Geotechnical Special Inspectors

Qualified GSIs may be changed at any time prior to Work beginning on a Project element, provided another qualified GSI is utilized. If a GSI must be changed during a Work activity which has already started, another qualified GSI shall assume the duties, provided the replacement GSI has already inspected similar Work. If there is no available qualified GSI meeting the requirement above, the Work for that element shall stop until a qualified GSI is available.

2.6.8.2 Elements Requiring Special Inspection

Temporary and permanent Project elements listed in this Section shall be inspected and documented at the frequencies noted below. Additional geotechnical special inspection may be required by the EOR and shall be referenced in the GSIP.

2.6.8.2.1 Soil Bearing Verification – Periodic Inspection

For structures, materials at the bearing elevation shall be inspected to ensure that the materials meet the design and construction requirements. The GSI shall document observations regarding soil type, moisture conditions, and groundwater conditions as encountered at the bearing elevation in the associated excavation.

2.6.8.2.2 Deep Foundations, Casings, and Sheet Piles – Continuous Inspection

For deep foundations such as drilled shafts, caissons, driven piles, micropiles, and soldier piles, the GSI or a QA Inspection Technician shall inspect the Work to ensure that acceptance criteria are achieved.

For driven elements, including casings installed by vibration, impact, twisting, rotation, or oscillation, the GSI or a QA Inspection Technician shall observe and document the installation including: the methods used; equipment and appurtenances used, and equipment operational parameters. The rate of advancement shall be noted at a minimum every half hour and the timing and duration of all stoppages shall be documented, including the reason for the stoppage.

For drilled elements or elements constructed with grabs, chisels, down-hole hammers, and other similar methods the GSI or a QA Inspection Technician shall observe and document the installation including: the methods used; materials and ground water conditions encountered; equipment and appurtenances used; equipment operational parameters; methods used to control loss of ground, groundwater intrusion, heave, and caving; conditions of the bottom of a drilled shaft; and penetration and tip elevation. The rate of advancement shall be noted at a minimum every half hour and the timing and duration of all stoppages shall be documented, including the reason for the stoppage.

2.6.8.2.3 Field Testing – Continuous Inspection

The following field tests shall be performed under the direction of a GSI or a QA Inspection Technician:

- All verification, performance, and proof tests of soil nails (all types), ground anchors (all types), pin piles, and micropiles
- Testing for pile acceptance or drivability, including Pile Driving Analyzer (PDA), Pile Integrity Testing (PIT), pile load tests, and Statnamic tests
- Plate load tests

2.6.8.2.4 Non-destructive Testing of Drilled Shafts – Periodic Inspection

The Design-Builder shall perform Crosshole Sonic Log (CSL) or Thermal Integrity Profiling (TIP) testing of all drilled shafts constructed for bridges in accordance with the Standard Specification. The Design-Builder shall submit the results and analysis of the non-destructive testing for each shaft tested to the EOR for review. The EOR will determine final acceptance of each shaft, based on the CSL/TIP test results and analysis for the tested shafts. The test results and analysis and determination of Final Acceptance by the EOR shall be provided to the WSDOT Engineer for Review and Comment within 3 Calendar Days after receiving the test results and analysis.

All repair of defects, including coring and schedule impacts shall be the sole responsibility of the Design-Builder and shall be included in the Proposal Price.

2.6.8.2.5 Soldier Piles, Ground Anchors, Soil Nails, Micropiles – Continuous Inspection

The following shall be observed, verified, and documented by a GSI or a QA Inspection Technician:

- Types and locations of soil/rock units encountered during construction
- Groundwater conditions during drilling; the types of equipment used to drill
- The drilling methods used, methods to remove cuttings from the hole, spoil volumes, rates of advancement and daily production rates
- Hole stability during construction and the use of casings
- Cleanliness of the bottom of drill hole
- Types, lengths, and dimensions of steel section, bars, tendons, and permanent casings placed in drilled holes
- Volumes and locations of Control Density Fill (CDF), concrete, and grout placed
- Caving or heave during construction

2.6.8.2.6 Grouting Operations – Continuous Inspection

The GSI or a QA Inspection Technician shall verify and document compliance of grout types used, mix designs, and batching/mixing equipment; and monitor and record grout pressures and volumes. The report may be prepared by the GSI or a representative of QA. The GSI shall review the information on a daily basis and the document shall be certified as complete and accurate by the preparer.

2.6.8.2.7 Ground Improvement – Continuous Inspection

Ground improvement methods and performance requirements are Work-specific. Accordingly, identifying geotechnical special inspection requirements shall be the responsibility of the Design-Builder and referenced in the GSIP.

2.6.8.2.8 Dewatering System Construction – Continuous Inspection

Dewatering systems, methods, and performance requirements are Work-specific. Accordingly, the GSI or a QA Inspection Technician shall observe, verify, and document the following:

- Types and locations of soil/rock units encountered during construction of dewatering systems
- Groundwater conditions observed during system construction, and at the completion of construction for system components

- Drilling methods used, methods to remove cuttings from drill holes, spoil volumes, rates of advancement and daily production rates
- Hole stability during construction and the use of casings and screens
- Types, lengths, and dimensions of system components installed
- Volumes and locations of the various materials placed in wells, well points, and other system components
- Details of well development
- Water quantity and quality information
- Quantities and types of CDF, concrete, grout, sand, and bentonite placed
- Note all instrumentation installed and the appropriate calibration factors for the equipment, if applicable
- Caving or heave during construction

Additional geotechnical specific inspection requirements shall be the responsibility of the Design-Builder and referenced in the GSIP.

2.6.8.2.9 Dewatering System Operation and Maintenance – Periodic Inspection

The GSI or a QA Inspection Technician shall verify and document that regular maintenance is occurring and shall record observations of pumping rates and discharge quantities. If groundwater monitoring is being performed, the GSI shall ensure the instrumentation is being monitored and reported as required; and monitor instrumentation, if required.

2.6.8.2.10 Trenchless Technology (including directional drilling, micro-tunneling, ramming, jacking) – Continuous Inspection

Trenchless technology methods and performance requirements are Work-specific. Accordingly, the GSI shall observe, verify, and document the following for trenchless technology methods ***where the casing or direct-bury carrier pipe is*** greater than 12 inches in ***outside*** diameter:

- Types and locations of soil/rock units encountered during construction
- Groundwater conditions during construction; the types, methods, and operational parameters of the equipment used for construction
- Drilling methods used, methods to remove cuttings from the hole, spoil volumes, rates of advancement and daily production rates
- Hole stability during construction and the use of casings, grouts, lubricants, and fillers
- Types, lengths, and dimensions of system components installed
- Quantities and types of CDF, concrete, grout, sand, and bentonite placed

- All instrumentation installed
- Appropriate calibration factors for the equipment, if applicable
- Caving, heave, or ground loss during construction
- All deviations from planned alignment, grade, and orientation

Additional geotechnical specific inspection requirements shall be the responsibility of the Design-Builder and referenced in the GSIP.

2.6.8.2.11 Rock Slope Cuts – Periodic Special Inspection

The Design-Builder shall provide inspection and documentation of field conditions during the construction of cuts in rock. Periodic special inspection for this item shall be performed on a daily basis during cut construction. This documentation shall include the following:

- Progress of cut construction at the time of observation
- Description and condition of soil and rock materials exposed in the cut including the orientation and condition of any observed discontinuities
- Presence of and volume of seepage in the exposed cut
- Any areas of instability or potential instability
- Geotechnical Recommendations for installation of supplemental drainage
- Geotechnical Recommendations for supplemental slope stabilization measures

All special inspection and related design services for this item shall be performed by a Licensed Engineering Geologist or Geotechnical Engineer with experience in the design and construction of rock cuts. The licensed professional performing this inspection may be required to generate supplemental designs for drainage, slope stabilization, or slope reinforcement as part of the Work. All designs shall be completed in accordance with the requirements of the Contract.

*2.6.8.2.12 ***Pond Subgrade – Periodic Inspection****

The Design-Builder shall provide inspection and documentation of subgrade conditions of the slopes and bottoms of stormwater ponds, swales, and treatment facilities prior to application of compost, slope protection, or underdrain systems. The GSI shall observe, verify, and document the subgrade conditions of the slopes and bottoms of stormwater ponds, swales, and treatment facilities prior to the application of compost, slope protection, or underdrain systems. The documentation shall include the following:

- That zones of seepage or coarse-grained soil above the seasonal high groundwater table are not present that could destabilize the slopes under long-term operating conditions

- That slope stabilization materials designed for placement over seepage areas are designed to provide containment, stability, and meet filtration criteria with the native materials in the subgrade
- That indications of observed flow from seeps and location of seasonal high water are consistent with those used for design.

2.6.9 *Submittals*

2.6.9.1 General

All submittals, including those pertaining to changes during construction, shall be submitted to the WSDOT Engineer for Review and Comment in accordance with the requirements of Section 2.12, *Project Documentation* and Section 2.28, *Quality Management Plan*.

Project geotechnical submittals at a minimum include the following:

- SIP
- GIP
- GSIP
- Soil and Rock Properties for design
- Pre-condition survey
- Peer Reviewer qualifications
- ***Calculation verification packages***
- Technical memoranda and supporting calculations
- Geotechnical report(s) and supporting calculations
- Ground stabilization measures and supporting calculation
- Design and supporting calculations for temporary works, including shoring, cofferdams, slopes, retaining walls, work access, and work platforms
- All Geotechnical Recommendations, calculations, and communications issued between the Design-Builder and the Peer Reviewer
- Non-destructive test reports and determination of final acceptance by the EOR
- Final Geotechnical Documentation Package

2.6.9.2 Subsurface Investigation Plan

The Design-Builder shall develop a SIP. The SIP at a minimum shall include the following:

- A narrative of the reasons for the exploration and goals to be achieved

- A map or air photo with the proposed exploration type, location, and depth shown
- Identify ***type and depth interval of sampling
- Identify type and frequency of field and laboratory tests***
- Instrumentation to be installed in explorations, installation procedures, and monitoring schedule
- Traffic Control Plan
- Site access plans and right of entry permits
- Environmental considerations (spoil containment and removal) and Best Management Practices Plan
- Schedule
- Utility locate information
- Emergency procedures and contacts

2.6.9.3 Geotechnical Instrumentation Plan

The Design-Builder shall develop a geotechnical instrumentation plan (GIP) ***to describe the instrumentation program. The GIP at a minimum shall:

- Establish the tolerable levels of vibration of sensitive facilities*** and curing concrete in nearby foundations and structures ***as performance criteria, including alert and action levels.
- Identify zones of influence for each instrument. The zone of influence is the three-dimensional space (X, Y, and Z) to which the instrument's readings apply.
- Identify instrumentation make, model, serial number, and calibration documentation.
- Contain frequency of readings for all instruments.
- Identify alert and action levels for all instruments***, including deformation limits prescribed in Section 2.13.
- ***Contain corrective action plans.
- Describe reporting requirements which, at a minimum, shall include the following:
  - Frequency of monitoring (for all instruments)
  - Personnel (with their qualifications) who will perform the monitoring
  - Frequency and schedule (elapsed time after measurement) of initial instrumentation data reporting
  - Format of the data in the initial instrumentation data report
  - Required review of the initial instrumentation data report by the GGM

- Schedule and format of the GGM review of the initial instrumentation data report
- Schedule and format of the final (and any interim) summary instrumentation data report(s)
- Schedule and format of the GGM review of the final data (and any interim) summary instrumentation data report(s)
- Vibration levels that, if exceeded, could be potentially damaging

The instrumentation program shall provide a means of monitoring the field conditions and comparing those conditions to the performance criteria established in the GIP.***

The GIP shall contain the requirement that all instruments shall be installed and operated in conformance to the manufacturer's requirements. The manufacturer's minimum calibration requirements for the instrumentation systems shall be maintained at all times during the monitoring program.

2.6.9.4 Soil and Rock Properties for Design

Prior to beginning geotechnical design for the Work, the Design-Builder shall submit the following items to the WSDOT Engineer for Review and Comment:

- The approach that will be used to determine the design soil and rock properties for the Project (e.g., property correlations, lab test results, back-analysis based on measured performance). Also identify how variability in the properties will be assessed and taken into account in the design.
- Soil property correlations which will be used to determine soil properties for design, if correlations are used.
- For a correlation not specifically cited in the WSDOT *Geotechnical Design Manual*, supporting documentation for the correlation that provides information on the development, applicability, and variation of the correlation.

At the beginning of geotechnical design for a Project-specific element or group of common elements, the Design-Builder shall define the Engineering Stratigraphic Units (ESU) to be used for design of those elements. The Design-Builder shall determine the properties for each ESU in accordance with the WSDOT *Geotechnical Design Manual* and the soil and rock properties for design submittal, and shall utilize an over-the-shoulder review process with WSDOT to discuss the properties that will be used in the design. The Design-Builder shall not modify or use different properties for Final Design without over-the-shoulder review of the changes. During the course of the Project, the Design-Builder may obtain additional information through field exploration, laboratory testing, or back analysis which could change the design properties for an ESU. Should this occur;

the changes to the design properties for an ESU shall be carried forward in all calculation packages that postdate the change.

After the design is complete and RFC Documents prepared, the GGM shall review calculations for temporary works during the construction phase. If the GGM identifies soil or rock properties that are significantly different from those used in the RFC design, the GGM shall work with the Project Quality Manager to ensure that the temporary works will perform as intended and are compatible with the permanent Work.

2.6.9.5 Geotechnical Special Inspection Plan

The Design-Builder shall develop, implement, and maintain a documented GSIP intended to validate geotechnical design assumptions and requirements of the Work through inspection and documentation. The GSIP shall be included in the Design-Builder's QMP and shall include items requiring special inspection as detailed in this Section. The following shall be included in the GSIP:

- Qualifications and expertise of firms/corporations providing special inspection services, including the following items:
  - A listing of firms and how they meet the minimum requirements in this Section
  - List the type(s) of expertise of each firm
  - Provide an organization chart of the proposed team and include the respective roles that each firm will provide for the team
- Qualifications and expertise of individuals providing special inspection services, including the following items:
  - Individuals providing special inspection services and show how they meet the minimum requirements in this Section
  - If licensed, provide the license information for the individual
- An itemized list of special inspection items or elements to be inspected while performing the Work to satisfy the requirements of this Section and Section 2.28, *Quality Management Plan*.
- Identify Hold Points in accordance with the requirements of this Section, Section 2.28*, Quality Management Plan*, and the RFC Plans.

2.6.9.6 Final Geotechnical Documentation Package

The Design-Builder shall prepare a Final Geotechnical Documentation Package that includes all final field notes, field testing, instrumentation data, laboratory results, Geotechnical Recommendations, and calculation packages. The Final Geotechnical Documentation Package shall be stamped and signed by a Licensed Professional Engineer.

The Final Geotechnical Documentation Package shall be provided with all supporting calculation packages cross referenced to individual sections so that it can be easily determined which calculation packages apply to which section(s) or design elements.

The Final Geotechnical Documentation Package shall be submitted for Review and Comment with the Final Design Documents in accordance with Section 2.12, *Project Documentation*. This package shall also be provided in electronic format (PDF).

2.6.9.7 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

The GGM shall ensure that the Final Geotechnical Documentation Package is delivered to the WSDOT Engineer and the WSDOT Geotechnical Office.

End of Section

2.7 Pavement

2.7.1 *General*

The Design-Builder shall perform all Work necessary to construct the pavement required to complete the Project. The terms "pavement" or "pavement section" shall be defined as the entire pavement structural section, at a minimum, Hot Mix Asphalt (HMA), base, and subbase materials.

Elements of work shall include, at a minimum, the following:

- ***New and reconstructed SR 18 mainline and on and off ramp pavement, including full-depth shoulders
- New and reconstructed Washington Department of Natural Resources (DNR) access driveways
- Widening of existing pavement along I-90 at the westbound I-90 off-ramp
- Pedestrian Access Route
- Rehabilitating existing HMA pavement***

2.7.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Materials Manual* M 46-01 (Appendix D)
4. WSDOT *Pavement Policy* (Appendix D)
5. WSDOT *Pavement Surface Condition Field Rating Manual for Asphalt Pavements* (Appendix D)
6. WSDOT *Construction Manual* M 41-01 (Appendix D)
7. WSDOT *Design Manual* M 22-01 (Appendix D)
8. Standard Plans M 21-01 (Appendix D)

9. *Qualified Products List (http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm)*
10. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)

2.7.3 *Design and Construction Requirements*

2.7.3.1 General Design Requirements

WSDOT has prepared the *Pavement Design Report* (Appendix J). The pavement sections are described further in this Section.

2.7.3.1.1 *Pavement Sections*

The longitudinal joints in the HMA wearing course shall coincide with a lane line or an edge line.

Where it is necessary to remove existing pavement to construct other items; including, at a minimum, concrete barriers, foundations, walls, drainage facilities, and electrical facilities; all replacement pavement shall consist of the same type and thickness, including base, as existing. Vertical full depth saw cuts are required at the edge of the excavation.

Compaction requirements for all HMA shoulders shall be the same as traveled lanes in accordance with Section 5-04.3(10) of the Standard Specifications.

When new pavement is required on ramps, new pavement between the beginning (or end) of the ramp taper and the gore nose shall match the compacted pavement depths for ***mainline SR 18 or I-90*** traveled lanes.

- ***SR 18 mainline and Snoqualmie Parkway (alignments: MR1, ML1, M1, MR2, ML2, M2, MR3, and ML3)
  - 0.15-feet HMA class ½ inch, performance grade (PG) 58H-22 (final overlay/final lift), over
  - 0.70-feet HMA class ½ inch, PG 58H-22 (two 0.35-feet lifts), over
  - 0.70-feet Crushed Surface Base Course (CSBC)
    - Note: Maximum CSBC lift height is 0.35-feet
  - For areas of unsuitable soil (see 2.7.3.1.1.4 - ***Unsuitable Soil)
    - 1.00-feet Permeable Ballast
- I-90 widening and I-90/SR 18 interchange ramps (alignments: LL, SE, NE, WS, WN, EN, ES, NW, and SW)
  - 0.15-feet HMA class ½ inch, PG 58H-22 (final overlay/final lift), over
  - 0.60-feet HMA class ½ inch, PG 58H-22 (two 0.30-feet lifts), over

  - 0.50-feet CSBC
    - Note: Maximum CSBC lift height is 0.35-feet
  - For areas of unsuitable soil (see 2.7.3.1.1.4 - ***Unsuitable Soil)
    - 1.00-feet Permeable Ballast
- DNR access driveways (alignments: 834, 816, 817, and 833)
  - 0.15-feet HMA class ½ inch, PG 58H-22 (final overlay/final lift), over
  - 0.20-feet HMA class ½ inch, PG 58H-22, over
  - 0.65-feet CSBC
    - Note: Maximum CSBC lift height is 0.35-feet
- Pedestrian Access Route
  - 0.25-feet HMA class ½ inch, PG 58H-22, over
  - 0.35-feet CSBC
- Pedestrian Access Route Shoulder
  - 0.35-feet CSBC***

2.7.3.1.1.1 Local Agency Pavement

The compacted depths of new Local Agency pavement shall meet Local Agency design requirements. If the Local Agency does not have design requirements, the minimum pavement thickness shall be as shown below. The new pavement type shall match existing adjacent pavement that is to remain:

- ***SE 104th Street (Alignment: SE104)
  - 0.15-feet HMA class ½ inch, PG 58H-22 (final overlay/final lift), over
  - 0.30-feet HMA class ½ inch, PG 58H-22, over
  - 0.55-feet CSBC
    - Note: Maximum CSBC lift height is 0.35-feet***

2.7.3.1.1.2 ***Access Roads***

The following section shall be used for drainage facilities and DNR facilities beyond the limits of the driveways identified in the Plans. Separate the quarry spalls from the subgrade soil with geotextile for soil stabilization in accordance with the WSDOT Standard Specifications Section 9-33.2(1), Table 3.

- 0.35-feet CSBC, over
- 0.50-feet quarry spalls

2.7.3.1.1.3 Miscellaneous Pavement

Unless specified elsewhere, the Design-Builder shall design the pavement thickness for pavement outside the traveled lanes and shoulders. The minimum thickness shall be in accordance with the WSDOT *Pavement Policy*. ***Maintenance pullouts and refuge areas shall be constructed with the following minimum pavement thickness:

- 0.35-feet HMA class ½ inch, PG 58H-22, over
- 0.35-feet CSBC***

2.7.3.1.1.4 ***Unsuitable Soil***

In new pavement areas where unsuitable subgrade is identified during the construction, the soft subgrade should be over-excavated and removed 1 foot below the bottom of the pavement section, and the exposed subgrade should be compacted. Place 1 foot of permeable ballast in accordance with the WSDOT Standard Specifications Sections 9-03.9(2). Separate the ballast from the subgrade soil with geotextile for soil stabilization in accordance with the WSDOT Standard Specifications Section 9-33.2(1), Table 3.

If unsuitable subgrade is the result of high groundwater, over-excavate the soft subgrade to a depth of 1 foot below the bottom of the pavement section. Replace this area by placing geotextile for underground drainage, moderate survivability, Class C, as described in WSDOT Standard Specification Section 9-33.2(1), Table 1, on the proof rolled subgrade. Place 1 foot of permeable ballast material, in accordance with Standard Specification Section 9-03.9(2), to provide a drainage layer and stable platform for constructing the remainder of the pavement section. A perforated pipe (minimum 6 inches in diameter) should be embedded (longitudinal along the shoulder) in the permeable ballast section. In addition, solid pipes should be connected transversely to the perforated pipes to discharge collected groundwater to the catch basin or drainage ditch. The width of the cut for the solid pipe area can be 2 feet wide on the shoulder and spaced every 150 feet. The solid pipe should be sloped away from the roadway.

2.7.3.1.2 *Incorporation of Existing Hot Mix Asphalt into Final Pavement Design*

The Design-Builder shall not use existing HMA unless approved by the WSDOT Engineer prior to use. When approved by the WSDOT Engineer, existing HMA pavement may be incorporated into the final pavement section for new widening and profile adjustment, provided the following conditions are met:

- The final total HMA thickness is equal to or greater than the required HMA thickness for that location shown in this Section.

- The existing HMA is free of defects including at a minimum cracking, delamination between layers, disintegration and stripping.
- The top 0.15-feet of HMA pavement in the existing traveled lanes shall be removed by planing and replaced with new HMA.
- The top 0.30-feet of HMA pavement in the existing shoulders shall be removed by planing and replaced with new HMA.

The Design-Builder shall verify the existing HMA thickness by coring the existing HMA to be incorporated into the final pavement at 250-foot intervals. The Design-Builder shall submit the core thickness and condition information to the WSDOT Engineer for Review and Comment as a supplement to the *Pavement Design Report* (Appendix J). The pavement cores shall be available for examination by the WSDOT Engineer.

2.7.3.2 Hot Mix Asphalt Pavement Rehabilitation

The Design-Builder shall identify locations requiring crack sealing and pavement repair and prepare a Pavement Rehabilitation Plan in accordance with this Section.

The Design-Builder shall rehabilitate existing HMA pavement at locations identified in the Pavement Rehabilitation Plan, and at locations specified elsewhere in this Section. The Design-Builder shall perform the work in accordance with the requirements of this Section and Section 5-04 of the Standard Specifications. At a minimum, HMA rehabilitation shall include:

- Crack sealing
- ***HMA pavement repair
- Bridge overlay replacement***
- Planing bituminous pavement and HMA overlay

2.7.3.2.1 *Crack Sealing*

The Design-Builder shall seal cracks more than 0.25-inches wide in accordance with Section 5-03 of the Standard Specifications. In areas where the existing HMA will be planed prior to placing HMA, crack sealing shall occur after the areas to be crack sealed have been planned.

After Notice to Proceed (NTP), the Design-Builder shall identify cracks within the Project limits that are more than 0.25-inches wide. The Design-Builder shall show the locations of these cracks on the Pavement Rehabilitation Plan.

2.7.3.2.2 *Hot Mix Asphalt Pavement Repair*

The Design-Builder shall repair pavement ***at the locations shown in the *Pavement Design Report* (Appendix J).***

Pavement repair shall be accomplished by excavating the existing HMA and underlying base and constructing new HMA and base in accordance with the appropriate pavement thicknesses for that location described in accordance with this Section.

***In areas of medium-severity cracking, plane and remove the damaged pavement of 0.30 foot for a minimum width of 40 inches, extending the length of the damaged HMA. Replace the area with 0.30 foot (0.15-feet final overlay/final lift over 0.15-feet wearing course) of HMA Class ½ inch, PG 58H-22.

In areas of high-severity cracking, saw cut or grind and remove the damaged pavement. If pavement is spalled or depressed more than 0.50 inch, remove the existing HMA and underlying base materials to a depth of 1.55 feet from the proposed finished grade for a minimum width of 40-inches, extending the length of the damaged HMA. Compact the exposed subgrade soil and replace the excavated areas with:

- 0.15 feet HMA class ½ inch, performance grade (PG) 58H-22 (final overlay/final lift), over
- 0.70 feet HMA class ½ inch, PG 58H-22 (two 0.35-feet lifts)
- 0.70-feet Crushed Surface Base Course (CSBC)
    - Note: Maximum CSBC lift height is 0.35-feet***

WSDOT has estimated that there is ***2,500** square yards of pavement repair. For the purposes of the Proposal, the Design-Builder shall assume that ***2,500*** square yards of HMA requires pavement repair.

The estimated locations of these ***2,500*** square yards are shown in the ****Pavement Design Report**** (Appendix J). The locations of pavement repair as shown in this table are preliminary. The Design-Builder shall identify the final locations and quantities of HMA pavement repair.

If more than ***2,500*** square yards of HMA pavement repair are later identified by the Design-Builder, WSDOT will determine, at its discretion, which HMA pavement and base will be replaced full depth and whether more than ***2,500*** square yards of HMA pavement repair will be approved for full depth replacement. Payment for additional Work to perform pavement repair on more than ***2,500*** square yards will be addressed in accordance with Section 1-09 of the *General Provisions*.

2.7.3.2.3 ***Prelevel***

This Section is intentionally omitted.

2.7.3.2.4 ****Hot Mix Asphalt Overlay****

The Design Builder shall overlay the existing lanes and shoulders of the I-90 mainline ramps with 0.15 feet of HMA Class ½ inch, PG 58H-22

When pavement widening is called for in conjunction with the HMA overlay, construction of the wearing course for both he HMA overlay and the wearing course for the widening shall be placed over all traveled lanes and shoulders as the final stage of the paving operations.

2.7.3.2.5 *Bridge Overlay Replacement*

WSDOT Bridge Number ***018/034*** shall have the existing overlay replaced by ***planing*** and HMA paving along with the added ancillary Work described below:

- ***Full depth removal of existing HMA surfacing on the bridge deck
- Chain drag testing of exposed concrete bridge deck to identify areas of spalling and delamination
- Bridge deck repair of exposed concrete bridge deck***
- Placing membrane waterproofing on exposed concrete deck
- Paving bridge deck with ***0.25 foot of HMA, HMA class ½ inch, PG 58H-22***
- New HMA on a bridge deck should be compacted to 92 percent of Rice Density, be all virgin mix, and traffic should not be allowed on the new pavement until cores to determine compaction have been taken

When existing bridge deck overlays are removed, live traffic will be allowed to drive on the exposed surface for a maximum of 3 Calendar Days before a bridge deck overlay is required in the exposed section.

A witness point shall be provided for the identification of all bridge deck and approach slab areas requiring further deck preparation and repair. The documentation of the chain drag testing indicating all patching, spalling, and delamination quantities shall be submitted to WSDOT. A WSDOT spreadsheet is available for this documentation. A Hold Point shall be provided upon completion of the repairs and prior to the placement of the new overlay. The Design-Builder shall include an area of "further deck preparation" equal to 25 percent of the area of the bridge decks. If WSDOT determines that the quantity of "further deck preparation" exceeds this area, additional compensation will be made in accordance with Section 1-04 of the *General Provisions*.

All reinforcing steel damaged due to the Design-Builder's operations shall be repaired by the Design-Builder.

2.7.3.2.6 *Planing Bituminous Pavement and Hot Mix Asphalt Overlay*

Planing bituminous pavement and HMA overlay shall be constructed in the following locations:

- ***SR 18 mainline
- Snoqualmie Parkway
- Ramp tapers
- SE 104th Street***

When pavement widening is called for in conjunction with planing bituminous pavement and HMA overlay, construction of the wearing course for both the planing bituminous pavement and HMA overlay and the wearing course for the widening shall be placed over all traveled lanes and shoulders as the final stage of the paving operation. The longitudinal joints in the final overlay shall be located at the lane line, edge line of the traveled way, or in the shoulder.

The existing bituminous pavement shall be planed to a depth of ***0.15*** feet minimum ***on SR 18 between Milepost (MP) 25.41 and MP 27.80***, such that the entire thickness of the existing top lift is removed. ***The existing bituminous pavement shall be planed to a depth of 0.20 feet minimum on SR 18 and Snoqualmie Parkway between MP 27.80 and SE 99th Street, such that the entire thickness of the existing top lift is removed.**** The planed area shall then receive an HMA overlay with a compacted pavement depth equal to the depth removed by planing. Unless stated otherwise elsewhere in this Section, the planed area shall ***include the traveled way and shoulders.*** The planed area shall be overlaid with HMA Class ***½ inch, PG 58H-22***. In no case shall the compacted pavement depth of the overlay be less than 0.15-feet. A notched wedge joint shall be constructed along all longitudinal joints in the wearing surface of new HMA where the edge is not confined in accordance with Section 5-04 of the Standard Specifications.

2.7.3.3 ***Cement Concrete Pavement Rehabilitation***

This Section is intentionally omitted.

2.7.3.3.1 *****Replace Cement Concrete Panel*****

This Section is intentionally omitted.

2.7.3.3.2 *****Partial Depth Spall Repair*****

This Section is intentionally omitted.

2.7.3.3.3 *****Dowel Bar Retrofit*****

This Section is intentionally omitted.

2.7.3.3.4 ****Cement Concrete Pavement Grinding****

This Section is intentionally omitted.

2.7.3.4 Construction Requirements

Widening of existing HMA pavement shall be constructed by removing the existing shoulder pavement, gore or ramp taper by saw cutting a sufficient distance into the full depth pavement in the traveled lane to provide a clean vertical face. ***The longitudinal joints created between the existing and new HMA shall be outside of the wheel path and either in the middle or at the edge of the travel lane. If the joint falls in the wheel path, the width of lane or shoulder excavation and removal shall be increased accordingly to avoid this condition. The areas listed below shall be constructed as follows:

- SR 18
  - In areas of pavement widening, the existing shoulder pavement can be utilized if the final asphalt pavement thickness is 0.85 feet or greater. If the existing shoulder pavement is utilized, at a minimum, sawcut 1 foot from the outer edge of the pavement and remove the pavement and subgrade soil to a depth of 1.55 feet from the final proposed finished grade. The exposed subgrade shall be compacted. Pavement cores are required to justify the use of existing shoulder pavement.
  - If the existing shoulder is not utilized, sawcut the pavement at the existing edge of traveled way and remove the shoulder pavement and subgrade to a depth of 1.55 feet from the final proposed finished grade. The exposed subgrade shall be compacted.
- I-90 / SR 18 interchange On-/Off-Ramps and I-90 Ramp Tapers
  - In areas of pavement widening, the existing shoulder pavement can be utilized if the final asphalt pavement thickness is 0.75 feet or greater. If the existing shoulder pavement is utilized, at a minimum, sawcut 1 foot from the outer edge of the pavement and remove the pavement and subgrade soil to a depth of 1.25 feet from the final proposed finished grade. The exposed subgrade shall be compacted. Pavement cores are required to justify the use of existing shoulder pavement.
  - If the existing shoulder is not utilized, sawcut the pavement at the existing edge of traveled way and remove the shoulder pavement and subgrade to a depth of 1.25 feet from the final proposed finished grade. The exposed subgrade shall be compacted.
- I-90 Mainline Ramp Tapers

  - For the entire ramp tapers, including the shoulders, plane the top 0.15 foot of pavement and inlay 0.15 foot of HMA Class ½ inch, PG 58H-22. The width of the grinding shall extend from the edge of the PCCP I-90 pavement to the outside edge of pavement. The length of planing shall begin at the start of the taper and extend through the gore area.

- SE 104th Street
  - In areas of pavement widening, the existing shoulder pavement can be utilized if the final asphalt pavement thickness is 0.45 feet or greater. If the existing shoulder pavement is utilized, at a minimum, sawcut 1 foot from the outer edge of the pavement and remove the pavement and subgrade soil to a depth of 1 foot from the final proposed finished grade. The exposed subgrade shall be compacted. Pavement cores are required to justify the use of existing shoulder pavement.
  - If the existing shoulder is not utilized, sawcut the pavement at the existing edge of traveled way and remove the shoulder pavement and subgrade to a depth of 1 foot from the final proposed finished grade. The exposed subgrade shall be compacted. ***

Planed butt joints equal in depth to the final lift of HMA shall be used at transverse joints where new HMA matches into existing HMA. ***Butt joints should taper from 0.15 foot to 0.00 foot over a length of 30 feet***. The Design-Builder shall include details and location of butt joints in the RFC Paving Plans.

All acceptance testing for HMA aggregate, mixture, in-place density, cyclic density, longitudinal joint density, and coring as required will be performed by the party indicated in Section 2.25, *Control of Materials*.

Low cyclic density areas will be evaluated by WSDOT in accordance with Section 5-04.3(10)B of the Standard Specifications. The credit for the price adjustment shall be made under the item "Cyclic Density Price Adjustment".

The Design-Builder shall develop the volumetric HMA mix design in accordance with Section 2.25, *Control of Materials*. ***The number of*** Equivalent Single Axle Loads (ESALs) used in determining the volumetric mix design ***shall be as follows:

- SR 18 mainline and I-90/SR 18 interchange ramp tapers (alignments: MR1, ML1, M2, MR2, ML2, M2, MR3, and ML3)
  - 47 million ESALs

- I-90 / SR 18 interchange ramps (alignments: SE, NE, WS, WN, EN, ES, NW, and SW)
  - 29 million ESALs***

All costs to measure pavement thicknesses as specified will be the responsibility of the Design-Builder.

The exact location and number of thickness measurements within each primary unit, both longitudinally and transversely, will be determined by the WSDOT Engineer. The exact location and number of thickness measurements shall be adjusted when requested by the WSDOT Engineer.

2.7.3.5 ***Cement Concrete Pavement Smoothness***

This Section is intentionally omitted.

2.7.3.5.1 *****Price Adjustment for Cement Concrete Pavement Smoothness*****

This Section is intentionally omitted.

2.7.3.6 Hot Mix Asphalt Smoothness

Section 5-04.3(13) of the Standard Specifications is replaced with General Special Provision (GSP) 5-04.3(13).OPT1.FR5 (Surface Smoothness).

2.7.3.7 Existing Conditions

During the last review of this roadway, which was conducted on ***March 16, 2021 and April 15, 2021***, by WSDOT, International Roughness Index (IRI) (inches/mile) values were obtained ***for SR 18 mainline between MP 25.41 and MP 27.91, and for I-90 Mainline EB and WB between MP 24.8 and MP 27.49***. These IRI values are given in the *Existing IRI Values* (Appendix J). The IRI values are informational only and are averaged IRI values for 0.1-mile sections.

If correction of the roadway as listed above either will not or does not produce satisfactory results as to smoothness or serviceability, the WSDOT Engineer may accept the completed pavement and a credit will be calculated. Under these circumstances, the decision whether to accept the completed pavement or to require corrective Work as described above shall be at the sole discretion of the WSDOT Engineer.

2.7.3.7.1 *Price Adjustment for Hot Mix Asphalt Pavement Smoothness*

Smoothness Compliance Adjustments shall be based on the requirements in Section 5-04.3(13) of the Standard Specifications and the following calculations:

- Final IRI acceptance and incentive/disincentive payments for pavement smoothness will be calculated on an IRI value per 0.10 miles in accordance with the price adjustment schedule.
  - For sections of a lane that are a minimum of 0.01 miles and less than 0.10 miles, the price adjustment will be calculated using the average of the 0.01-mile IRI values and the price adjustment prorated for the length of the section.
  - For bridges, approach slabs, and 0.02 miles on either side, the price adjustment will be calculated independently from other measured lanes.
  - IRI values per 0.01 miles that were measured prior to corrective work will be included in the 0.10-mile price adjustment for sections with corrective work.
- A smoothness compliance adjustment will be calculated in the sum of minus $250.00 for each and every section of single traffic lane 0.01 miles in length in that does not meet the 10-foot straight edge requirements.

The price adjustment schedule for this Contract shall be:

Pay Adjustment Schedule

IRI for each 0.1 mile section	Pay Adjustment Schedule 1	Pay Adjustment Schedule 2	Pay Adjustment Schedule 3
Inches / mile	**$ / 0.1 mile**	**$ / 0.1 mile**	**$ / 0.1 mile**
<30	600	600	600
30	600	600	600
31	580	580	580
32	560	560	560
33	540	540	540
34	520	520	520
35	500	500	500
36	480	480	480
37	460	460	460
38	440	440	440
39	420	420	420
40	400	400	400
41	380	380	380
42	360	360	360
43	340	340	340
44	320	320	320
45	300	300	300
46	280	280	280
47	260	260	260
48	240	240	240
49	220	220	220
50	200	200	200

Pay Adjustment Schedule

IRI for each 0.1 mile section	Pay Adjustment Schedule 1	Pay Adjustment Schedule 2	Pay Adjustment Schedule 3
Inches / mile	$ / 0.1 mile	$ / 0.1 mile	$ / 0.1 mile
51	180	180	180
52	160	160	160
53	140	140	140
54	120	120	120
55	100	100	100
56	80	80	80
57	60	60	60
58	40	40	40
59	20	20	20
60	0	0	0
61	0	0	0
62	0	0	0
63	0	0	0
64	0	0	0
65	0	0	0
66	-20	0	0
67	-40	0	0
68	-60	0	0
69	-80	0	0
70	-100	0	0
71	-120	0	0
72	-140	0	0
73	-160	0	0
74	-180	0	0
75	-200	0	0
76	-220	-20	0
77	-240	-40	0
78	-260	-60	0
79	-280	-80	0
80	-300	-100	0
81	-320	-120	0
82	-340	-140	0
83	-360	-160	0
84	-380	-180	0
85	-400	-200	0
86	-420	-220	0
87	-440	-240	0
88	-460	-260	0
89	-480	-280	0
90	-500	-300	0
91	-520	-320	0

Pay Adjustment Schedule

IRI for each 0.1 mile section	Pay Adjustment Schedule 1	Pay Adjustment Schedule 2	Pay Adjustment Schedule 3
Inches / mile	$ / 0.1 mile	$ / 0.1 mile	$ / 0.1 mile
92	-540	-340	0
93	-560	-360	0
94	-580	-380	0
95	-600	-400	0
96	-620	-420	0
97	-640	-440	0
98	-660	-460	0
99	-680	-480	0
100	-700	-500	0
101	-720	-520	0
102	-740	-540	0
103	-760	-560	0
104	-780	-580	0
105	-800	-600	0
106	-820	-620	0
107	-840	-640	0
108	-860	-660	0
109	-880	-680	0
110	-900	-700	0
111	-920	-720	0
112	-940	-740	0
113	-960	-760	0
114	-980	-780	0
115	-1000	-800	0
116	-1020	-820	0
117	-1040	-840	0
118	-1060	-860	0
119	-1080	-880	0
120	-1100	-900	0
121	-1120	-920	0
122	-1140	-940	0
123	-1160	-960	0
124	-1180	-980	0
≥125	-1200	-1000	0

2.7.3.8 Temporary Traffic Detours

The Design-Builder shall be responsible for the design of all temporary pavements and for the evaluation of existing shoulders and roadways regarding their suitability for carrying traffic during construction, if necessary. In the event that the existing shoulders or roadways are found to be inadequate for the proposed temporary traffic volumes and duration, the Design-Builder shall be responsible

for upgrading the pavement to an acceptable level. Prior to placing traffic on existing shoulders, the Design-Builder shall remove the existing rumble strips. Temporary pavements shall be designed in accordance with the most recent version of the WSDOT *Pavement Policy*. Temporary pavement designs and associated calculations shall be submitted to the WSDOT Engineer for Review and Comment prior to incorporation. The expected duration for traffic on temporary pavement shall be included as part of the Submittal. The IRI of the temporary detour pavement, when tested in accordance with GSP 5-04.3(13). OPT1.FR5 (Surface Smoothness), shall not exceed 125 inches per mile over a 0.10-mile interval and 175 inches per mile over a 0.01-mile interval.

2.7.3.9 Repair of Damaged Pavement

The Design-Builder shall repair any pavement damaged during construction. The damaged pavement shall be replaced with new pavement to pre-construction condition or better. Damaged CCP panels require a full panel replacement. Damaged Local Agency pavement and sidewalks shall be replaced in accordance with the Local Agency's pavement design standards.

2.7.3.10 Pervious Pavement

Pervious pavement will not be allowed in traveled lanes and shoulders. The Design-Builder may propose pervious pavement in other locations. Pervious pavement shall be in accordance with the WSDOT *Pavement Policy.*

2.7.4 *Submittals*

2.7.4.1 Hot Mix Asphalt Mix Design

The Design-Builder shall submit a copy of the completed HMA mix design to the WSDOT Engineer in accordance with Section 2.25, *Control of Materials*.

2.7.4.2 City and County Streets and Sidewalks

If the Work impacts city or county streets, the Design-Builder shall prepare and submit pavement designs for all city and county streets and sidewalks. These shall be submitted to the WSDOT Engineer for Review and Comment.

2.7.4.3 ***Pavement Rehabilitation Plans***

The Design-Builder shall include the type and location of pavement rehabilitation Work in the RFC Paving Plans. The information may be in a tabular form. The Design-Builder shall submit the Pavement Rehabilitation Plan to the WSDOT Engineer for Review and Comment. The Design-Builder shall resolve all comments on the Pavement Rehabilitation Plan prior to the final Paving Plans being RFC.

2.7.4.4 Pavement Design Supplement

The Design-Builder shall prepare and submit a supplement to the *Pavement Design Report* (Appendix J) to include information based on additional pavement cores used for the incorporation of existing HMA into Final Pavement Design or for use of roadway shoulders as temporary traffic detours.

2.7.4.5 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.8 Environmental

2.8.1 *General*

The Design-Builder shall account for all costs to mitigate for all environmental impacts associated with the Project, and to obtain and comply with all environmental permit and approval requirements. National Environmental Policy Act (NEPA)/State Environmental Policy Act (SEPA) documentation has been completed for the Project; the Design-Builder shall be responsible for obtaining all environmental permits needed for the project.

The Design-Builder shall perform all Work necessary to deliver the Project while protecting and enhancing the environment. At a minimum, elements of the Work shall include the following:

- Avoiding impacts to the community and to the environmental, historic, archaeological, and cultural resources. If new impacts are unavoidable, the Design-Builder shall make every effort to minimize the unavoidable impacts. New, unavoidable temporary and permanent impacts shall be mitigated in accordance with all environmental regulations. ***The Design-Builder shall be responsible for all cost and schedule impacts associated with identifying and executing any additionally required environmental reviews, permits, and related mitigation requirements.***
- Fostering working relationships with Federal, State, and Local regulatory agencies, tribes, and stakeholders by ensuring that the commitments WSDOT has made are reflected in the Project's final design and are fulfilled during construction. The Design-Builder shall accomplish this by meeting or exceeding all environmental requirements and commitments listed in the Contract, permits, environmental documents, and regulatory agency concurrence letters or documents.
- Complying with all Federal, State, and Local laws, regulations, and ordinances (collectively referred to in this Section as "regulations") , which includes recognizing and rectifying issues to avoid permit violations or notifications from a regulatory agency or tribe.

2.8.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, Mandatory Standards.

If the requirements of a Mandatory Standard, programmatic agreement, or permit issued for the Project conflict, then the provisions within the Project-specific permit shall take precedence.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. Standard Plans M 21-01 (Appendix D)
4. WSDOT *Environmental Manual* M 31-11 (Appendix D)
5. WSDOT *Hydraulics Manual* M 23-03 (Appendix D)
6. WSDOT *Highway Runoff Manual* M 31-16 (Appendix D)
7. WSDOT *Temporary Erosion and Sediment Control Manual* M 3109 (Appendix D)
8. WSDOT *Design Manual* M 22-01 (Appendix D)
9. WSDOT *Construction Manual* M 41-01 (Appendix D)
10. ***WSDOT *Fish Exclusion Protocols* (Appendix D)
11. *Washington State Aquatic Habitat Guidelines Program,* Stream Habitat Restoration Guidelines (Appendix H)
12. WSDOT *Monitoring Guidance for In-Water Work* (Appendix E)***

2.8.2.1 Interagency Agreements and Memoranda

****This section is intentionally omitted.****

2.8.3 *Personnel Requirements*

2.8.3.1 Environmental Compliance Manager

The Design-Builder shall appoint an Environmental Compliance Manager (ECM) to be responsible for the overall environmental compliance for the Project, and shall function as principal technical advisor and coordinator for environmental issues.

The ECM shall be assigned to the Project and be available on-site full-time to provide assistance and oversight through Project Physical Completion, including the submittal of the Environmental Commitment Close Out Report. If the Design-Builder replaces the ECM, the Design-Builder shall provide an equally or more qualified replacement, contingent upon approval from the WSDOT Engineer. If during the course of the Contract, the WSDOT Engineer finds that the ECM is not ensuring full environmental compliance with all permits, provisions, policies, and commitments; then the WSDOT Engineer may require replacement of the ECM in accordance with Section 1-05 of the General Provisions.

The ECM shall have at least 5 years of experience managing environmental design and construction compliance issues on projects. Within those 5 years, ***2*** years shall be specific to ***stream habitat restoration and linear transportation projects in western Washington and ***3*** years shall be in the Pacific Northwest region (Oregon and Washington). The ECM shall have direct experience with permitting transportation projects of similar scope and complexity, which include stream restoration, and shall

have experience in successfully facilitating communication and negotiations with Federal, State, and Local regulatory agencies, tribes, and stakeholders.*** The ECM shall have knowledge of the environmental regulations and permits relevant to the Project. The ECM is required to be a current Certified Erosion and Sediment Control Lead (CESCL), as recognized by the Washington State Department of Ecology (Ecology) or be a Certified Professional in Erosion and Sediment Control (CPESC) before the start of Notice to Proceed (NTP).

The ECM shall also be responsible for the following:

- Integrating with the design team during plan preparation and advising how to avoid and minimize adverse effects to the natural environment and communities through design and construction means and methods
- Reviewing engineering plans to ensure the Project's design accurately reflects environmental commitments and Contract requirements
- Developing Design-Builder Submittals necessary to obtain or modify environmental permits, acting as a lead point of contact for the WSDOT permitting team, to provide schedule details, quantities, and other information as required
- Coordinating with Design-Builder engineers early to ensure they are aware of environmental commitments, and reviewing Plans to ensure they are consistent with environmental commitments and permit requirements
- Ensuring and providing documentation that the Work complies with all environmental commitments agreed to in the environmental documents, permits, agreements, and approvals of the Project, including maintaining and updating the *Environmental Commitments List* (Appendix C)
- ***Ensuring that wetland, stream, and critical areas mitigation is adequate***
- Attending environmental coordination meetings with Federal, State, and Local regulatory agencies and tribes, as required for permit compliance, modifications, or additional permit approvals
- Leading Environmental Task Force Meetings, including preparing an agenda, facilitating, taking notes, and distributing them
- Developing and conducting environmental protection training throughout the life of the Project
- Acting as a liaison to WSDOT, the design team, and the construction personnel (e.g., submitting reports, discussing changes to the Project, communicating compliance issues, and discussing noncompliant events)
- Attending pre-activity meetings
- Maintaining the authority and means to bring the Project into compliance or stop Work if the Project is out of compliance with an environmental regulation, permit condition, or commitment
- Overseeing preparation and implementation of the *Temporary Erosion and Sediment Control (TESC) Plan* ***in accordance with the WSDOT *Temporary Erosion and Sediment Control Manual* (Appendix D)***; Spill Prevention, Control, and Countermeasures (SPCC) Plan; ***Soil and Groundwater

Management Plan; and*** Water Quality Monitoring and Protection Plan (WQMPP) to ensure Best Management Practices (BMPs) are effective and maintained

- Ensuring Sensitive Areas beyond those authorized by permit, are not impacted as a result of the Work
- Developing or providing direct supervision to individuals assigned to prepare and implement the Plans described in this Section
- Attending field visits by Federal, State, and Local regulatory agencies, tribes, or stakeholders
- Providing internal Quality Assurance (QA) reviews and documentation that the Work complies with all environmental commitments agreed to in the environmental documents, permits, agreements, and approvals for the Project
- Identifying when a noncompliant event is occurring or has occurred and immediately contacting the WSDOT Engineer in accordance with the environmental communications protocol. Prepare Draft Environmental Compliance Assurance Procedure (ECAP) Incident Reports for WSDOT's Review and Comment within 2 Calendar Days of identifying the noncompliance, and Final ECAP Incident Reports in coordination with WSDOT's Environmental Manager within 7 Calendar Days of the incident
- Ensuring the Environmental Compliance Inspector (ECI), or other certified staff, conducts field inspections as needed to ensure that environmental compliance measures and BMPs are meeting environmental requirements and reviewing Daily Environmental Inspection Reports (DEIRs) prepared by the ECI
- Conducting a weekly walk-through before or after the Environmental Task Force Meeting to inspect BMP effectiveness and maintenance. WSDOT shall be invited to attend the walk-through
- Coordinating with the ECI and the Erosion and Sediment Control (ESC) Lead to determine the priority of field Work
- Managing and closing all environmental commitments

2.8.3.2 Environmental Compliance Inspector

The Design-Builder appointed ECI shall assist and report to the ECM. The ECI shall be responsible for field inspections and other environmental duties as designated by the ECM. The ECI shall inspect all environmental related field Work at the direction of the ECM. The ECI shall be physically present on-site full-time through Project Physical Completion. The ECI shall have a valid CESCL or CPESC before the start of NTP and shall have a minimum of 4 years of environmental compliance experience, or have a bachelor's degree in a civil engineering or an environmental related field with environmental compliance and regulatory experience.

The ECI shall be responsible for producing DEIRs. A DEIR shall be produced for each day of field Work and shall include a minimum:

- Three photos of environmental compliance activities (representative of the overall Work being completed that day)
- Documentation of environmental compliance issues identified during this inspection and corrective actions recommended or taken

If Work occurs on a night shift, similar reporting shall be included to describe night Work. All photos shall be date and time stamped. The DEIRs will be reviewed by the ECM and ***then*** posted or emailed to a distribution list as determined by the WSDOT Engineer within 3 Calendar Days of each daily inspection. If field Work has occurred during any single 24-hour period, then a DEIR shall be produced for that period of Work. Photos and content of the DEIRs shall be submitted to the WSDOT Engineer for Review and Comment. The frequency of the daily inspections may be reduced with approval from the WSDOT Engineer for Work activities that are determined to have no risk to the environment.

2.8.3.3 ***Trained Fish Moving Personnel***

The Design-Builder shall provide a Fish Moving Team to move fish from the in-stream work zones in accordance with WSDOT Fish Exclusion Protocols and Standards (Appendix E). This team shall include a Directing Biologist, and Trained Fish Moving Personnel that possess all qualifications listed in WSDOT Fish Exclusion Protocols and Standards. The team shall provide all equipment and materials necessary to implement the WSDOT Fish Exclusion Protocols and Standards. The equipment and materials shall include, but not be limited to electro-fishing equipment, block nets, pea gravel bags, t-posts, buckets, dip nets, crowding nets, and minnow traps. The Design-Builder shall provide at least two TFMPs per 100 linear feet of de-watered channel. Additional TFMPs may be needed to comply with fish moving standards at some stream locations. The Design-Builder's Directing Biologist shall schedule an on-site meeting with the WSDOT Engineer 14 Calendar Days prior to any in-water work to discuss their fish moving plan.

2.8.4 *Environmental Compliance Plans*

The Design-Builder shall prepare and implement an Environmental Compliance Plan (ECP) that identifies roles and responsibilities of the ECM, ECI, and ESC; procedures for environmental compliance; procedures to identify and correct noncompliant events, and procedures for emergency response. WSDOT's goal is to ensure environmental compliance without receiving any noncompliance notifications.

2.8.4.1 Interim Environmental Compliance Plan

To facilitate preliminary field investigation in support of design and early construction (early Work), the WSDOT Engineer will accept an Interim Environmental Compliance Plan (IECP) specific to the proposed early Work. The IECP shall include all applicable information for construction in the locations where early Work will occur, including a description of Work to occur. The information provided in the IECP shall be incorporated and modified as necessary into the Draft and Final ECP when submitted to WSDOT in accordance with this Section.

For early Work, the Design-Builder shall submit an IECP to the WSDOT Engineer for Review and Comment 14 Calendar Days prior to the start of early Work. The Design-Builder shall obtain all necessary permits and modifications to existing permits needed to complete the early Work. The Design-Builder shall ***coordinate with the WSDOT Engineer on permitting requirements and*** provide notification to regulatory agencies as required by permits applicable to locations where early Work will occur. The IECP shall, at a minimum, include the following plans and documents prior to the start of early Work:

- TESC Plan
- SPCC Plan
- WQMPP (if the early Work will occur in-water)
- Fugitive Dust Control strategy or plan
- *Unanticipated Discovery Plan* (Appendix E)
- Additional permits and modifications to existing permits obtained by the Design-Builder, plans, and Reference Documents applicable to early Work and locations

2.8.4.2 Environmental Compliance Plan

The Design-Builder shall provide the WSDOT Engineer with a complete Draft ECP prior to or with the first Preliminary Design submittal. The ECM shall be responsible for preparing and submitting the Draft ECP to WSDOT for Review and Comment. The Design-Builder shall provide the WSDOT Engineer with the Final ECP 10 Calendar Days prior to the commencement of any construction activities not otherwise identified within the IECP for review and comment. The Design-Builder shall resolve all comments before the ECP may be Released for Construction (RFC). The Design-Builder shall stamp and sign the ECP RFC. The ECP shall be consistent with all other requirements of the Section 2.28 Quality Management Plan.

The ECP shall consist of three parts as described in this Section:

- Part I: Environmental Roles, Communications, and Training
- Part II: Environmental Plans and Strategies
- Part III: Environmental Compliance, Monitoring and Reporting

The Final ECP shall be stored in a format easily accessible by WSDOT. The ECP shall be maintained by the ECM at the Design-Builder's construction office or on-site at the Project. The ECP shall be updated throughout the life of the Project to reflect changes resulting from permit modifications, Project design, field conditions, or staffing.

2.8.4.2.1 Part I: Environmental Roles, Communication, and Training

2.8.4.2.1.1 Environmental Communications Protocol

As part of the ECP, the ECM shall develop, document, and implement an environmental communications protocol. The environmental communications protocol shall include, at a minimum:

- Organizational charts that identify the Design-Builder's ECM and other personnel who will be assisting the ECM to ensure compliance during design and construction with all permit conditions, performance standards, and environmental commitments.
- A narrative and flow chart depicting the process and strategies to be used for noncompliance reporting including a list and contact information of WSDOT, Design-Builder, tribal, and regulatory agency personnel that would be contacted in the event of a spill, inadvertent discovery, or noncompliance event.
- Roles and communication procedures that shall be used for internal and external communications, and communications with WSDOT.

The Design-Builder shall ensure the environmental communications protocol is consistent with WSDOT's ECAP (Design ECAP located in Section 225.05(1) of the WSDOT *Design Manual* and Construction ECAP located in Section 1-07.5 of the WSDOT *Construction Manual*). The environmental communications protocol shall also be consistent with the Project Communications Plan required in Section 2.9 *Communications*.

2.8.4.2.1.2 Environmental Meetings

2.8.4.2.1.2.1 *Kick-Off Meeting*

The Design-Builder shall include environmental topics on the agenda for the Project kick-off meeting (refer to Section 2.1, *General Information*). During the kick-off meeting, the Design-Builder shall introduce environmental personnel; discuss the status of environmental submittals, including the environmental training program; and demonstrate how the environmental Contract requirements are being fulfilled.

2.8.4.2.1.2.2 *Environmental Task Force Meetings*

The Design-Builder's ECM shall organize and implement weekly Environmental Task Force meetings during design and construction to ensure that the Project design meets the Project environmental commitments, and to identify which construction elements such as locations, Work activities, detours, weather conditions, and times of day present the greatest risk to the environment and surrounding communities. The requirement to meet weekly may be waived by the WSDOT Engineer upon the request of the Design-Builder based upon Project needs and risk. At the Environmental Task Force meetings, the ECM shall discuss and review noncompliance events and challenges, and lessons learned, to avoid and minimize future risk. WSDOT shall be invited to attend these meetings. The ECM shall use the *Environmental Commitments List* (Appendix C) and the construction schedules to identify environmental Contract requirements pertaining to upcoming Work activities. The ECM shall review environmental commitments at each meeting to ensure they are implemented in daily Work activities.

2.8.4.2.1.3 Environmental Protection Training

The Design-Builder's ECM shall develop and implement an environmental protection training program for the Design-Builder's design and construction staff, QA personnel, Subcontractors, and vendors. The Design-Builder shall be responsible for all Work,

including Subcontracted and supplied Work, and associated personnel should their Work practices lead to a negative effect on the environment or result in a noncompliant event or noncompliance notifications. Therefore, the Design-Builder's training program shall orient employees, Subcontractors, and all other parties brought onto the Project to complete Work in support of the Project to the following elements prior to the start of Work ***including but not limited to***:

- Permit conditions, performance standards, environmental Contract requirements, and environmental regulations related to the Project
- The overall importance of environmental issues
- The specific environmental sensitivities of the Project
- Plans and protocols for the protection and management of birds
- Keeping high pH and turbid water from reaching storm drains and surface water
- Recognizing high visibility silt fencing (HVSF), other BMPs, and their purpose
- Erosion and sediment control policies and procedures, applicable Standard Specifications, WSDOT Temporary Erosion Control and Sediment Control Manual, and certification(s)
- Proper handling and disposal of concrete and waste products
- Environmental compliance monitoring and reporting procedures; this shall include WSDOT's Design and Construction ECAPs
- Requirements of the noise variance(s) or exemption(s)
- Spill prevention, spill containment, location of SPCC Plan, and location of spill response kits
- Management of known or suspected Hazardous Materials
- ***Plan and procedures for management of unanticipated discoveries of contaminated soil and groundwater***
- Plan and procedures for management of unanticipated historic or archaeological discoveries
- Emergency response procedures

The Design-Builder's ECM shall submit the environmental protection training curriculum to the WSDOT Engineer for Review and Comment 14 Calendar Days prior to the first training. In addition, the Design-Builder shall notify the WSDOT Engineer of environmental training sessions and invite WSDOT to participate.

The Design-Builder shall ensure staff are trained to sample stormwater in compliance with the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit and surface water ***in compliance with WSDOT *Monitoring Guidance for In-Water Work* (Appendix E) and*** to comply with the State water quality standards contained in Washington Administrative Code (WAC) 173-201A, Project-specific permit conditions, performance standards, and environmental commitments. This training shall include a field visit with WSDOT environmental staff prior to construction to establish sample locations and to review monitoring and reporting procedures.

2.8.4.2.2 Part 2: Environmental Plans and Strategies

2.8.4.2.2.1 Temporary Erosion and Sediment Control Plan

The Design-Builder shall prepare and implement a TESC Plan that describes ***and illustrates*** measures to prevent and minimize erosion and the discharge of pollutants during construction activities. The Design-Builder shall identify a certified ESC Lead who shall develop, implement, inspect, and update the TESC Plan.

The ESC Lead shall complete a CESCL certification course offered by an Ecology-approved training program before NTP or shall be current as a CPESC. A listing of CESCL certification courses can be found on the Ecology website under Permits & Certifications.

The TESC Plan (narrative and plan sheets) shall ***follow the *WSDOT TESC Plan* template (Appendix E) and*** be prepared and implemented in accordance with the WSDOT *Temporary Erosion and Sediment Control Manual* and Division 8 of the Standard Specifications ***(Appendix D)***. The WSDOT *Temporary Erosion and Sediment Control Manual* ***is provided in Appendix D, and** additional guidance is available online at the WSDOT Erosion control policies & procedures website.

The TESC Plan shall address how off-site stormwater shall be intercepted and piped through or around the Project Site, and address on-site erosion and sediment risks, and provide contingencies for how to minimize and reduce site-specific risks. The Design-Builder's TESC Plan shall accommodate all Project-specific permit conditions, performance standards, and environmental commitments.

The Design-Builder shall submit a TESC Plan that addresses early Work elements as a part of the Preliminary Design submittal. Updated TESC Plans, including narrative and plan sheets, shall be submitted as part of the Final Design submittal described in Section 2.28, *Quality Management Plan*. Construction shall not proceed on any element of Work until the relevant TESC Plans, including narratives, are stamped "Released for Construction" as described in Section 2.28, Quality Management Plan.

The TESC design shall be prepared under the direction of a Professional Engineer and shall carry the Professional Engineer's stamp.

The temporary drainage facility design shall consider traffic safety during construction including, but not limited to, consideration of gutter flow spread along the roadway shoulder. Gutter flow spread for temporary drainage facility design shall meet the WSDOT *Hydraulics Manual* ***(Appendix D)*** requirements that apply to the permanent facility.

See Section 2.14, *Hydraulics* for additional TESC requirements.

2.8.4.2.2.1.1 High Visibility Construction Fencing Requirements

Within the Project limits (including staging areas, borrow sources, and other sites developed or used to support the construction of the Project), all Sensitive Areas, including jurisdictional ditches, and their buffers that are not permitted for impact shall be fenced with high-visibility fencing (HVF) or HVSF prior to commencing construction

activities, including ***but not limited to*** geotechnical borings, equipment staging, materials storage, and parking of workers' vehicles. The Design-Builder shall identify the Sensitive Areas to be protected in the plan sheets. The Design-Builder shall install and maintain HVF/HVSF and ensure protection of the Sensitive Areas in accordance with Sections 8-01.3(1), 9-14. 6(8), and 9-14.6(9) of the Standard Specifications. If the Project will be constructed in stages, the HVF/HVSF and other markings described below shall be completely installed before construction on that stage begins.

No other Work shall be performed by the Design-Builder until the WSDOT Engineer has had an opportunity to verify the installation of HVF/HVSF. Installation of HVF/HVSF is identified as a Hold Point in accordance with Section 2.28, *Quality Management Plan*. Throughout the life of the Project, the Design-Builder shall preserve and protect the Sensitive Area, acting immediately to repair or restore any HVF/HVSF that has been damaged or removed.

Maintenance activities ***by WSDOT staff*** may occur behind HVF/HVSF.

2.8.4.2.2.1.2 *Best Management Practices*

The Design-Builder shall select, install, inspect, maintain, and remove all erosion and sediment control BMPs in accordance with the requirements described in Sections 8-01 and 9-14 of the Standard Specifications ***(Appendix D)***, WSDOT *Temporary Erosion Control and Sediment Control Manual* ***(Appendix D)***, and the *Environmental Commitments List* (Appendix C). The Design-Builder shall only use BMPs that are listed in the WSDOT *Temporary Erosion Control and Sediment Control Manual* or Ecology's *Stormwater Management Manual(s) for Western Washington*. BMPs not listed in the manuals must be approved by Ecology. Additionally, if the Design-Builder plans to use chemical treatment, they shall submit Form ECY 070-258, "Request for Chemical Treatment" to Ecology prior to use.

2.8.4.2.2.2 Spill Prevention, Control, and Countermeasures Plan

The Design-Builder shall prepare a Project-specific SPCC Plan that ***shall***be used for the duration of the Project. The SPCC Plan shall contain all necessary information for managing accidental Hazardous Material spills and it shall be in accordance with the *SPCC Plan Requirements for Design-Build Projects* (Appendix E). It shall include all information required in the current version of the SPCC Plan Template available online at the WSDOT Hazardous materials webpage.

The Design-Builder shall submit the SPCC Plan to the WSDOT Engineer as part of the ECP in accordance with the requirements described in this Section. No on-site construction activities, including placing materials or equipment in staging and storage areas, may commence until WSDOT has had the opportunity to Review and Comment on the SPCC Plan for the Project.

2.8.4.2.2.3 Water Quality Monitoring

2.8.4.2.2.3.1 *Monitoring Plan for In-Water Work*

The Design-Builder shall prepare a WQMPP as a Type 3 Working Drawing ***in accordance with Section 1-05.3(5) of the *General Provisions**** and submit it to the WSDOT Engineer for Review and Comment ***at least 45*** Calendar Days prior ***to submission of the Joint Aquatic Resources Permit Application (JARPA) submittal to Ecology (see Section 2.8.5.2)***. The WSDOT Engineer may grant the Design-Builder permission to coordinate directly with Ecology in preparing their submittal. The WQMPP shall address all of the requirements identified within the Section 401 *Water Quality Certification* (Appendix P) issued to WSDOT. ***The WQMPP shall be in compliance with the WSDOT *Monitoring Guidance for In-Water Work* (Appendix E).***

All costs, delays, or both that result from not having an Ecology-approved WQMPP shall be the Design-Builder's responsibility, in accordance with Section 1-04 of the *General Provisions.* The Design-Builder shall be responsible for updating the WQMPP in accordance with the requirements of the Section 401 *Water Quality Certification* (Appendix P). If monitoring shows the activity is out of compliance, the Design-Builder shall immediately stop the in-water Work that is causing noncompliance with the water quality standard and notify the WSDOT Engineer. The Design-Builder shall provide the sampling results to WSDOT on a weekly basis during in-water construction.

2.8.4.2.2.3.2 *National Pollutant Discharge Elimination System Construction Stormwater General Permit Sampling*

The Design-Builder shall be responsible for all discharge sampling and reporting requirements to comply with the NPDES Construction Stormwater General Permit Special Conditions S4. Monitoring Requirements, Benchmarks, and Reporting Triggers, and S5. Reporting and Recordkeeping Requirements. ***This includes submitting sample data to Ecology in accordance with the Discharge Monitoring Report (DMR) requirements listed in the permit.***

The Design-Builder ESC Lead shall demonstrate that they have obtained and know how to use the appropriate sampling equipment and its calibration.

2.8.4.2.2.4 Bird Protection Plan

The Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (Eagle Act) together prohibit harm to most bird species. To prevent Work-related schedule delays caused by the presence of actively nesting birds, the Design-Builder shall prepare and implement a Project-specific Bird Protection Plan.

At a minimum, the Design-Builder shall:

- Prepare a Project-specific Bird Protection Plan to be used for the Project in accordance with the WSDOT *Bird Protection Protocols and Standards* provided in Appendix E.

- In accordance with the Project-specific Bird Protection Plan, take precautions to prevent birds from nesting on bridges or other Structures that would be demolished, modified, or disturbed by Project construction.
- Provide training that includes an overview of the MBTA and the Eagle Act, how to identify nesting activity, and what to do if a nest is discovered (per the Project-specific Bird Protection Plan).
- Maintain a copy of the Project-specific Bird Protection Plan at the Work Site, including any necessary updates as the Work progresses.

2.8.4.2.2.5 Air Quality and Fugitive Dust Control

The Design-Builder shall comply with all rules of local air pollution authorities. If there are none, air quality rules of Ecology govern the Work. Fugitive dust shall be controlled by the Design-Builder in accordance with the WSDOT *Environmental Manual* and Project-specific commitments.

2.8.4.2.2.6 Unanticipated Discovery Plan

No archaeological, or cultural sites have been identified within the Right of Way (ROW) as described in the Cultural Resources sections of the environmental documents prepared for the Project. WSDOT has prepared an *Unanticipated Discovery Plan* (Appendix E) pursuant to Section 106 of the National Historic Preservation Act and the Statewide Section 106 Programmatic Agreement. The *Unanticipated Discovery Plan* (Appendix E) shall be adopted by the Design-Builder and incorporated as part of the Design-Builder's ECP, prior to the start of construction.

2.8.4.2.3 Part III: Environmental Compliance, Monitoring and Reporting

As part of the ECP, the Design-Builder's ECM shall develop and implement a strategy for ensuring compliance with all environmental commitments and requirements during Project Work. The environmental compliance strategy shall include the strategy for reporting on environmental compliance and noncompliance to WSDOT, Design-Builder, tribal, and regulatory agency personnel. The strategy shall include, at a minimum, the components described below.

2.8.4.2.3.1 Environmental Commitments List

WSDOT made commitments in the NEPA/SEPA environmental documents, ***including National Historic Preservation Act (Section 106), and Endangered Species Act (ESA) documents, permit applications, and*** permits, which contain a number of specific design and construction criteria ***(Appendix E)***.

The *Environmental Commitments List* (Appendix C) reflects the environmental commitments known to WSDOT at the time the Request for Proposal (RFP) is issued. These commitments have been tailored to better define compliance roles and responsibilities for the Project.

***The Design-Builder shall track and maintain the *Environmental Commitments List* (Appendix C) during the Project, and ensure fulfillment through various phases of the Project. The Design-Builder shall add new commitments; modify the *Environmental*

Commitment List (Appendix C), or both, throughout the life of the Project to reflect permit conditions, permit modifications or additional approvals obtained by WSDOT or the Design-Builder. The Design-Builder shall implement and report on the fulfillment of these commitments. The commitments included in the *Environmental Commitments List* (Appendix C) and each new or modified commitment shall be incorporated into the Design submittals and the RFC Documents for this Project.

A list of the permits obtained and additional permits required for the Project is included in Section 2.8.5.2, *Permits and Approvals*. The principal environmental documents for the Project are incorporated into this RFP as Appendices C, E, and P.***

The Design-Builder shall review all permits, the NEPA/SEPA documentation, and all other pertinent documents to ensure all commitments are captured ***and included in the *Environmental Commitments List****

2.8.4.2.3.2 Commitment Tracking

The Design-Builder shall:

- Track and maintain the *Environmental Commitments List* (Appendix C) during the Project, and ensure fulfillment through various phases of the Project
- Add new commitments; modify the *Environmental Commitment List* (Appendix C), or both, throughout the life of the Project to reflect permit modifications or additional approvals obtained by WSDOT or the Design-Builder
- Track noncompliance events
- Implement and report on the fulfillment of these commitments

The commitments included in the *Environmental Commitments List* (Appendix C) and each new or modified commitment shall be incorporated into the Design submittals and the RFC Documents for this Project.

2.8.4.2.3.3 Post-Construction Monitoring

Within 7 Calendar Days of Substantial Completion, the ECM shall conduct final monitoring inspections to assess and document compliance with permitting requirements and other environmental commitments included in the *Environmental Commitments List* (Appendix C). Inspections shall address the successes, failures, and remedial actions for site restoration and Design-Builder initiated compensatory mitigation sites.

2.8.4.2.3.4 Environmental Commitment Close Out Report

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

- Fulfillment descriptions completed for all permit conditions, performance standards, and environmental commitments
- The fulfillment description, which shall be detailed and specific enough to clearly describe and document how each individual commitment was met (e.g., by specific

action, plan submittal, activity completion, design, construction, and operational milestone completion). The description shall include a date to indicate when each commitment was fulfilled.

- Long-term commitments that WSDOT will be required to manage and following close out, for example future requirements for maintaining permanent BMPs (such as cleaning detention ponds)
- Other commitments the Design-Builder was unable to fulfill and why
- Significant compliance deficiencies, including all ECAP reports and notices of violation and penalties, that may have occurred during the duration of the Project and the corrective actions taken

The Environmental Commitment Close Out Report shall be submitted for review and comment by the WSDOT Engineer within 21 Calendar Days of Substantial Completion. Preparation of the Environmental Commitment Close Out Report shall be consistent with all other requirements of the Design-Builder's QMP. The Design-Builder may submit the Environmental Commitment Close Out Report in stages as discrete elements of Work are completed (e.g., at completion of wetland and stream ***restoration/***mitigation sites).

2.8.5 *Environmental Documentation*

2.8.5.1 National Environmental Policy Act and State Environmental Policy Act Documentation

NEPA/SEPA (Appendix E) documentation has been prepared by WSDOT to address the scope, impacts, and mitigation for the Project. The Design-Builder shall not design or construct the Project in such a way that causes impacts to the environment or surrounding communities beyond those identified in the environmental documentation and authorized by permit. If the Design-Builder designs or constructs the Project in such a way that causes different impacts to the environment or surrounding communities, additional NEPA/SEPA documentation may be required. If required, the Design-Builder shall be responsible for providing any additional information necessary to support WSDOT's NEPA/SEPA analysis. In addition, the Design-Builder shall pay all costs and accept all responsibility for any schedule delays associated with additional environmental analysis so that WSDOT can update or secure the additional environmental approvals.

The environmental review process shall follow the WSDOT *Environmental Manual* and 23 CFR 636.109 and 23 CFR 771. WSDOT will coordinate with all applicable Federal, State, and Local regulatory agencies, tribes, and stakeholders as part of any environmental documentation process. Final determination regarding the necessity of additional environmental documentation shall be made by WSDOT and the Federal Highway Administration (FHWA).

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

2.8.5.2 Permits and Approvals

The following Section describes the permits and approvals WSDOT has obtained or will obtain and permits the Design-Builder is responsible for obtaining.

The process to obtain permits, approvals and exemptions can be lengthy, and the Design-Builder shall submit the applications as soon as practicable. WSDOT will be available as a resource if the Design-Builder requests assistance during the permitting and approval process. The Design-Builder is being put on notice that one or more permits will take a year or more to obtain from the date of permit application acceptance from the regulatory agencies (deemed to be a complete application by the regulatory agencies).

2.8.5.2.1 Permit Acquisition

2.8.5.2.1.1 ***I-90/SR 18 I/C to Deep Creek

WSDOT has prepared and submitted the Project *JARPA* (Appendix E) to the regulatory agencies, and will be the owner and authorized agent for the following permits and approvals:

- Department of the Army Corps Section 404 Permit
- Washington Department of Ecology Section 401 Water Quality Certification
- Washington Department of Fish and Wildlife Draft Hydraulic Project Approval

The Design-Builder shall be responsible for preparation of all permit applications including updating the JARPA and supporting documentation; however, WSDOT will submit the permit applications and be the main point of contact for the Section 404 Permit, Section 401 Permit, and Hydraulic Project Approval. The applicable terms and conditions of the permits and approvals that are known at the time of the RFP publication are included in the *Environmental Commitments List* (Appendix C).

The Design-Builder shall acquire the following permits and approvals (if necessary) and comply with all associated environmental requirements. The Design-Builder shall submit draft permit applications and supporting documentation for WSDOT's Review and Comment prior to submittal to Federal, State, and Local regulatory agencies. The Design-Builder shall be responsible for updating the *Environmental Commitments List* (Appendix C) with environmental commitments included in all Design-Builder obtained permits and approvals.

- NPDES Construction Stormwater General Permit
- King County permits, including but not limited to:
    - Shoreline Conditional Use Permit and Shoreline Substantial Development Permit
    - Critical Areas Alteration Exception and/or Shoreline Variance
    - Flood Hazard Certification for each stream impacted by the Project
    - Clearing/Grading Permit
    - King County Noise Variance

- City of Snoqualmie Noise Variance, if needed (if night work is proposed within the city boundary)
- Any permits associated with the off-site tree replacement areas (Section 2.15, Roadside Restoration) and the I-90 Highpoint to SR 18 Fiber Extension.
- Washington Department of Natural Resources, U.S. Coast Guard, U.S. Forest Service, and/or U.S. Department of Agriculture permits may be required if Conceptual Plans (Appendix M) are modified***
- Any other permits or approval, as required

2.8.5.2.1.2 I-90 Highpoint to SR 18 Fiber Extension

WSDOT has obtained the following permits for the I-90 Highpoint to SR 18 Fiber Extension:

- *King County Street Use Permit* (Appendix P)
- *King County Noise Variance* (Appendix P)

The Design-Builder shall renew any permits that may expire during the Work and acquire any additional permits that will be needed for the I-90 Highpoint to SR 18 Fiber Extension.***

2.8.5.2.2 Permit Compliance, Modifications, and Additional Approvals

The Design-Builder shall follow the requirements of all permits, approvals, and commitments referenced in this Section, Appendices C, E, and P, and any other permits that are obtained for the Project. The Design-Builder shall provide the WSDOT Engineer with notice of its intent to propose an alternative construction method or a design change that is inconsistent with a particular permit, environmental requirement, or commitment, in accordance with the process outlined in the Design-Builder's Quality Management Plan.

All costs, delays, or both that result from the discovery of a previously unknown sensitive resource (i.e., streams, wetlands, jurisdictional ditches, 4(f) resources, and archaeological resources) due to any Alternative Technical Concept (ATC), alternative construction method, or design change shall be the Design-Builder's responsibility, in accordance with Section 1-04 of the *General Provisions*. To secure permit modifications or additional permits or approvals:

- The Design-Builder's ECM shall, upon request, attend environmental coordination meetings between WSDOT, Federal, State, and Local regulatory agencies, tribes, and other entities that may have an approval role.
- WSDOT will work with the Design-Builder to identify any changes to the methods and means previously described as part of the original environmental documents and permit applications. WSDOT will bring final detailed proposals provided by the Design-Builder to the Federal, State, and Local regulatory agencies for permit modifications, to obtain modified permits, and to re-initiate ***or update*** ESA consultation or Section 106 consultation as required.

- The Design-Builder shall be responsible for preparing any additional environmental documentation needed to secure the additional environmental approvals required for implementation of the Design-Builder's Proposal.

The Design-Builder is advised that there are Sensitive Areas throughout the Project limits that shall not be disturbed by construction activity unless specifically authorized by permits or environmental approvals.

2.8.5.3 Impact Area Line

The Impact Area Line was established to limit access to the area needed to construct each element of the Project. ***The Impact Area Line limits the area within the NEPA Area of Potential Effect where impacts are anticipated.*** The portions of the Impact Area Line that cut through Sensitive Areas are elements of the Basic Configuration. ***The Impact Area Line is shown in the *Conceptual Plans* (Appendix M).

The Design-Builder shall adhere to the total disturbed (cleared of vegetation) acreage amount in the *Conceptual Plans* (Appendix M). The disturbed acreage is defined as the area between the existing edge of pavement and the Impact Area Line. The total disturbed area acreage shall not exceed this limit. Work shall not occur outside of the Impact Area Line except for landscaping associated with the off-site tree mitigation areas and ROW fence installation per Section 2.15.***

2.8.5.4 Sensitive Areas

WSDOT prepared a ****Wetland and Stream Assessment Report* (Appendix E)*** to support environmental permitting for the Project. This report includes wetland delineations, characterizations, ratings, and functional assessments, as well as an assessment of all ***identified*** streams within the Project vicinity.

The Design-Builder shall conduct an independent verification prior to the installation of HVF and HVSF to confirm that all Sensitive Areas have been identified, as follows:

- The Design-Builder shall submit a Sensitive Area verification confirmation letter to WSDOT stating its concurrence with the previously-identified Sensitive Areas.
- If the Design-Builder disagrees with WSDOT's findings, the letter shall identify the location of all new Sensitive Areas and all existing Sensitive Areas in question.
- The Design-Builder shall install HVF/HVSF as shown in the RFC Documents around all Sensitive Areas that are not permitted for temporary or permanent impacts.

The Design-Builder shall not ***excavate or*** discharge dredge material or fill material into waters of the State, unless authorized by permit.

All impacts, including impacts associated with Intelligent Transportation System (ITS) conduit, cabinets, sign bridges, etc., shall be accounted for in the total area impacts, and evaluated against the permits for impact.

2.8.5.4.1 Wetlands

WSDOT has determined that construction of the Project will result in impacts to wetlands and their buffers. Temporary impacts to wetlands and their buffers shall be restored by the Design-Builder in accordance with the Project permits, ***and all other impacts shall be mitigated in accordance with the permits and environmental documents.***

2.8.5.4.2 Streams

WSDOT has determined that construction of the Project will cause unavoidable impacts to streams and their buffers. All Work in and around streams shall be conducted within the parameters of the permits and environmental documents.

2.8.5.4.3 Jurisdictional Ditches

WSDOT has determined that construction of the Project will result in permanent and temporary impacts to jurisdictional ditches. Jurisdictional ditch impacts shall be restored or mitigated by the Design-Builder in accordance with the permits. The Design-Builder shall install HVF or HVSF around jurisdictional ditches identified through the permitting process that have not been permitted for permanent impact.

WSDOT has completed a preliminary assessment of the Project ditches to evaluate whether they are jurisdictional tributaries under the Navigable Waters Protection Rule, and has determined that there is a potential for one or more jurisdictional ditch to meet the definition of jurisdictional tributary (see *JARPA*, Appendix E). The Design-Builder shall verify whether any jurisdictional ditches meet the jurisdictional tributary definition. If a jurisdictional ditch does meet the definition of jurisdictional tributary, the jurisdictional ditch may be regulated as a stream and additional mitigation for impacts may be required.

2.8.5.4.4 Mitigation

The Design-Builder shall reference the exhibits in the ***draft *Wetland and Stream Mitigation Plan* and *JARPA* (Appendix E)*** to prepare design submittals for the ***restoration/***mitigation sites in accordance with Sections 2.15, *Roadside Restoration*, and 2.28, *Quality Management Plan*, WSDOT *Plans Preparation Manual*, and WSDOT *Highway Runoff Manual*. The Design-Builder shall ensure all permit conditions and environmental commitments are met***, and will revise the *Draft Wetland and Stream Mitigation Plan* and associated permit documents if impacts change from those outlined in the *JARPA*.*** Refer to the *Environmental Commitments List* (Appendix C), permits or approvals included in Appendices E and P, and any permits or approvals obtained by the Design-Builder for the Project. The Design-Builder shall ensure that the mitigation goals, objectives, and performance criteria as outlined in the ****Wetland and Stream Mitigation Plan* (Appendix E)*** are achieved ***in accordance with all environmental permits.***

2.8.5.4.5 Additional Impacts

If the Design-Builder proposes changes that have the potential to result in impacts that are not permitted, the Design-Builder shall conduct field investigations to assess impacts to Sensitive Areas and to determine if additional and previously unidentified Sensitive Areas are present.

If known or previously unidentified Sensitive Areas are present and would be impacted by the proposed change, or if previously unidentified Sensitive Areas are present that would be impacted by the Conceptual Plans, the Design-Builder shall provide the WSDOT Engineer with all information***, technical documents, and permit applications*** necessary to obtain a permit modification. This information shall include an assessment of all Sensitive Area impacts based on the footprint of the Final Project Design. The Design-Builder shall not impact these Sensitive Areas without written authorization from the WSDOT Engineer. Authorization will not be provided until WSDOT has received modified permits from Federal, State, and Local regulatory agencies. The Design-Builder shall strive to include all additional impacts to Sensitive Areas in a single submittal.

If the Design-Builder plans to Work outside the Impact Area Line or outside permitted impacts due to an ATC or design change, the Design-Builder shall conduct a field investigation to determine if Sensitive Areas are present. If a Sensitive Area exists, the Design-Builder shall work with the WSDOT Engineer to determine if it has been delineated and permitted for impacts. If not, all costs and schedule delays associated with having to obtain permit modifications, new permits, documentation changes, or additional mitigation shall be the responsibility of the Design-Builder.

2.8.5.5 In-Water Work

The Design-Builder shall ensure that all in-water Work is conducted between July 1 to September 15, as prescribed in the *Environmental Commitments List* (Appendix C). See *JARPA* (Appendix E) for which streams the in-Water work window applies.***

2.8.5.6 Protected Species

2.8.5.6.1 Threatened and Endangered Species

The Design-Builder shall not impact more than 13.7 acres of marbled murrelet suitable habitat. The Design-Builder shall coordinate with WSDOT to reinitiate consultation with the U.S. Fish and Wildlife Service (USFWS) if impacts exceed 13.7 acres. See *Marbled Murrelet Habitat Impact Areas* (Appendix E).

In addition, if the Design-Builder modifies design or construction activities ***and/or timelines*** from those described in the ***Biological Assessment* and *Biological Opinion* in the NEPA documentation (Appendix E)***, ESA consultation may have to be re-initiated ***and/or updated***. If this occurs, the Design-Builder shall work through WSDOT to provide the necessary information and documentation required for updates to or re-initiation of ESA consultation. WSDOT will take the lead in coordinating with the National Oceanic and Atmospheric Administration Fisheries and United States Fish and Wildlife Service. If ESA consultation needs to be re-initiated or updated due to changes

made by the Design-Builder, all cost and schedule impacts shall be the Design-Builder's responsibility.

The ****Biological Assessment* and *Biological Opinion* in the NEPA documentation (Appendix E)*** contains a number of performance standards. Performance standards have been included in the *Environmental Commitments List* (Appendix C). The Design-Builder shall fulfill and report on the implementation of all performance standards and environmental commitments in the Environmental Commitments Close Out Report described in this Section.

Limited operating periods (LOPs): South of MP 25.65, LOPs may be required for any work in this vicinity. LOPs may require that no work will occur from 1 hour before sunrise to 2 hours after sunrise and no work from 2 hours before sunset to 1 hour after sunset during the nesting season. The marbled murrelet nesting season in Washington is defined as the period from April 1 to September 23. No LOPs are required for the areas covered by the Year 1 and Year 2 Marbled Murrelet surveys north of MP 25.65 unless murrelet activity is observed in or adjacent to areas where activities are ongoing or proposed (within 110 and 121 yards for activities requiring the Use of heavy equipment or pile driving, respectively). See *ESA_USFWS_BO* (Appendix E).

2.8.5.6.2 Bird Protection Acts

The Design-Builder shall be responsible for compliance with the MBTA and the Eagle Act. WSDOT conducted preliminary Site visits ***and did not observe migratory bird nest but concluded that a second MBTA and BE search shall be required prior to the start of any construction activity*** (see *MBTA Memo* in Appendix E). ***In addition***, birds are also known to nest on inactive equipment or graveled areas. Therefore, Design-Builders shall prepare a Project-specific Bird Protection Plan as part of the ECP, in accordance with Section 2.8.4.2.2 *Part II: Environmental Plans and Strategies*.

2.8.5.7 Noise

2.8.5.7.1 Construction Noise

The Design-Builder shall implement mitigation measures for temporary noise impacts associated with construction activities in accordance with the local noise regulations. The Design-Builder shall obtain a nighttime noise variance or exemption from the required Local agencies, and shall comply with all noise variance/exemption conditions.

The Design-Builder shall be aware that the process to obtain noise variances and/or exemptions can be lengthy, and shall submit the nighttime noise variance and/or exemption applications as soon as practicable. WSDOT will be available as a resource if the Design-Builder requests assistance during the variance approval process. Copies of all noise variances and applications shall be provided to the WSDOT Engineer.

2.8.5.7.2 Noise Walls

Although no reasonable and feasible noise abatement measures are recommended for this Project, if the Design-Builder adjusts the proposed roadway by more than 10 feet horizontally, or the proposed roadway by more than 2 feet vertically, the Design-Builder shall prepare, and submit for Review and Comment, a Supplemental Noise Analysis Report. The Supplemental Noise Analysis Report shall confirm that the future noise

levels are equal or better than the noise levels at all the receivers in the most current noise model depicted in the ***_Noise Report_* in Appendix E***. The Design-Builder's *Supplemental Noise Analysis Report* shall comply with the *Traffic Noise Policy and Procedures* (Appendix E), and be consistent with FHWA guidelines and the methodology used by WSDOT in preparation of the ***_Noise Report_* in Appendix E***. If the Design-Builder makes a change from the Basic Configuration that may potentially impact noise modeling results, the Design-Builder shall analyze the proposed change for impacts to noise in the Supplemental Noise Analysis Report.

Noise walls shall not be modeled with absorptive properties to reduce the proposed noise wall dimensions depicted in the Basic Configuration. Any additional noise analysis required by this Section shall not model the noise walls with absorptive properties. However, absorptive materials may be considered in application to provide additional noise benefits.

The Design-Builder shall submit the Supplemental Noise Analysis Report to the WSDOT Engineer for Review and Comment. The Design-Builder shall submit the Traffic Noise Model (TNM) files with the Supplemental Noise Analysis Report. The TNM files shall contain line of sight analysis.

The Design-Builder shall provide methods for achieving the decibel reduction targets, as outlined in the Supplemental Noise Analysis Report. These methods may include noise walls. The Design-Builder shall work with the WSDOT Engineer to communicate these methods to the public. This communication shall be done in accordance with Section 2.9, *Communications*. Prior to finalizing noise wall design, the Design-Builder shall prepare schematics of the noise walls for review with adjacent property owners. If requested by WSDOT, the Design-Builder shall attend meetings with adjacent property owners to discuss ***the noise walls. Noise walls shall be completed, including panel erection and application of pigmented sealer, within 9 months of the start of any clearing and grubbing that is within 50 feet of the noise wall alignment, where the clearing and grubbing includes removal of trees that are greater than 4 inches diameter at breast height.

2.8.5.8 Hazardous Materials

Contamination has not been confirmed within the ROW. ***However, previous spills have been identified within the Project corridor, and there is potential to encounter contamination. Additional details on the hazardous materials in the Project corridor are included in the *Hazardous Materials Report* in Appendix E.*** Known or suspected contamination shall be addressed in the RFC documents.

The Design-Builder shall reevaluate the findings of the *Hazardous Materials Report* if changes are made to the Project, such as proposing an ATC that results in impacts to areas not previously analyzed, Project realignment or changes to property acquisitions, which could alter the conclusions.

2.8.5.8.1 Discovery of Unknown Hazardous and Regulated Materials

***The Design-Builder shall prepare a Soil and Groundwater Management Plan. The Design-Builder shall submit the Plan to the WSDOT Engineer as part of the ECP in accordance with the requirements described in this Section.

The Soil and Groundwater Management Plan shall provide specific guidance for screening and managing contaminated media that might be encountered on the Project, including soil, groundwater, or stormwater run-off. Contaminated media shall be handled and disposed of in accordance with all applicable federal, state, and local statutes and regulations, including but not limited to Models Toxics Control Act (MTCA) Chapter 173-340 Washington Administrative Code (WAC), Solid Waste Handling Rule Chapter 173-350 WAC, Dangerous Waste Regulations Chapter 173-303 WAC, and Surface Water Quality Standards, WAC Chapter 173-201A.

The Design-Builder shall comply with all federal, state, and local regulations pertaining to Work practices and protection of workers and visitors to the site relative to the presence of known contaminants. Design-Builder personnel and all subcontractors performing excavation, dewatering, and other tasks that require working with contaminated or hazardous soil and water shall be trained in accordance with all applicable regulatory requirements, including but not limited to WAC 296-824 and WAC 296-843, and be thoroughly briefed on anticipated hazards.***

If unknown contamination is discovered during construction, the Design-Builder shall notify the WSDOT Engineer immediately and shall follow the Soil and Groundwater Management Plan, if applicable, as well as all appropriate regulations. This effort may be considered a Differing Site Condition in accordance with Section 1-04 of the *General Provisions*.

The Design-Builder shall prepare a Worker Health and Safety Plan to minimize the effects of known and unknown Hazardous and Regulated Materials in accordance with Section 1-07 of the *General Provisions.*

2.8.5.8.2 Asbestos and Lead Based Paint

WSDOT has prepared a Good Faith Survey Report that summarizes their pre-renovation asbestos and hazardous materials survey results (Appendix E). The intent of the survey was to determine whether materials at the I-90/SR 18 interchange and structures associated with the SR 18 road widening contain asbestos. The Good Faith Survey Report did not include the I-90 Highpoint to SR 18 Fiber Extension. The Design-Builder shall review the Good Faith Survey Report to verify that all structures have been surveyed and survey any additional structures that will be demolished or modified. All existing conditions, quantities, and locations shall be field verified by the Design-Builder prior to any renovation, modification, and/or demolition activities.***

The Design-Builder shall be responsible for filing a Notice of Intent with the ***Washington State Department of Labor and Industries and the Puget Sound Clean Air Agency*** prior to asbestos abatement or demolition of any structures. The Design-Builder shall ensure notification is received by the Washington State Department of Labor and Industries ***and the Puget Sound Clean Air Agency*** no later than 14 Calendar Days prior to the asbestos removal start date. The Design-Builder shall inspect, remove, and dispose of all Hazardous Materials including, but not limited to, ACM/LBP identified in the survey. This effort will not be considered a Differing Site Condition in accordance with Section 1-04 of the *General Provisions*.

Prior to commencing asbestos-related work, the Design-Builder shall provide the WSDOT Engineer with copies of approvals and notifications from the local air pollution authorities ***such as the Puget Sound Clean Air Agency***. If there is none, Ecology

will govern the Work. The Design-Builder shall designate a Washington State Certified Asbestos Supervisor to personally supervise the asbestos removal and to ensure that the handling and removal of asbestos is accomplished by certified workers, pursuant to Washington State Department of Labor and Industries Standards.

Refer to Section 2.24, *Right of Way* for building or structure demolition. Retrofitting and widening of a bridge shall require a lead and asbestos good faith survey by an AHERA certified personnel and conducted in accordance with the Clean Air Agency in that County.

2.8.5.8.3 Underground Storage Tanks

If the Design-Builder encounters an unknown Underground Storage Tank (UST) within the ROW, the Design-Builder shall stop Work in the immediate area and notify the WSDOT Engineer prior to decommissioning and removal of the UST. This effort may be considered a Differing Site Condition in accordance with Section 1-04 of the *General Provisions*. If a UST is encountered, WSDOT and the Design-Builder shall follow all applicable rules and regulations associated with UST removal activities.

The Design-Builder shall dispose of construction waste material such as concrete or other harmful materials at approved sites in accordance with Sections 2-01, 2-02, and 2-03 of the Standard Specifications ***(Appendix D)***, and in accordance with all applicable State, Federal, and Local laws and regulations. The Design-Builder shall ensure that the site is properly contained during construction so that contaminants do not migrate off-site and so that the health and safety of all on-site personnel are protected during Work at the site.

2.8.5.9 Historic, Archaeological, and Cultural Preservation

Any historic, archaeological, or cultural objects encountered by the Design-Builder shall not be further disturbed in accordance with Section 1-07 of the *General Provisions* and *Unanticipated Discovery Plan* (Appendix E).

If the Design-Builder elects to propose a change that would impact areas not previously analyzed; including ***but not limited to*** geotechnical borings, ITS conduit, junction box foundations, camera poles, drainage elements, and additional subsurface investigation; consultation with the Department of Archaeology and Historic Preservation, consulting parties, FHWA, and affected and interested tribes may be necessary. WSDOT reserves the right to take up to 14 Calendar Days to notify the Design-Builder if additional concurrence for the proposed design change is required with other entities, and to complete field investigations. If this consultation is necessary, the Design-Builder shall plan on at least 180 Calendar Days of delay for re-consultation. It is unlikely this additional Work and coordination will be necessary for Work within roadway fill. It is more likely to be required when working near streams and within undisturbed native layers of soil. If additional investigations and coordination are needed as a result of changes made by the Design-Builder, all cost and schedule impacts shall be the Design-Builder's responsibility.

2.8.5.10 Environmental Justice

The Design-Builder shall conduct work as described, and adhere to the commitments made, in the Environmental Justice (EJ) analysis completed by WSDOT in the

environmental documentation. If the planned Work changes (including additional ROW, added or changed detours/alternative routes, schedule), the Design-Builder shall notify the WSDOT Engineer of the change(s), and allow time for additional public outreach and to determine if any disproportionate impacts are incurred, because a new EJ analysis may need to be completed by WSDOT to reflect the changes. The Design-Builder shall work with the WSDOT Engineer to ensure outreach materials are in all relevant Limited English Proficiency languages and distributed appropriately to the identified populations within the Project area. ***The Design-Builder shall be responsible for implementing any other mitigation or control measures to provide for EJ populations or reduce/mitigate EJ impacts.***

2.8.5.11 Disposal of Surplus Material

All surplus excavation or other materials shall be properly characterized and disposed of outside the Project limits or re-used in a manner that does not impact sensitive resources such as wellhead protection zones, surface water bodies, parks, and child-use areas.

Additionally, surplus material or other material shall not be disposed of or reused in Sensitive Areas shown in the Conceptual Plans, or in any areas determined by the WSDOT Engineer to be Sensitive Areas. All trucking tickets or other means of tracking where the material was disposed of shall be provided to the WSDOT Engineer.

2.8.5.12 ***Temporary Stream Diversion***

This Work shall include designing, installing, operating, maintaining, removing, and disposing of the temporary stream diversion, in compliance with Legal Requirements, permits, and the *Environmental Commitments List* (Appendix C). The Design-Builder shall submit their Temporary Stream Diversion Plan for WSDOT to review at least 14 Calendar Days prior to fish exclusion and have WSDOT approval prior to fish exclusion activities and temporary stream diversion/fish exclusion materials removal.

*2.8.5.12.1 ***Fish and Aquatic Species Exclusion and Notifications****

Fish exclusion shall be performed under the direction of the WSDOT Directing Biologist by TFMPs to all protocols and standards in the permit requirements and WSDOT *Fish Exclusion Protocols and Standards* (Appendix E). The Design-Builder shall notify the WSDOT Engineer 14 Calendar Days prior to fish exclusion activity.

The Design-Builder is responsible for notifications prior to fish exclusion activity required by the Hydraulic Project Approval.

*2.8.5.12.2 ***Inspection and Maintenance****

Dewatering the isolated in-water Work area shall occur at a rate slow enough to allow the WSDOT Directing Biologist and TFMPs to safely capture and relocate all fish species and other aquatic organisms to avoid stranding, as determined by the WSDOT Engineer.

2.8.6 *Submittals*

The Design-Builder shall submit the following documents to the WSDOT Engineer as required by this Contract and the permits obtained for the Project. At a minimum, the submittals shall include the following:

- IECP (if necessary)
  - TESC Plan
  - SPCC Plan
  - WQMPP or water quality monitoring plan (if the early Work will occur in-water)
  - Fugitive Dust Control strategy or plan
  - *Unanticipated Discovery Plan* (Appendix E)
  - Additional permits and modifications to existing permits obtained by the Design-Builder, plans, and Reference Documents applicable to early Work and locations
- ECP, including the following associated required plans and strategies:
  - TESC Plan
  - SPCC Plan
  - WQMPP as will be required by the Section 401 *Water Quality Certification*
  - Soil and Groundwater Management Plan
  - *** Temporary Stream Diversion Plan***
  - Bird Protection Plan
  - Fugitive Dust Control strategy or plan
  - *Unanticipated Discovery Plan* (Appendix E)
- ACM/LBP Surveys Copies of approvals and notifications pertaining to asbestos removal and demolition-related Work
- Supplemental Noise Analysis Report (if necessary)
- ***NEPA/SEPA updates, including associated documents (if necessary)***
- Applications for Design-Builder obtained environmental permits/approvals, and the resulting permits and approvals
- Noise variance(s) or exemption(s) (if necessary)
- Environmental Commitments Close Out Report
- Various Construction Monitoring Reports as required in the permits
- ***Sensitive Area verification confirmation letter***
- Final wetland, stream, and buffer Mitigation Plans
- Final wetland, stream, and buffer Mitigation As Built Plans ***and Report***
- Dump tickets for any and all soils and materials removed as excess or waste from the site
- Copies of permits for all off-site disposal facilities to be used
- Construction ***activities*** log ***to document nighttime work***
- Certifications of CESCL or CPESC personnel
- Site Log Book as required for the NPDES Construction Stormwater General Permit

- Copies of DMRs submitted to Ecology
- ECAP Incident Reports through the duration of the Project ***(if applicable)***
- Violation/Corrective Action Reports to agencies (if necessary)
- Notice of Violation or Notice of Penalty from regulatory agencies (if received)
- UST Decommissioning and Closure Plans, if encountered

2.8.6.1 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section

2.9 Communications

2.9.1 *General*

WSDOT and the Design-Builder shall develop and maintain a consistent level of public communication while encouraging broad public awareness and understanding of the Project.

Providing clear, consistent, and timely messaging is an essential element to successful Project delivery. The communications role consists of many tasks including preparing for and attending public meetings and open houses; coordinating with the WSDOT Engineer on messaging related to the Project, including responding to public inquiries and complaints,; coordination with the media, preparing regular traffic updates, press releases, webpage and social media updates, and photo and video documentation; and coordination with Local Agencies, transit providers, emergency services, and local neighborhood, community, multimodal, and business groups. To support this effort, WSDOT will share clear, concise, and timely information with the public, elected officials, community leaders, businesses, tribes, the news media, and social media audiences.

WSDOT Communications will lead the communications efforts on this Project. All communications materials, including photographs and video, produced by the Design-Builder shall be submitted to the WSDOT Engineer prior to release for Review and Comment to ensure it meets WSDOT standards for form, Associated Press style, graphic design, content, messaging and plain talk.

The Design-Builder shall work with WSDOT to achieve all communication and community relations goals.

2.9.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced Section 2.2, *Mandatory Standards.*

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Communications Manual* M 3030 (Appendix D)
4. WSDOT *Project Identification Sign Detail* (Appendix W)

5. Associated Press Stylebook, published ***2020***

2.9.3 *Joint Responsibilities*

Development and dissemination of public information for the Project requires the integration of resources and labor between WSDOT and the Design-Builder. Joint communications will educate and inform the public, establish expectations, and play a significant role in delivering a successful Project.

The Design-Builder shall coordinate construction closures and communications with other projects being constructed along and near the *** I-90/SR 18 I/C to Deep Creek Interchange Improvements & Widening Project. ***. The Design-Builder shall also maintain ongoing communication with *** local agencies, businesses, residents, and other stakeholders*** affected by the Project regarding upcoming construction activities and planned closures.

2.9.3.1 Communications Planning Workshop

WSDOT will plan a Communications/No Surprises Workshop that will review and discuss communications for the Project. This workshop will clarify the communications roles of WSDOT and the Design-Builder, review emergency communications procedures, and review WSDOT's No Surprises philosophy. The Design-Builder shall attend and participate in this workshop.

2.9.3.2 Project Communications Plan

The Design-Builder will write and implement a Project Communication Plan *** following the example and template provided in Appendix W2.***. The plan will describe the communications goals, strategies, measurable objectives, and tactics to encourage broad public awareness and understanding of the Project and maintain a consistent level of communication and community engagement with:

- The public (including Environmental Justice (EJ) and Limited English Proficiency (LEP) populations)
- Elected officials
- Emergency services
- Community leaders
- Tribal leadership
- News and social media channels

WSDOT will work with the Design-Builder to finalize and implement the Project Communication Plan.

2.9.4 *WSDOT's Responsibilities*

In addition to previously mentioned responsibilities, WSDOT will retain primary responsibility for the following communications tasks:

- Responses to media inquiries, requests for interviews, or Project tours
- Acting as the primary spokesperson for the Project
- Coordination with WSDOT executive and steering committees
- Communications related to issues such as transportation demand management, bus rapid transit, bicycle/pedestrians, and context sensitive solutions
- Media relations and social media activities
- Contacting elected officials and tribal leaders
- Reviewing and approving all Design-Builder communications materials to ensure it meets WSDOT standards for form, graphic design, content, messaging, and plain talk
- Posting content to the Project website

2.9.5 *Design-Builder's Responsibilities*

In addition to previously mentioned responsibilities, the Design-Builder shall identify a single point of contact to work with WSDOT. This single point of contact shall be responsible for:

- Participating in Project Communications Task Force Meetings between WSDOT and the Design-Builder weekly, or more often if determined necessary by WSDOT to maintain regular coordination on all communications goals and activities
- Responding to public comments regarding the Project
- Any communication or responses to public comments regarding noise impacts and Sensitive Area mitigation
- Managing the public contact database, including citizen requests for information
- Supporting media relations and social media activities
- Drafting content for the Project website, to be reviewed and posted by WSDOT
- Assisting WSDOT in conducting Project-related events such as open houses (in additional languages as identified in the EJ analysis), public meetings, media events, groundbreaking or ribbon cutting events, and stakeholder briefings

- Providing WSDOT with a prioritized after-hours Project Call List within 15 Calendar Days after NTP. The Project Call List shall include the contact information for the Design-Builder's backup staff, including home and mobile phone numbers, and email addresses.

2.9.5.1 Personnel Requirements

The Design-Builder shall provide a Communications Specialist to support the communications needs of the Project. The Communications Specialist is responsible for executing the Project Communications Plan and updating it upon request by WSDOT.

The Design-Builder shall be readily available by telephone during regular business hours with immediate computer and email access. During critical construction activities and emergencies, the Design-Builder shall be available as necessary.

The Communications Specialist shall have at least ***3 years*** of recent experience coordinating information on public projects, preferably on large transportation or infrastructure projects. The Communications Specialist's professional experience shall be a combination of the following:

- Writing for the public, news media, web, and social media. Knowledge of WSDOT's Reader-Friendly Toolkit, plain talk communications, and media relations protocols is preferred
- Providing and presenting information to the public, news reporters, community groups, and others
- Developing, implementing, and measuring the results of strategic communication plans, social media posts, and strategic messaging
- Developing and producing maps, charts, graphs, diagrams, and other visual images, using one or more of the following programs: InDesign, Adobe Illustrator, Adobe Photoshop, and WSDOT design templates to meet WSDOT graphics standards found on the WSDOT Web Toolkit page
- Developing and implementing public involvement and community engagement programs
- Taking and editing photographs and videos

The Communications Specialist shall have full access to all of the Design-Builder's Project details that may be relevant to interested parties. The Communications Specialist shall share information with WSDOT continually throughout the Project.

2.9.5.2 Communication Task Force Meetings

The Design-Builder's and WSDOT staff shall meet weekly to maintain regular coordination and communication with WSDOT on all communications goals and activities. The Design-Builder shall provide and be available to discuss:

- A week look-ahead construction schedule complete with a detailed description of type of work being performed, work locations, upcoming lane closures, detours that are cross referenced to the Traffic Management Plan
- A month look-ahead on the Traffic Management Plan to demonstrate compliance and adequacy of the plan
- Current and upcoming construction issues including noise, environmental impacts, traffic control, and other physical impacts (e.g. tree removal, narrowed lanes, commercial vehicle restrictions)
- An ongoing list of upcoming Project milestones and Project timeline
- Public correspondence received by WSDOT or the Design-Builder

2.9.5.3 Crisis Communications Plan

The Design-Builder shall prepare a Crisis Communications Plan for responding to emergencies and incidents during the Project. The Crisis Communications Plan shall be submitted to WSDOT for Review and Comment within 30 Calendar Days of NTP. The Design-Builder shall coordinate this approach with the Design-Builder's overall Traffic Management Plan and Traffic Incident Management Plan as referenced in Section 2.22, *Maintenance of Traffic*. The Design-Builder's Crisis Communications Plan shall address the following:

- Communications approaches to emergencies such as fire, Utility line strikes, injured employees, fatalities, auto accidents, environmental spills and other incidents in a Work zone
- Staff designated to respond to the emergency
- Immediate actions that can be taken to mitigate a crisis
- Procedures for notifying WSDOT, emergency services, and the public
- Procedures for referring construction related claims, such as auto damage, to WSDOT's Enterprise Risk Management Office

In the event of a crisis, the Design-Builder shall summarize the incident in an Emergency Incident Report. This report shall detail the steps the Design-Builder took to handle the incident from beginning to end, including corrective procedures put in place as a result of the crisis. The Design-Builder shall submit that report to WSDOT within 3 Calendar Days of the incident.

Within 40 Calendar Days of NTP, the Design-Builder shall schedule a Crisis Communications Workshop with WSDOT to discuss protocols and potential emergency situations.

2.9.5.3.1 *Dissemination of Emergency Information*

As part of the Crisis Communications Plan, the Design-Builder shall establish and manage an Emergency Contact List as required by this Section and the *General Provisions*. All appropriate personnel shall be included on the Emergency Contact List for immediate response in the event of an emergency. The Emergency Contact List shall be divided into areas of expertise, so the proper people are contacted for specific emergency situations.

The Emergency Contact List for notification of all emergencies shall include, at a minimum, the following WSDOT personnel:

- WSDOT Engineer
- On-call WSDOT Communications staff
- Traffic Management Center (TMC) also referred to as WSDOT Seattle Radio
- WSDOT Safety Officer

The Emergency Contact List for notification of all emergencies shall include, at a minimum, the Design-Builder personnel listed in the *General Provisions*.

In addition, the Design-Builder shall provide prompt information and assistance as requested by WSDOT during an emergency. Design-Builder shall update the Emergency Contact List within 30 Calendar Days of any personnel change.

2.9.5.4 Weekly Progress Report

The Design-Builder shall provide a brief Weekly Progress Report to WSDOT. The report shall summarize progress made the previous week and include photos of the previous week's construction activities. The Design-Builder shall submit the report by email every Monday to the WSDOT Engineer for the Project, starting at the beginning of construction activities.

2.9.5.5 Construction Information Dissemination

The Design-Builder shall coordinate with WSDOT to collect and disseminate design and construction information to the Project website, social media channels, the WSDOT 511 Travel Alert System, Highway Advisory Radio (HAR), Variable Message Signs (VMS), and Portable Changeable Message Signs (PCMS).

2.9.5.5.1 *Construction Schedule*

The Design-Builder shall notify WSDOT and the public of construction schedules 30 Calendar Days prior to commencement of construction in any area of the Project. The Design-Builder shall provide construction updates to WSDOT on a weekly basis. The Design-Builder shall deliver additional updates if construction and traffic impacts change or if WSDOT requests additional updates. These updates shall include the upcoming week's planned closures, detours, Project status, and other information relevant to the public.

The Design-Builder shall submit weekly construction reports to WSDOT detailing planned Work activities and lane closures for the next 3 weeks. Construction reports shall be submitted to the WSDOT Engineer and *** NWConstruction@wsdot.wa.gov*** or another designated WSDOT email address, no later than ***2 p.m. Wednesday every week***. The Communications Specialist shall write a summary of the upcoming approved closures for posting on the construction closures website and submit it to WSDOT by ***2 p.m. Wednesday every week***.

2.9.5.6 Coordination with Traffic Management Plan

The Design-Builder shall be responsible for coordinating traffic communications with neighboring construction projects as part of an established coordinated Communications Plan. Neighboring projects include but are not limited to:

- I-90 Eastgate to SR 900 Improvements
- I-90 Sunset Way to East Fork Issaquah Creek
- I-90 Eastbound Weigh Station
- I-90 - 468th Avenue SE to West Summit Road - Concrete, Deck, and Culvert Rehab ***

2.9.5.6.1 *Maintenance of Traffic and Access*

The Design-Builder shall provide Maintenance of Traffic (MOT) and access information for the entire Project to all that are affected, at least 14 Calendar Days prior to any revision to access in the area affected. Notifications shall include at a minimum the following:

- Purpose of the change
- Area affected and dates of impact
- Alternate routes and detours
    - If an alternate route or detour is identified, the WSDOT Engineer will analyze the new route for EJ impacts and the need for communication of this information. This process may take more

than the minimum 14 Calendar Days, depending on the communities, impacts identified, and mitigation.

2.9.5.6.2 *Traffic Conditions*

The Design-Builder shall inform the TMC and WSDOT Project personnel of any unusual traffic conditions, such as road obstructions, within 15 minutes of detection.

2.9.5.6.3 *Commercial Vehicle Access and Restriction Information*

Fourteen Calendar Days prior to any 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 coordinate and provide the following agencies with a description, start date, and end date of the event:

- ***King County Emergency Services
- Work Zone Traffic Engineering Manager or Traffic Control Manager
- Washington State Patrol (WSP)
- WSDOT NW Region Traffic Office
- WSDOT Commercial Vehicle Services
- Washington State Trucking Association
- Independent Owner Operator Drivers Association***

2.9.5.6.4 *Emergency Vehicle Access*

The Design-Builder shall develop and implement a protocol for communicating timely information to the emergency service providers regarding access to the Project area for emergency vehicles. The Design-Builder shall provide the WSDOT Engineer with a record of each notification. The Design-Builder shall follow up with a phone call at least 14 Calendar Days prior to the closure.

2.9.5.6.5 *Bicycle and Pedestrian Access*

The Design-Builder shall clearly define and communicate to WSDOT access routes for bicycles and pedestrians, including alternate routes and detours that comply with the accessibility requirements for persons with disabilities. The Design-Builder shall provide MOT and access information at least 14 Calendar Days prior to any revision of a bike or pedestrian path. Pedestrian access shall be in accordance with Section 2.22, *Maintenance of Traffic*.

2.9.5.7 Utility Shut-Offs

The Design-Builder shall conduct regular communication with residents and businesses affected by Utility shut-offs to mitigate the impacts of Utility disruptions. The Design-Builder shall contact and provide written notification to all residents and businesses affected 48 hours in advance of a Utility shut-off and shall maintain a record of each notification. Notices shall indicate the purpose and expected duration of the outage, and provide information indicating how those affected by the outage can contact the Design-Builder. Notices shall meet WSDOT's communications style and be pre-approved by WSDOT before dissemination. Such notices may also be provided by WSDOT.

In the event of an emergency involving a Utility shut-off, the Design-Builder shall notify the Utility Owner in accordance with Utility company standards and local emergency services.

A list of representatives for Utility companies with facilities within the Project Site is shown in the *Utility Owner Contact List* (Appendix U).

2.9.5.8 Construction Traffic Mitigation

The Design-Builder shall collaborate with the WSDOT Engineer on opportunities to work with transportation coordinators, transit agencies, local chambers of commerce, sports teams, retail centers, businesses, communities, and others, to encourage more efficient use of transportation options. The Design-Builder shall work with the WSDOT on communication plans to contact these entities and to keep them informed of construction activities. The Design-Builder shall participate in all necessary meetings with WSDOT to keep them informed of construction activities.

2.9.5.9 Methods and Tools for Dissemination of Information

All communications with the public shall also be available in the non-English languages present in the Project area if a LEP is identified (greater than or equal to 5 percent of the population) and along any detours as identified in the EJ analysis. WSDOT has identified the following populations that require communications to be translated into the following languages:

Spanish

2.9.5.10 Methods and Tools for Dissemination of Information

2.9.5.10.1 *Highway Advisory Radio*

The Design-Builder shall provide accurate information daily or as requested by WSDOT for HAR messages. WSDOT will prepare and record.

2.9.5.10.2 *Variable Message Signs and Portable Changeable Message Signs*

The Design-Builder shall prepare draft messages for advance notice of traffic restrictions due to planned construction activities in accordance with Section 2.22, *Maintenance of Traffic.* WSDOT and the Design-Builder will enter the information into the required type of message sign and activate.

2.9.5.10.3 *Project Identification Signs*

The Design-Builder shall install advance signing in accordance with Section 2.22, *Maintenance of Traffic*.

2.9.5.10.4 *Telephone Hotline*

The Design-Builder shall establish and manage a telephone hotline for the Project. The Design-Builder shall update the recorded message when new phases of construction begin or a traffic switch occurs and how traffic is impacted. The Design-Builder shall check the telephone hotline daily, which shall occur by 3:00 p.m. The Design-Builder shall respond to any inquiries from the hotline within 24 hours. The Design-Builder shall answer and respond to after-hours calls forwarded from the hotline. The Design-Builder shall ensure that all staff responding to inquiries are trained, friendly, responsive, and informed about construction and traffic impacts.

The Design-Builder shall be responsible for compiling and summarizing questions from the general public. This includes tracking responses to callers, analyzing and reporting trends, and providing a weekly status report file to WSDOT.

2.9.5.10.5 *Project Website*

WSDOTshall maintain Project websites utilizing the Design-Builder's weekly and monthly Project information updates. The Design-Builder shall provide timely construction progress photographs for use on Project websites.

2.9.5.10.6 *Collateral Materials*

WSDOT will lead the development and distribution of collateral materials by the Design-Builder for this Project. Collateral materials may include, but are not limited to:

1. Noise flyers for noisy work within 500 feet of the Work zone or as required by noise variances. The Design-Builder shall be responsible for distribution to the affected area.
2. Project one-pagers, fact sheets, or folios, or all.
3. Key messages

4. List serve articles

All costs associated with the production and distribution of materials shall be borne by the Design-Builder.

2.9.5.10.7 *Correspondence and Email*

Correspondence received by or assigned to the Design-Builder for response shall be submitted to the WSDOT Engineer for Review and Comment prior to release. If necessary, WSDOT staff will ask the Design-Builder to respond to public inquiries by phone.

The Design-Builder shall furnish written documentation of other Project-related correspondence to WSDOT within 3 Calendar Days of the communication. Project-related correspondence shall include communications with the public, businesses, community groups, government entities affected by the Project, and other communications required in this Request for Proposal. This includes tracking responses to callers and providing a weekly status report file to WSDOT.

The Design-Builder shall provide information to the WSDOT Engineer for use in responding to public concerns or questions.

2.9.5.10.8 *Special Events, Public Meetings, and Speaking Engagements*

The Design-Builder shall assist WSDOT in preparing for and participate in meetings designed to inform the public or stakeholders of the Project's status and to answer questions related to the Project.

The Design-Builder shall be available to attend public and community meetings or to make presentations at WSDOT's request. The Design-Builder shall support WSDOT by helping staff with an opening event, such as a groundbreaking, a ribbon cutting, or a dedication ceremony.

2.9.5.10.9 *External Events*

The Design-Builder shall coordinate, communicate, and provide a plan to minimize construction impacts for public events held by public and private entities. The Design-Builder shall develop and maintain a list of public events. The Design-Builder shall assume there will be ***a minimum of 30*** events during this Project. These events include, at a minimum, the following:

- ***Western Washington State Fair
- Watershed Music Festival
- Boeing Classic Golf Tournament
- Hoopfest

- Railroad Days
- The Festival at Mount Si
- Seafair
- Issaquah Salmon Days
- Snoqualmie Casino events with expected attendance of over 2,000. Events can be found online at https://www.snocasino.com/entertainment
- Events, or combinations of events, within a 30-mile radius of the I-90/SR 18 interchange with an anticipated combined attendance of over 25,000
- Other events detailed in Appendix W***

The Design-Builder shall coordinate lane closures or other construction Work with the WSDOT Engineer to ensure that planned activities do not affect events within the local communities.

2.9.5.10.10 *Photographs and Video*

The ***WSDOT***will lead the photography and video efforts on this Project. The Design-Builder shall provide photos and video to the WSDOT Engineer, if requested.

2.9.5.10.11 *Media Relations and Social Media*

Although media relations are 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 shall provide timely 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 coordinate all media requests with WSDOT prior to interviews. WSDOT will be the primary media spokesperson. The Design-Builder shall provide WSDOT with information and access to key Project staff for media interviews, as requested.

At WSDOT's request, the Design-Builder shall conduct tours of the Project Site for media, local or State government officials, or WSDOT management. The Design-Builder shall provide information and materials that meet broadcast, electronic, and print media requirements and deadlines.

As requested by WSDOT, the Design-Builder shall write draft and final versions of news releases and travel advisories, using the WSDOT news release and travel

advisory templates. WSDOT will provide the Design-Builder with copies of the templates.

2.9.5.10.12 *Language Identification and Emergency Services Card*

The Design-Builder shall identify events and locations where the WSDOT Language Identification and Emergency Services Card shall be readily available to assist in face-to-face situations to help determine which language a person speaks or needs emergency services. WSDOT will supply a copy of the Language Identification and Emergency Services Card to the Design-Builder.

2.9.6 *Submittals*

Project submittals include, at a minimum, the following:

- Project Call List – Submitted within 15 Calendar Days of NTP
- Weekly Progress Reports – Format to be established within 30 Calendar Days of Contract execution, with reporting beginning immediately thereafter
- Construction information – Submitted on a weekly basis
- Noise flyers
- Crisis Communications Plan – Submitted within 30 Calendar Days of NTP
- Photos and videos

2.9.6.1 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section

2.10 Utilities and Relocation Agreements

2.10.1 *General*

This Section describes the requirements associated with Project Utilities, including Utility Agreements, design requirements, utility design sheets, construction requirements, and testing requirements. This Section applies to existing and proposed Utilities, both underground and overhead.

2.10.1.1 Scope

The Utilities identified within the Project limits are described in the *Existing Utility Listing* (Appendix U). The Design-Builder shall avoid, Protect in Place (either permanently or temporarily), or Relocate these Utilities during construction. The Design-Builder, in coordination with the Utility Owner, shall consider all options during the design process.

No Utilities ***on this Project have been*** identified as Prior Relocations on the *Existing Utility Listing* (Appendix U); ***the Utilities that*** are in conflict with the Basic Configuration ***of the Project will be relocated during Project construction. The relocations will be performed by either the Utility Owner or the Design-Builder as negotiated during the final design phase to complete any necessary Utility Relocation Agreements prior to construction.***

Additional Relocation Work may be necessary to construct the Project. The Design-Builder shall be responsible for determining what, if any, additional Utility Relocations will be required; and shall work with Utility Owners to design and construct such Relocations in compliance with the Contract.

Incidental Utility Work and any additional Relocation Work that becomes necessary due to the Design-Builder's design, the Design-Builder's correction of any inaccuracies in the Utility Information, changes made by the Design-Builder to the Conceptual Plans, or otherwise, shall be addressed in accordance with this Section and Section 1-07.17 of the *General Provisions*.

2.10.1.2 Utility Type

All Utilities are classified as Type #1, except as noted in the *Existing Utility Listing* (Appendix U).

All Utilities are classified as Type #2 when they are located within a recorded Utility Easement, on private property, or have prescriptive rights.

Based on the conceptual level of research, the following one Utility has been identified as a Type #2 Utility specific to the Project:

- ***Bonneville Power Administration (BPA) – 500-kilovolt amperes (kVa) and 345-kVa overhead transmission electrical lines***

2.10.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

All Utility Work (whether performed by the Design-Builder or by the Utility Owner) shall comply with the Mandatory Standards, all applicable Governmental Rules, any applicable franchises or permits, the Utility Standards required by the applicable Utility, and any applicable Utility Standards provided in the Request for Proposal (RFP) Appendices. The Design-Builder shall be responsible for obtaining Utility Standards from the Utility Owners, and for obtaining all other Mandatory Standards relating to the Utility Work.

1. ***WSDOT *Utilities Accommodation Policy* M 22-86 (Appendix D)
2. WSDOT *Utilities Manual* M 22-87 (Appendix D)
3. *AASHTO: Accommodation of Utilities on Freeway Right of Way*
4. Utility Standards (applicable to the particular Utility Owner)***
5. Special Provisions (Appendix B)
6. WSDOT *Work Zone Traffic Control Guidelines for Maintenance Operations* M 54-44 (Appendix D)
7. *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways* (Appendix D)
8. Washington State Modifications to the Manual on Uniform Traffic Control Devices (WAC 468-95) (Appendix D)
9. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
10. ***Standard Specifications M 41-10 (Appendix B)***
11. Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards (49 CFR Part 192)
12. WSDOT *Bridge Design Manual* M 23-50 (Appendix D)
13. ***Standard Plans M 21-01(Appendix D)***

2.10.3 *Personnel Requirements*

2.10.3.1 Utility Engineer

The Design-Builder shall provide a Utility Engineer to manage and coordinate all aspects of Utility Work. The Utility Engineer shall have a minimum of 5 years of

experience managing and leading design and construction of Utility Relocation Work on public transportation projects. The Utility Engineer shall attend and lead all Project Utility coordination meetings. ***The Utility Engineer shall manage the coordination of all utility locate requests as described in Section 2.10.6.3.***

2.10.4 *Performance Requirements*

2.10.4.1 Reimbursement to and Collection from Utility Owners

2.10.4.1.1 *Reimbursement to Utility Owners - General*

The Design-Builder shall deliver copies of all invoices received from Utility Owners to the WSDOT Engineer within 14 Calendar Days of receipt. If the Design-Builder fails to make any payment to a Utility Owner as specified in Section 1-07.17 of the *General Provisions* or elsewhere in the Contract on or before the deadline stated in the applicable Relocation Agreement (or if no deadline is stated, then the payment shall be made within 30 Calendar Days after receipt of the Utility Owner's invoice), then the WSDOT Engineer will have the right to pay the Utility Owner the amount due (including interest, penalties, or both). If WSDOT pays a Utility Owner, the Design-Builder shall reimburse WSDOT for such payment within 14 Calendar Days after receipt of WSDOT's invoice; or WSDOT, at its discretion, may deduct the amount of reimbursement due from the next payment (or payments, if necessary) due to the Design-Builder under the Contract.

2.10.4.1.2 *Collection from Utility Owners - General*

The Design-Builder shall provide the WSDOT Engineer copies of all invoices sent to Utility Owners within 14 Calendar Days of invoice. If the Utility Owner fails to make any payment to the Design-Builder for Relocation Costs consistent with the applicable franchise, permit, and Governmental Rules, the Design-Builder shall notify the WSDOT Engineer within 30 Calendar Days.

The Relocation Agreements and their subsequent amendments, between the Design-Builder and a Utility Owner that provides specific details for the Relocation of one or more particular Utilities, shall provide that eligibility of the Design-Builder's Relocation Costs for reimbursement shall be consistent with the applicable franchise or permit and the applicable Governmental Rules.

2.10.4.2 Government Approvals and Other Permits

The Design-Builder shall obtain or ensure that the Utility Owner obtains all Governmental Approvals and any other clearances, permits, approvals, and agreements necessary for a Relocation; and shall verify that the same have been obtained prior to commencing or permitting the commencement of any construction. The Design-Builder shall verify that the Work performed (whether by the Design-Builder or by or on behalf of the Utility Owner) complies with the requirements of such Governmental Approvals and other clearances, permits, approvals, and agreements.

2.10.4.3 Access to Existing Utilities

Any authorized agent of WSDOT, a Utility Owner, or a Utility Owner's representative may enter the Right of Way (ROW) to inspect, repair, maintain, rearrange, alter, or connect Utilities and equipment with at least 10 Calendar Day advance notice. The Design-Builder shall cooperate with such efforts and shall avoid creating delays or hindrances to the performance of such Work. If the Design-Builder determines, or a Utility Owner requests, that a Utility Owner must be on-site to protect its Utility, the Design-Builder shall provide at least 7 Calendar Days advance notice to the Utility Owner. Refer to Section 2.22, *Maintenance of Traffic,* for Traffic Management Center notification requirements.

2.10.4.4 Best Management Practices and Temporary Erosion and Sedimentation Control

Regardless of who performs or pays for any Relocation Work, the Design-Builder shall ensure that appropriate Best Management Practices (BMPs) and Temporary Erosion and Sedimentation Control (TESC) measures are followed in the performance of Utility Work. Refer to Section 2.8, *Environmental* for BMPs and TESC requirements.

2.10.4.5 Forward Compatibility

Each Utility Relocated by the Project shall be placed in a location that is Forward Compatible. All exceptions shall be approved in writing by WSDOT before proceeding with the Relocation Work for the excepted Utility. ***To the point we are aware, projects that could occur within the immediate vicinity of, or at the same time as, the Project, are listed in Section 2.1.***

2.10.5 *Relocation Agreements, Franchises, and Permits*

2.10.5.1 Relocation Agreements

2.10.5.1.1 *Requirements*

Each Relocation ***for the project*** shall be addressed in a Relocation Agreement entered into between the Design-Builder and the Utility Owner as required by Section 1-07.17 of the *General Provisions,* ***as there are no established Prior Relocation Agreements or Intergovernmental Agreements for the Project***. The Design-Builder shall prepare and negotiate each Relocation Agreement including such exhibits as may be appropriate, and shall prepare and provide all Project information (e.g., reports, Plans, and surveys) necessary to negotiate the Relocation Agreement. For each Relocation, the Design-Builder shall initiate contact with the Utility Owner at the earliest possible time in order to begin working with the Utility Owner to develop a Relocation Agreement and a Relocation Plan that meets the Project design and schedule.

***As stated in this Section, there are no prior relocation agreements in place for the Project. However, the Design-Builder is alerted to Letter of Understanding (LOU) that has been established between Puget Sound Energy (PSE) and

WSDOT and a Memorandum of Understanding (MOU) between Bonneville Power Administration (BPA) and WSDOT. The LOU provides a baseline of responsibilities and coordination between PSE, WSDOT, and Design-Builder. The MOU between WSDOT and BPA provides information and procedures for how the Design-Builder shall contact and work with BPA on the Project. These documents can be found in Appendix U.***

The Design-Builder shall refer to Chapter 2 of the WSDOT *Utilities Manual* for guidance in preparing Relocation Agreements. The Relocation Agreements shall be consistent with the applicable franchise/permit and Governmental Rules. At a minimum, each Relocation Agreement shall set forth the specific details of the Work, which typically include the following:

- The nature and location of the Utilities to be Relocated
- Allocation of responsibility for design, construction, and other Relocation tasks
- Applicable standards
- Cost responsibility, cost estimates, and eligibility of costs for reimbursement, if applicable
- Reimbursement procedures, if applicable
- Schedules
- Joint use issue resolution
- Procedures for design review and approval including inspection of construction, acceptance of the Relocation Work, and such other provisions as may be appropriate or reasonably required by the WSDOT Engineer

Cost Responsibility for each Relocation shall be determined in accordance with Section 1-07.17 of the *General Provisions*, unless otherwise designated by the WSDOT Engineer. Each Relocation Agreement shall designate WSDOT as a third-party beneficiary. Schedules for completion of the tasks specified in each Relocation Agreement shall conform to the Contract Schedule, which shall provide reasonable and adequate time for each task.

The Design-Builder shall provide the WSDOT Engineer with the option to participate in negotiations of Relocation Agreements in accordance with Section 1-07.17 of the *General Provisions*. The Design-Builder shall give WSDOT at least 7 Calendar Days advance notice of negotiation sessions. The Design-Builder shall submit draft minutes of each negotiation session to the WSDOT Engineer for Review and Comment within 7 Calendar Days after the session.

No material modifications to the Relocation Work or terms of a fully executed Relocation Agreement shall be made without processing a revision to the Relocation Agreement using the procedures described in this section.

2.10.5.1.2 *Process for WSDOT Review*

2.10.5.1.2.1 Draft Relocation Agreement

The Design-Builder shall submit a draft of each Relocation Agreement and exhibits to the WSDOT Engineer for Review and Comment. The ***submittal*** shall also include the most current copy of the sections of the Design Documents that identify the Utility being affected by the Project. The WSDOT Engineer will Review and Comment within 14 Calendar Days from receipt of the draft document. WSDOT's failure to respond within this time frame does not constitute an approval of the terms or form of the ***submittal***. The Design-Builder shall resolve all WSDOT comments on the Draft Relocation Agreement and exhibits and shall obtain WSDOT approval prior to submitting it to the Utility Owner. The Design-Builder shall deliver each Draft Relocation Agreement concurrently to the WSDOT Engineer and the Utility.

2.10.5.1.2.2 Final Relocation Agreement

The Final Relocation Agreement shall be submitted to the WSDOT Engineer for Review and Comment at least 20 Calendar Days prior to the date scheduled for its full execution. A Relocation Agreement shall be considered final and ready for execution when all of its provisions have been reviewed and approved by the WSDOT Engineer through the review process described in this Section.

2.10.5.2 New Franchises and Permits

An active franchise or permit is required for the accommodation of any Utility installation to occupy the ROW where the Utility Owner does not have an established property right. The Utility Owner shall prepare an application for a new franchise or permit simultaneously with preparation of the Relocation Agreement. The Design-Builder shall ensure that the Utility Owner submits an application for a new franchise or permit to the WSDOT Engineer as far in advance of construction as possible, but not later than ***90*** Calendar Days prior to construction. The application and Relocation Agreement shall be revised as necessary to obtain a franchise or permit from WSDOT.

A franchise or permit is required for any Utility Relocation that will remain in the ROW after the Project is completed. The Design-Builder shall ensure that a new franchise or permit is issued by the WSDOT Engineer prior to beginning construction of any Relocation.

A new franchise or permit is ***may not be*** required for Temporary Relocation.

A new franchise or permit ***may not be*** required for the deactivation or removal of an existing Utility from within the ROW. The Design-Builder shall notify the WSDOT Engineer of any Deactivated Utility, noting the permit number and how it was deactivated. A list of existing Utility franchises/permits is provided in the *Existing Utility Listing* (Appendix U).

2.10.5.3 ***Limited*** Assignment ***and*** Delegation of Utility Permit***/Franchise*** Rights and Obligations

For each Authorized Utility determined by the Design-Builder as requiring Relocation, the Design-Builder shall prepare a ****Limited Assignment and*** Delegation of Utility Permit/***Franchise*** Rights and Obligations* (Appendix U). The Design-Builder shall submit the completed document to the WSDOT Engineer for approval and execution. The Design-Builder may begin coordinating with a Utility Owner prior to execution of the document by WSDOT, provided that the document shall be submitted to the WSDOT Engineer no later than the Design-Builder's ***submittal*** of the first draft of a Relocation Agreement.

If the Design-Builder determines that it will be unable to successfully negotiate a reasonable Relocation Agreement with the Utility Owner for a particular Authorized Utility, the Design-Builder shall notify the Utility Owner and the WSDOT Engineer of such determination. The Design-Builder may, in addition to requesting assistance from the WSDOT Engineer in accordance with Section 1-07.17 of the *General Provisions*, exercise the rights that have been assigned to it pursuant to the applicable assignment/delegation document, provided, however, that WSDOT makes no representation or warranty as to the Design-Builder's ability under the assignment/delegation document to enforce those rights in a manner that satisfies the Design-Builder's Project requirements, or at all.

2.10.6 *Identification of Utilities*

2.10.6.1 Information Provided by the WSDOT Engineer

As specified in Section 1-07.17 of the *General Provisions*, WSDOT performed certain investigations of existing Utilities located within the ROW. These investigations were preliminary, and their results may be inaccurate or incomplete. The Utility Information is provided in this Section and Appendix U. The Design-Builder is advised of the following:

- WSDOT's investigations may have included making requests for "As Builts" from Utility Owners listed in the WSDOT database as having Utilities located within the ROW; visually locating above-ground Utility objects, including, at a minimum, poles, cabinets, vents, visible manholes, valve boxes, and vault covers; and surveying above ground objects.
- ***WSDOT has not identified small (less than 2 inches) residential or commercial existing service lines as part of the discovery for the Project.***
- The information shall not be utilized for determining Utility locations.

Refer to Section 1-07.17 of the *General Provisions* for the limited circumstances in which the Design-Builder may be entitled to an extension of the Contract Time or an increase in the Contract Price because of delays or increased costs of the Work that are directly attributable to the correction of inaccurate Utility

Information. Unless specified otherwise, the Design-Builder's reliance on any Utility Information is at the Design-Builder's sole risk.

2.10.6.1.1 ****BPA Existing Line(s) and Survey Information****

WSDOT performed an investigative preliminary survey of the existing BPA lines crossing the Project limits at Raging River as part of the conceptual design effort for the Project. The information from that investigation and corresponding discussion can be found in the *Raging River Constructability Memorandum* (Appendix S) for reference. The data supplied within these requirements and draft conceptual plans are provided for information only and were gathered in the field through LIDAR survey on a day not considered to be at peak transmission load or peak maximum operating temperature. Thus the Design-Builder shall acknowledge (in accordance with 1-07.17(5) of Chapter 1) the information contained in the RFP documents and shown on the conceptual bridge plans may not be accurate, and the Design-Builder shall be aware that greater sag in the lines from what is shown on the conceptual bridge plans and discussed in the RFP documents might be present on any day. The Design-Builder shall verify all Utility information included in the RFP and shall perform its own investigations in accordance with the Contract Documents and shall not proceed with any construction work until such investigation has been completed.

2.10.6.2 Utility Easements

All Utility Easements (existing and proposed) within the Project limits shall be identified or described by the Design-Builder in the Final Design Documents. All new Utility Easements within the ROW are subject to Review and Comment by the WSDOT Engineer.

2.10.6.2.1 *Project Utility Easements*

- Initial WSDOT investigations have identified one utility that has easement rights within the Project limits. That utility is listed below and identified in the *Existing Utility Listing* (Appendix U).
    - ***BPA – Easement at Raging River Crossing***

2.10.6.2.2 *New Utility Easements*

The Design-Builder is advised that WSDOT does not obtain easements for Utilities outside of the ROW. Utility Owners are entitled to reimbursement of their costs for acquiring such easements only if WSDOT determines that they held a pre-existing property right entitling them to such reimbursement.

2.10.6.3 Design-Builder's Investigations

The Design-Builder shall be solely responsible for verifying, at its expense, the exact horizontal and vertical location, size, type, and all other relevant characteristics of all Utilities potentially impacted by the Project (including any

Utilities located outside of the ROW), whether or not such Utilities are shown in the *Existing Utility Listing* (Appendix U). Such actions shall include making diligent inquiry at the offices of the Utility Owners, consulting public records, and conducting field studies. The Design-Builder shall consider the possibility that the *Existing Utility Listing* (Appendix U) and the information provided by Utility Owners may be inaccurate or incomplete. The Design-Builder shall request Utility locates during the design phase. ***All locate requests, including requests from subcontractors, shall be made through the Utility Engineer, such that all locate requests originate from a single source. The Utility Engineer shall manage the tracking of all locate requests to ensure that multiple such requests are not submitted for the same location within the time limit defined in RCW 19.122.030, under which the excavator is required to maintain locate marks.***

Prior to submitting plans for Review and Comment, the Design-Builder shall identify Utilities that conflict with new roadway elements and roadside features shown in the Plans.

Refer to Section 1-07.17 of the *General Provisions* for the Design-Builder's obligations upon determining that a Major Underground Utility was not identified in the *Existing Utility Listing* (Appendix U) with Reasonable Accuracy, or when identifying any other Utilities not described in the *Existing Utility Listing* (Appendix U).

2.10.6.4 Utility Management Plan

The Design-Builder shall maintain a Utility Management Plan in tabular form, in electronic format, which shall list each existing and proposed Utility located within the ROW or otherwise potentially impacted by the Project. At a minimum, the Utility Management Plan shall include the following information for each listed Utility:

- The name of the Utility Owner
- A brief description of the Utility by size and type
- The location of the Utility (MP or station)
- Permit, franchise or agreement number
- Relocation start and completion dates
- The proposed disposition (e.g., Relocation, Protection in Place) for the Utility
- The determination as to whether the Utility is a Type #1 Utility, a Type #2 Utility
- The nature of the Utility Owner's right of occupancy of the ROW for such Utility (e.g., franchise, permit, easement)
- Responsible party for design
- Responsible party for construction
- The status of the Relocation Agreement
- The status of Utility design and construction activities

- Type of location verification information (how was it obtained: records, potholing, Subsurface Utility Engineering)
- Additional information as requested by WSDOT

The Design-Builder shall update the Utility Management Plan to reflect revisions to Utility Information and status as new information is received no later than 3 ***Calendar Days*** prior to the Utility Task Force Meeting.

2.10.7 *Scheduling, Coordination, and Correspondence*

2.10.7.1 Scheduling

The Design-Builder shall develop a Contract Schedule that identifies all Utility Work, as well as Relocation Work to be performed by Utility Owners and allows sufficient time for completion of all such Work. The Contract Schedule shall include, as a minimum, activities for design coordination, review, and response times for WSDOT and Utility Owners, seasonal restrictions on interruptions of Utility service, material procurement, permitting activities and performance of Utility Work.

2.10.7.2 Coordination Responsibilities

The Design-Builder shall be responsible for coordination with all Utility Owners with Utilities located within the Project limits. Such responsibilities shall include obtaining information from and providing information to the Utility Owners; notifying Utility Owners that Utilities affected will require Relocation; coordination and scheduling of design review, inspections, approvals, and acceptances; and coordination and scheduling of construction Work. The Design-Builder is responsible for monitoring the progress of Work by Utility Owners and for resolving any scheduling difficulties with them.

The Design-Builder shall keep Utility Owners informed of the Design-Builder's construction schedules and of changes which affect their Utilities. The Design-Builder shall also provide Utility Owners with sufficient time to notify their customers of any potential impacts to service. The Design-Builder shall confirm the required notification time for each Utility per the Utility Owner policies.

The Design-Builder shall cooperate with the Utility Owners to the extent that such cooperation is consistent with the Design-Builder's obligations pursuant to the Contract and the scope of Work. The Design-Builder shall act diligently in maintaining a positive relationship with the Utility Owners.

2.10.7.3 Notices and Correspondence Between the Design-Builder and Utility Owners

All notices to Utility Owners from the Design-Builder shall be in writing. The Design-Builder shall deliver to the WSDOT Engineer copies of all correspondence between the Design-Builder and the Utility Owner within 7 Calendar Days of receipt or sending.

2.10.7.4 Meetings With Utility Owners

The Design-Builder shall implement a schedule of periodic coordination meetings with individual Utility Owner affected by the Work. Such meetings shall commence as early as possible in the Project design process and shall continue until Completion of the Project (or completion of the Utility Owner's Relocations, if earlier). Such meetings shall include a preliminary design meeting for the Design-Builder and Utility Owners affected to meet and familiarize themselves with design elements, Utility, and general features of the Project. Thereafter, the frequency of meetings between the Design-Builder and each Utility Owner affected shall be appropriate to the matters under discussion. The Design-Builder shall notify the WSDOT Engineer at least 7 Calendar Days in advance of each meeting, and shall allow the WSDOT Engineer the option to participate in each meeting.

2.10.7.5 Meetings Between WSDOT and the Design-Builder

Both the WSDOT Engineer and Design-Builder representatives shall be available to meet at the request of either party to discuss and resolve matters relating to Utility Work. The Design-Builder shall schedule such meetings at the reasonable convenience of WSDOT's representatives.

2.10.7.6 Meeting Minutes

The Design-Builder shall record and maintain minutes of all meetings with Utility Owners and with WSDOT with respect to Relocation and Utility Work. The Design-Builder shall deliver copies of these meeting minutes to the meeting attendees and make them available to the WSDOT Engineer within 7 Calendar Days after each meeting.

2.10.7.7 Contact Information

Utility Owners with Utilities potentially affected by the Project are listed in the *Utility Owner Contact List* (Appendix U). The information provided for those Utility Owners includes contact names and mailing addresses. The contact information is current as of the date of issuance of this RFP. The Design-Builder shall be responsible for verifying the accuracy of the contact information and maintaining current contacts for all Utilities affected by the Project, whether or not such Utility Owners are listed in the *Utility Owner Contact List* (Appendix U).

2.10.8 *Design Requirements*

2.10.8.1 General Design Criteria

The Design-Builder shall be responsible for verifying that all design Plans for Relocation Work, whether furnished by the Design-Builder or by the Utility Owner, are consistent and compatible with the following:

- The requirements specified in this Section
- The requirements of the applicable Utility Agreements

- The Design-Builder's design and construction of the Project
- WSDOT Bridge Office Load Rating for new utility attachments to existing bridges (refer to the WSDOT *Bridge Design Manual*)
- Any other Utilities being installed in the same vicinity
- Other WSDOT and Local Agency projects
- The terms and conditions of all applicable new or amended franchises and permits
- ***Specific clearance requirements and standards for design near BPA transmission lines as stated/discussed in the *Raging River Constructability Memorandum* (Appendix S).***

The Design-Builder shall confirm that all Relocations to be installed within a limited access ROW meet WSDOT's requirements as set forth in the WSDOT *Utilities Manual*, *WSDOT Utilities Accommodation Policy*, and *AASHTO: Accommodation of Utilities on Freeway Right of Way*.

2.10.8.2 Relocation Design Furnished by the Design-Builder

Where the Design-Builder and the Utility Owner have agreed that the Design-Builder shall furnish the Relocation design, the Design-Builder shall submit its design to the WSDOT Engineer and the Utility Owner for Review and Comment. The Design-Builder shall coordinate any necessary modifications and re-submittals with the WSDOT Engineer and the Utility Owner, and obtain written approval from the Utility Owner prior to commencing construction of the Relocation. All subsequent changes to Relocation designs shall be subject to the same Review and Comment, and written approval process.

The Design-Builder is advised that Type #2 Utility Owners are generally entitled to reimbursement of their design review costs as Relocation Costs.

2.10.8.3 Relocation Design Furnished by the Utility Owner

The Design-Builder shall coordinate the delivery of each Relocation design to be furnished by the Utility Owner pursuant to the applicable Relocation Agreement. The Design-Builder shall review each design for compliance with the specifications, and shall provide comments to the Utility Owner. The Design-Builder shall submit the Relocation design to the WSDOT Engineer for Review and Comment; transmit the WSDOT Engineer comments to the Utility Owner; and coordinate modification and re-submittal as necessary.

2.10.9 *Construction Requirements*

2.10.9.1 General Construction Criteria

The Design-Builder shall be responsible for verifying that all construction of Relocation Work, whether performed by the Design-Builder or by the Utility Owner, complies with the following:

- The requirements specified in this Section

- The requirements of the applicable Utility Agreements
- The Released for Construction (RFC) Documents
- The Design-Builder's design and construction of the Project
- Any other Utilities being installed in the same vicinity
- The terms and conditions of all applicable new or amended franchises and permits
- WSDOT *Utilities Manual*
- *WSDOT Utilities Accommodation Policy*
- ***Specific clearance requirements and standards for construction near BPA transmission lines as stated/discussed in the *Raging River Constructability Memorandum* (Appendix S).***

The Design-Builder shall cooperate with the Utility Owner to obtain all necessary permits and assure that Utility Owners meet all Project safety and environmental requirements.

2.10.9.2 Maintenance and Care During Construction

The Design-Builder shall carry out all Work affecting Utilities carefully and skillfully, and shall support, secure, and exercise care with respect to Utilities to avoid damaging them.

The Design-Builder shall ensure continuity of all existing Utility services to all users, except when a Utility Owner determines that temporary interruption is necessary and acceptable.

The Design-Builder shall not move or remove any Utility without the written consent of the Utility Owner, unless otherwise directed by the WSDOT Engineer.

The Design-Builder shall comply with all Applicable Laws relating to grading or excavation in the vicinity of underground Utilities. Before starting construction that may affect Utilities in a particular area (whether underground or overhead), the Design-Builder shall notify the affected Utility Owners in writing at least 30 Calendar Days prior to commencement of the Work. The Design-Builder shall contact the One-Call Locate Center and locate Utilities prior to performing any excavation. ***Subcontractors shall request locates through the Design-Builder, such that all locate requests originate from a single source. The Design-Builder, through the Utility Engineer, shall track all locate requests to ensure that multiple locate requests are not submitted for the same location within the time limit defined in RCW 19.122.030, under which the excavator is required to maintain locate marks.*** The Design-Builder shall maintain all appropriate clearances from active power lines in accordance with WAC 296-155-428.

If any Utilities are damaged by the Design-Builder's activities, the Design-Builder shall pay for all costs associated with damage caused by the Design-Builder including Utility down-time, all reconstruction, all remediation of hazards, litigation, loss of product, and Utility startup and delay costs. At the Utility Owner's request, the Design-Builder shall repair the damage or the Utility

Owner may choose to repair the damage at the Design-Builder's expense. All repairs by the Design-Builder shall be performed to the reasonable satisfaction of the Utility Owner. The Design-Builder shall pay any reimbursement due to the Utility Owner because of any damage caused by the Design-Builder within 30 Calendar Days after receipt of the Utility Owner's invoice, unless otherwise provided in an applicable Relocation Agreement.

2.10.9.3 Special Qualifications

For each Relocation for which the Design-Builder is assigned responsibility for construction as specified in this Section and in Section 1-07.17 of the *General Provisions*, and for which special qualifications are required by the Utility Owner to perform such construction, the Design-Builder shall utilize (or cause its subcontractors to utilize) qualified personnel acceptable to the Utility Owner to perform such Relocation Work.

2.10.9.4 Inspection

The Design-Builder shall perform all inspection, sampling, and testing of the Utility Owner's and the Design-Builder's Relocation Work necessary to comply with its obligations under the Contract, Relocation Agreements, and the Quality Management Plan. The Design-Builder shall immediately notify the WSDOT Engineer and the Utility Owners regarding any noncompliance.

Each Utility Owner shall have the right to inspect construction performed on its Utilities by the Design-Builder. The Design-Builder shall not refuse the inspection requests, and shall coordinate a mutually agreeable schedule and scope with the Utility Owner for the inspections. The Design-Builder shall inform the Utility Owner in writing, prior to commencing any Work, so that the Utility Owner may report such deficiencies to the Design-Builder's Construction Quality Assurance Manager (CQAM) for resolution.

Promptly upon completion of the Work, the Design-Builder shall obtain the Utility Owner's written acceptance of each Utility on which the Design-Builder performed the Relocation Work. The Design-Builder shall submit the original document of each written acceptance to the WSDOT Engineer.

2.10.9.5 Deactivation and Removal

When a Utility Owner determines a Utility is no longer needed, the Design-Builder shall remove the Utility from the ROW unless the WSDOT Engineer approves deactivation in place.

Deactivation in place shall mean allowing elements of the Deactivated Utility to remain in the ROW following flushing, capping, grouting, and other Work required to meet Utility Standards and Applicable Law (whichever is more stringent). Deactivated Utilities shall remain the property and responsibility of the Utility Owner. Deactivated Utilities within the ROW must remain on a WSDOT-issued franchise or permit to document the Utility as deactivated.

The Design-Builder shall be responsible for all Work associated with the removal and disposal of permanently Deactivated Utility. If the WSDOT Engineer approves deactivation in place of a Utility, the Design-Builder shall make all arrangements and perform all Work necessary for any proposed deactivation including design, construction, and consent from Utility Owners and landowners. The Design-Builder shall also obtain any necessary Governmental Approvals, the WSDOT Engineer approvals, and permits, or the Design-Builder shall confirm that the Utility Owner has performed the same.

The Design-Builder is advised that certain Utilities may be composed of asbestos-coated pipe. The Design-Builder shall design the Project to avoid affecting asbestos-coated pipe where feasible, and shall take all other appropriate action to minimize conflicts with such Utilities. Any removal of such pipe shall be performed in compliance with all applicable Governmental Rules and Environmental Laws.

Any Utility deactivated outside of the ROW shall be deactivated in accordance with the Utility Owner's Utility Standards and the standards of the Local Agency with jurisdiction over the affected Utilities.

The Design-Builder shall notify the WSDOT Engineer in writing of any Utilities that will be deactivated or removed.

2.10.9.6 Protection in Place

The Design-Builder shall be responsible for Protecting in Place (or causing to be Protected in Place by the Utility Owners) all Utilities impacted by the Project (including any Utilities remaining in place, any Utilities installed during the course of the Work, and any Prior Relocations), to ensure their continued safe operation and structural integrity in accordance with the requirements of this Section. Utilities to be Protected in Place shall not be relocated or taken out of service. The Design-Builder will provide notification to the WSDOT Engineer for all Utilities proposed to remain in their existing locations other than Prior Relocations. This notification may be part of the RFC drawings review.

Protection in Place may be permanent or temporary, depending upon the types of measures that are necessary to satisfy the specific requirements of a particular Utility. The Design-Builder shall coordinate with the Utility Owner to determine whether to provide either permanent or temporary Protection in Place.

If the Design-Builder incurs a cost to implement a design to avoid or to provide temporary or permanent protection of a Type #1 Utility, the cost associated with such modification shall be recovered directly from the Utility Owner. The cost for such modifications shall not be included in the lump sum bid cost for the Contract or as a basis for any Change Order.

2.10.9.7 Prior Relocations

Prior Relocations shall not be relocated again during the Contract. Following the initial Relocation by the Utility Owner, the Design-Builder shall design the Work so that these Utilities are not in conflict with the Work.

2.10.9.8 Maintenance of Service

All Utilities shall remain operational during all phases of construction, except as specifically allowed and approved in writing by the Utility Owner. The Design-Builder shall obtain the Utility Owner's approval in writing prior to any temporary diversion or interruption of service of affected Utilities.

2.10.9.9 Maintenance of Traffic

The Design-Builder shall be responsible for all traffic control to ensure safe and efficient traffic flow during the Utility Work according to applicable standards and Section 2.22, *Maintenance of Traffic*.

2.10.9.10 Street Restoration

The Design-Builder shall ensure that resurfacing, restoration, and re-striping of all streets, roadside features, or other affected areas over the affected facilities are constructed in compliance with any applicable standards of the WSDOT *Utilities Manual,* Standard Specifications*,* and the Local Agency, whichever is more stringent.

2.10.9.11 Environmental Compliance Pertaining to Utility Work

The Design-Builder shall comply with all applicable Environmental Laws in performance of Utility Work.

2.10.9.12 Maintenance of Records

2.10.9.12.1 *Construction and Inspection Records*

The Design-Builder shall maintain construction and inspection records in order to ascertain that the Work proposed in a Relocation Agreement is accomplished in accordance with the approved Plans and the requirements of the Contract.

2.10.9.12.2 *Utility As Built Plans*

Upon Physical Completion of the Project (or upon completion of the Utility Relocations, if earlier), the Design-Builder shall deliver to the WSDOT Engineer a complete set of Utility As-Built Plans and design files that incorporate all changes and details of the Relocation Work. ***An additional copy of the Utility As-Built Plans and design files described above shall be delivered to the WSDOT Northwest Region Utilities Office.*** As Built Plans will show the location of all Utilities located within the ROW and Utilities located outside of the ROW that was part of the Relocation Work.

The Design-Builder shall survey Utility features as they are being placed to an accuracy of 0.10 feet horizontally and 0.10 feet vertically (+/- 0.03), providing quality level A (QLA) data, as identified in the American Society of Civil Engineers (ASCE) 38-02 standards. Buried Utilities are to be surveyed at the top of conduit, while elements such as hand holes, junction boxes, clean outs, etc. are surveyed at the top center. Overhead items such as power poles are surveyed at

center of pole. Pole owner, style, and badge identification (ID) are noted at each object. Moreover, each Utility object shall be surveyed to a project datum as specified in Section 2.5, *Surveys and Mapping*, and the data shall be delivered in an ASCII format (X, Y, Z).

The Design-Builder shall be responsible for submitting As Built Plans to the individual Utilities. As Built Plans shall be prepared in accordance with each Utility's standards and the Design-Builder shall revise and resubmit the As-Built to each Utility, until they are approved.

In addition to the requirements in this Section, the Design-Builder shall reference the requirements of Section 2.28, *Quality Management Plan* for As Built Plans.

2.10.9.13 Fire Protection

The Design-Builder shall replace all fire hydrants that are impacted by construction of the Project.

2.10.9.14 Miscellaneous Submittals

The Design-Builder shall deliver to the WSDOT Engineer Work-related ***submittals*** that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.11 Roadway

2.11.1 *General*

The Design-Builder shall perform all Work necessary to complete the roadway design and grading elements for the Project.

2.11.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Design Manual* M 22-01 (Appendix D)
4. Standard Plans M 21-01 (Appendix D)
5. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
6. WSDOT *Local Agency Guidelines* M 36-63 (Appendix D)
7. WSDOT *Traffic Manual* M 51-02 (Appendix D)
8. *Washington State Modifications to the Manual on Uniform Traffic Control Devices* (WAC 468-95) (Appendix D)
9. *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, 2009 Edition with Revisions 1 & 2 dated May 2012 (Appendix D)
10. *Mitigation and Roadside Design Criteria* (Appendix L)
11. *AASHTO A Policy on Design Standards – Interstate System*
12. *AASHTO A Policy on Geometric Design of Highway and Streets*
13. *AASHTO Guide for High Occupancy Vehicle Facilities*
14. *AASHTO Roadside Design Guide*
15. *US Access Board ADA Accessibility Guidelines for Buildings and Facilities* (ADAAG)
16. *AASHTO Guide for the Development of Bicycle Facilities*
17. *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities*

18. *U.S. Access Board Revised Draft Guidelines for Accessible Public Rights of Way,* November 2005 (Appendix D)
19. *FHWA Flexibility in Highway Design* (Appendix L)
20. *Qualified Products List* (QPL) (http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm)
21. ****FHWA Diverging Diamond Interchange Informational Guide* (Appendix D)
22. *DDI Design Speed and Definitions* (Appendix O)***

2.11.3 *Design Requirements*

This Section is intentionally omitted.

2.11.3.1 ***Design Criteria***

- The Project shall be designed in accordance with the design parameters provided in *Design Approval* (Appendix O).
- SR 18 is classified as a Rural Other Freeways / Expressways and is a limited access highway with full control. Refer to Appendix O for further detail regarding design speed within the DDI.
  - The design speed for SR 18 shall be 55 miles per hour (mph) (milepost [MP] 25.41 to MP 27.61.
  - The design speed for SR 18 shall be 35 mph from SE 104th Street (MP 27.61) to the southern DDI crossover, with the exception of the 30-mph curve entering the southern DDI crossover for eastbound SR 18.
  - The design speed for SR 18 shall be 25 mph between the southern crossover and northern DDI crossover.
  - The design speed for SR 18 shall be 35 mph between the northern crossover and SE 99th Street, with the exception of the 30-mph curve entering the northern DDI crossover for westbound SR 18.
- I-90 is classified as a Rural Interstate and is a limited access highway with full control.
  - The design speed for I-90 shall be 70 mph.
- Snoqualmie Parkway is classified as a rural minor arterial with limited access control within the Project Limits.
- The design vehicle for all Project elements shall be WB-67.
- A WB-67 design vehicle shall accommodate movements for SE 104th Street, the U-turn south of the southern DDI crossover, and all Washington Department of Natural Resources (DNR) Access Driveways.
- The lane and shoulder width configurations shall match the configuration shown in the *Concept Channelization Plan for Approval* (Appendix M).
- A chain-up area on westbound SR 18 shall be constructed with a minimum length of 1,000 feet (excluding entrance and exit tapers) and a minimum

width of 20 feet, as shown in the *Concept Channelization Plan for Approval* (Appendix M).

- A chain-off area on the eastbound I-90 on-ramp shall be constructed with a minimum length of 200 feet (excluding entrance and exit tapers) and a minimum width of 20 feet, as shown in the *Concept Channelization Plan for Approval* (Appendix M).
- All alignments shall match existing superelevation rates at the limits of construction.
- All temporary pavement constructed as part of the Project shall be removed prior to Physical Completion.
- The gore areas shown in the *Concept Channelization Plan for Approval* (Appendix M) are for information only. The actual gores shall meet the requirements of the WSDOT *Design Manual*.
- Pavement markings shall be as shown in the *Concept Channelization Plan for Approval* (Appendix M).
- As determined by the WSDOT Engineer, if the Design-Builder's proposed configuration varies substantially from the conceptual design, the Design-Builder shall demonstrate equal or greater operational and safety performance using traffic modeling and Interchange Safety Analysis Tool enhanced (ISATe) safety analysis or the Interactive Highway Safety Design Model (IHSDM), as directed by the WSDOT Engineer. Documentation shall be in accordance with Section 2.12, *Project Documentation*.

2.11.3.2 Roadside Barrier Selection

All traffic barriers incorporated into the Project shall be in accordance with the WSDOT *Design Manual* and the Standard Plans; shall be ***single-slope concrete-type barrier; shall have a minimum exposed height of 42 inches; and shall be high performance barriers.***

Existing guardrail shall be evaluated for need and shall be relocated or removed as required in accordance with the WSDOT *Design Manual*. ***Existing Type 31 and Type 1 guardrail; high-tension cable barrier; and Type 2, Type F, and single slope concrete barrier may be left in place.

The median barrier between the Deep Creek Bridge and SE 104th Street shall include vertical blades to shield headlight glare. Vertical blades shall be designed in accordance with the WSDOT *Design Manual*. The location and type of vertical blades used on the project shall be documented in the Roadside Barrier Technical Memorandum.

Where practicable, roadside barrier, drainage inlets, and drainage trunk lines shall be constructed to be forward compatible with planned widening that relate to various scoping options noted in Section 2.1***

2.11.3.2.1 Walls and Barriers along Right of Way

Where there is a retaining wall along the Right of Way (ROW) within 12 feet of vehicle access such as parking, driveways, or streets, the Design-Builder shall provide a concrete barrier to prevent vehicles from going over the top of the wall, to protect the wall from damage, and to redirect errant vehicles.

Where the top of a concrete barrier is below the top of a retaining wall, the concrete barrier shall be placed as close to the wall as possible, and any gaps between the concrete barrier and wall shall be filled with concrete to the top of the concrete barrier. Where the top of the concrete barrier is above the top of a retaining wall, the concrete barrier shall be cast integral with the wall, constructed on a moment slab, or offset a minimum of 2 feet from any part of the wall, coping, or cap.

Where the top of the concrete barrier and wall are less than 6 feet above the ground on the community side of the wall, then ROW fencing shall also be provided. The fencing shall be mounted to the top of the concrete barrier or wall, whichever is taller, in a manner that prevents trash, leaves, or other debris from collecting between the fencing and the concrete barrier or wall.

2.11.3.3 Impact Attenuators

All impact attenuators shall be ***SCI 100GM/170GM, QuadGuard M10 TL-3(7), or QuadGuard M10 TL-2(7), an AASHTO MASH-compliant system available on the WSDOT *Qualified Products List*,*** and shall be designed in accordance with the WSDOT *Design Manual*.

If the Design-Builder determines that the system referenced above does not meet the design requirements for the proposed application, the Design-Builder shall submit an Impact Attenuator Technical Memorandum to the WSDOT Engineer for Review and Comment prior to construction.

2.11.3.4 Fencing

The Design-Builder shall construct, repair, and replace fence along the limited access line, except across streams, ***as shown in the Paving Plans and*** in accordance with the WSDOT *Design Manual* and the Standard Plans. Existing fencing along the limited access line that is disturbed or displaced by construction shall be ***replaced*** by the Design-Builder in accordance with the WSDOT *Design Manual* and the Standard Plans. Wildlife exclusion fence shall be installed in the vicinity of Deep Creek as shown in the Paving Plans.

2.11.3.5 Fall Protection

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

2.11.3.6 Side Slopes

Side slopes shall be in accordance with Chapter 1239 of the WSDOT *Design Manual*. For cut slopes and fill slopes behind traffic barrier protecting fixed objects, the Design-Builder shall submit a technical memorandum in accordance

with Section 2.12, *Project Documentation*, to provide the written justification for sides slopes steeper than 3:1 discussed in Chapter 1239 of the WSDOT *Design Manual*. The Design-Builder shall submit a Design Analysis in accordance with Section 2.12, *Project Documentation*, for all other side slopes not meeting the requirements of the WSDOT *Design Manual*. The technical memorandum shall be submitted to the WSDOT Engineer for Review and Comment prior to construction.

Side slopes shall be summarized in a side slope table on the construction drawings that shall identify the alignment, station range, and the side slope applied.

The final grading of trapezoidal channel sections shall be as specified in Section 2.14, *Hydraulics*.

2.11.3.7 Maintenance Access

Access requirements for facilities constructed by the Project are addressed in the applicable Sections. All existing maintenance access roads shall remain in place unless impacted by construction of permanent Work. Temporarily impacted maintenance access roads shall be restored to their original condition. Existing maintenance access roads are shown in the *Conceptual Plans* (Appendix M).

2.11.3.8 Break in Limited Access

There shall be breaks in limited access at ***the locations shown below. The gate locations are also shown in the *Concept Channelization Plans for Approval.* The Design-Builder shall coordinate the final location of access gates with WSDOT and DNR.

- MP 25.88 (Gate 834) for DNR Access
- MP 26.19 (Gate 816) for DNR Access (Existing access gate to be relocated to MP 26.13)
- MP 27.29 (Gate 817) for DNR Access
- MP 27.60 (Gate 833) for DNR Access
- MP 27.60 (Gate 832) for DNR Access
- SE 104th Street for residential access***

2.11.3.9 Channelization Design

With respect to the number of lanes and storage lengths at ***intersections and ramps,*** the configurations provided in the ****Concept Channelization Plan for Approval**** shall be the minimum, unless otherwise specified. The Design-Builder may propose reductions in these characteristics of the design with ***an Alternative Technical Concept (ATC) and in accordance with*** Section 2.21, *Traffic Operations*. WSDOT's determination to accept or reject such proposals will be in its sole discretion and such determinations are not subject to the disputes process otherwise provided under the Contract.

2.11.3.10 Pedestrian Facilities

***A Pedestrian Access Route shall be constructed to provide access for non-motorized users along the west side of the I-90/SR 18 interchange and shall be Forward Compatible with a future route along the west side of SR 18. The Design-Builder shall provide a 12-foot-wide Pedestrian Access Route with 2-foot-wide shoulders in the locations shown in the Plans. The pavement section shall be constructed as indicated in Section 2.7, *Pavement*. Crosswalks shall be constructed at the following locations:

- SR 18 (South crossover)
- Snoqualmie Parkway (north crossover)
- Eastbound I-90 to westbound SR 18 off-ramp
- Eastbound I-90 to eastbound SR 18 off-ramp
- Eastbound SR 18 to eastbound I-90 on-ramp
- Eastbound SR 18 to westbound I-90 on-ramp
- Westbound Snoqualmie Parkway to westbound I-90 on-ramp
- Westbound I-90 to eastbound Snoqualmie Parkway off-ramp

Curb ramps and landings shall be constructed on both ends of the crosswalks in accordance with the requirements of the WSDOT *Design Manual*. See Section 2.12. *Project Documentation* for documentation requirements.***

All existing pedestrian facilities impacted by the Project, including, but not limited, to sidewalks, curb ramps, accessible routes, bridges, driveways, and crossings, shall be evaluated to confirm that they meet the requirements of the WSDOT *Design Manual*. Existing pedestrian facilities that do not meet the requirements of the WSDOT *Design Manual* shall be modified to meet current WSDOT standards to the maximum extent feasible.

2.11.3.11 ***Noise Walls***

This Section is intentionally omitted.

2.11.3.12 ***Rumble Strips***

This Section is intentionally omitted.

2.11.3.13 Removal of Structures and Obstructions

The Design-Builder shall remove, at a minimum, abandoned existing manmade materials such as foundations, bridges, box culverts, and other drainage structures encountered during the Work in accordance with Section 2-02 of the Standard Specifications, or to the calculated streambed scour elevation depth, whichever is greater. If the requirements of the Governing Body having jurisdiction are more stringent than those in Section 2-02 of the Standard Specifications, then the

requirements of the Governing Body shall be followed. Identification of such material shall be the responsibility of the Design-Builder.

***Specific structures and obstructions requiring the removal include:

- Removal of fish-impassible structures
- Demolition and removal of the existing weigh station building and truck turn-around ramp and ancillary infrastructure items***

2.11.4 *Submittals*

2.11.4.1 Roadway Package

The Design-Builder shall prepare plan sheets for the Project in accordance with Section 2.28, *Quality Management Plan* and the Mandatory Standards. The Roadway Package Design Submittal shall include, at a minimum, the following Plans:

- Index
- Key Map
- Vicinity Map
- Roadway Sections
- Alignment/ROW Plan
- Site Preparation
- Roadway Profiles
- Paving Plan
- Pavement Marking Plan

2.11.4.2 Design Parameter Worksheet

The Design-Builder shall develop design parameter worksheets that include, ***but not limited to,*** all of the design criteria shown in the design parameter worksheets included in the *Design Approval* (Appendix O). The Design-Builder shall verify the information provided and update the design parameter worksheets to reflect the current design at the time of each Submittal. The design parameter worksheets shall be checked according to the Quality Management Plan and shall be submitted to the WSDOT Engineer ***with the *Channelization Plan for Approval* for Review and Comment. These shall be submitted prior to*** Project Development Approval.

2.11.4.3 Roadside Barrier Technical Memorandum

The Design-Builder shall prepare and submit a technical memorandum to the WSDOT Engineer for Review and Comment providing justification for need or removal of all existing and proposed roadside barrier. The technical memorandum shall include the following:

- Description of the roadside hazard including dimensions, station, offset, and narrative description
- Barrier length of need calculation
- Plan layout of barrier including beginning and ending stations, offset, terminal type, and barrier type
- Narrative documenting justification for the need or removal of roadside barrier, and the terminal type selection

2.11.4.4 Impact Attenuator Technical Memorandum

The Design-Builder shall prepare and submit a technical memorandum to the WSDOT Engineer for Review and Comment when using a system other than the *** SCI 100GM/170GM, QuadGuard M10 TL-3(7), or QuadGuard M10 TL-2(7)***. The technical memorandum shall include the following:

- Attenuator location
- Proposed substitution, including justification describing the attributes of the proposed attenuator that makes it the best product for the intended application
- Specific design rationale describing why one of the systems referenced above is not applicable

Acceptance will be at the WSDOT Engineer's sole discretion.

The design and written justification shall be revised based on comments received during the WSDOT Engineer's Review and Comment.

2.11.4.5 Clear Zone Inventory

The Clear Zone Inventory shall be completed prior to the start of construction and updated to reflect all changes from the Project. The Clear Zone Inventory shall be prepared using the *Clear Zone Inventory Form* (Appendix O) and Chapter 1600 of the WSDOT *Design Manual*. The Clear Zone Inventory shall be included within the Project Development Approval.

2.11.4.6 Pedestrian Facilities Technical Summary

For all existing pedestrian facilities described in this Section, the Design-Builder shall prepare and submit a technical summary to the WSDOT Engineer for Review and Comment, which outlines the pre-Project compliance conditions of all pedestrian facilities. The technical summary shall include the location of each facility; the facility type (e.g., sidewalk, sidewalk ramp, pedestrian access route, bridge, crossing, pedestrian push buttons, Utility lids, etc.); the pre-Project status (meets/does not meet criteria); mitigation required; photos; drawings; and worksheets similar to the ones provided in the *Maximum Extent Feasible Template* (Appendix O).

2.11.4.7 ***Superelevation Technical Memorandum***

The Design-Builder shall prepare and submit a technical memorandum to the WSDOT Engineer for Review and Comment. The technical memorandum shall include an evaluation of the superelevation rates and superelevation transitions for all horizontal curves on the Project. The technical memorandum shall also include the existing, proposed, and required superelevation rates, transition lengths, and position relative to the beginning or end of the horizontal curve.

2.11.5 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.12 Project Documentation

2.12.1 *General*

The Design-Builder shall conduct all Work necessary to complete the required documentation for the design and construction of the Project, and to obtain WSDOT acceptance of the final Project documentation. All final Project documentation shall be submitted in electronic format.

2.12.2 *Mandatory Standards*

The following is a list of Mandatory Standard*s* that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Design Manual* M 22-01 (Appendix D)
4. WSDOT *Bridge Design Manual* LRFD M 23-50 (Appendix D)
5. WSDOT *Highway Runoff Manual* M 31-16 (Appendix D)
6. WSDOT *Environmental Manual* M 31-11 (Appendix D)
7. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
8. WSDOT *Construction Manual M* 41-01 (Appendix D)
9. Standard Plans M 21-01 (Appendix D)
10. WSDOT *Electronic Engineering Data Standards* M 3028 (Appendix D)
11. *Qualified Products List* (QPL)
    http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm

2.12.3 *Design Requirements*

All documentation for the Project shall be submitted for review in accordance with the Quality Management Plan (QMP).

2.12.3.1 Design Documentation Package and Project File

The Design-Builder shall prepare a Design Documentation Package (DDP) and a Project File (PF) for the Project. The DDP and PF shall be maintained throughout the Project by the Design-Builder and then submitted to WSDOT for retention before Physical Completion. The Design-Builder shall obtain WSDOT generated

information not included in the original Request for Proposal that the Design-Builder needs in order to complete the DDP and PF items.

The DDP documents and explains design decisions, design criteria, and the design process that was followed. The DDP consist of three items: *Design Approval (DA)*, Project Development Approval (PDA), and DDP Supporting Documents. Further details on the DDP are found in Chapter 300 of the WSDOT Design Manual and the *Design-Build DDP Checklist* (Appendix O). The Design-Builder shall be responsible for assembling the entire DDP and submitting to WSDOT for retention.

- ***DA*:** The *DA* provided by WSDOT and included in Appendix O. The Design-Builder shall be responsible for any *DA* content changes and to record these changes in the PDA.
- **PDA:** The Design-Builder shall be responsible for completing the PDA to include all updates to the *DA* including concepts in the Technical Proposal, Alternative Technical Concepts, if included in the Project, and changes resulting from the Practical Design Workshop. The Design-Builder shall note where the PDA updates the *DA* in the DDP checklist and make these updates available to the WSDOT Engineer within seven Calendar Days of a request. The Design-Builder shall submit a draft of the PDA within 60 Calendar Days of the last Released for Construction (RFC) Submittal. The WSDOT Engineer will Review and Comment within 25 Calendar Days. All comments shall be resolved before the PDA is finalized and submitted to the WSDOT Engineer for approval. The WSDOT Engineer approval of the PDA is a requirement to achieve Physical Completion.
- **DDP Supporting Documents:** The DDP Supporting Documents are listed in the DDP checklist. When these documents are completed can vary with each project. As a result, some of these documents were completed by the WSDOT prior to *DA* and are included with the *DA* (see the *DDP checklist* inside the *DA*). If the design-builder changes or updates these DDP supporting documents, they are responsible for recording these changes in the PDA. The remaining DDP Supporting Documents required for PDA must be completed by the Design-Builder and shall be completed prior to submitting the PDA for Review and Comment.

The PF contains the documentation that is important to the Project design but not included in the DDP. This includes documents from planning, scoping, programming, design, contract assembly, utility relocation, needed right of way, advertisement, award, constructability, or maintenance review comments. The PF checklist is meant to be dynamic and is not an all-inclusive list of items. The PF begins with WSDOT and the Design-Builder completes it. The content of the PF is identified in the *PF Checklist* (Appendix O). If an item on the *PF Checklist* is not applicable, the Design-Builder shall note such on the checklist with clarifying

statements explaining why. The Design-Builder is responsible for assembling the entire PF and submitting it to WSDOT for retention prior to Physical Completion.

2.12.3.2 Basis of Design

The Design-Builder shall conduct all Work necessary to update the Basis of Design for the Project should any revisions be necessary to the Basis of Design included in the *Design Approval* (Appendix O). All Basis of Design revisions shall be approved by the WSDOT Engineer prior to the final submittal of the PDA.

2.12.3.3 Geometric Design Submittal Review

The geometric design portion of the DDP, including design parameter tables, shall be completed and submitted concurrently or prior to the submittal of the ***Channelization Plans for Approval*** Package in accordance with Chapter 300 of the WSDOT *Design Manual*. Paving and structural plans for the Project shall not be stamped "Released for Construction" prior to submitting the design parameters and the geometric design portion of the DDP to the WSDOT Engineer for Review and Comment. If the design includes a roundabout the Design-Builder shall conduct the geometric design peer review in accordance with WSDOT *Design Manual* prior to submittal.

The Geometric Design Submittal is intended to provide an opportunity for the WSDOT Engineer to review and provide comments and feedback on the geometric elements of the project prior to developing plans for construction. The Geometric Design Submittal shall be submitted in an electronic format. The submittal shall include a PDF showing geometric and channelization information, applicable supporting documentation including, but not limited to, cross sections, truck turning templates, location of key features such as bridges, walls, and stormwater facilities All pedestrian access routes shall be identified in the submittal and shall include supporting documentation demonstrating compliance with WSDOT design criteria for pedestrian facility design elements.

The geometric design may be phased to align with the Design-Builder's Work. If a phased approach is used the Design-Builder shall provide a phasing plan that shows logical breaks and match points for each area.

2.12.3.4 ***Channelization Plan for Approval*** Package

A *Concept Channelization Plan for Approval* (Appendix M) has been developed for this Project.

The Design-Builder shall develop a ***Channelization Plan for Approval*** Package for the Project and obtain the WSDOT Engineer's approval. Substantial Completion for the Project will not be granted prior to the WSDOT Engineer confirming that the Design-Builder has addressed all comments on the preliminary ***Channelization Plan for Approval*** Package. The preliminary ***Channelization Plan for Approval*** Package shall be updated for design

changes during construction and resubmitted for review and signature prior to Final Acceptance.

The ***Channelization Plan for Approval*** Package shall be prepared by, or under the direct supervision of, a Professional Engineer. Each sheet of the ***Channelization Plan for Approval*** Package shall carry the Professional Engineer's stamp and signature. The ***Channelization Plan for Approval*** Package shall be submitted using the WSDOT standard format and shall follow the ***WSDOT *Northwest Region Plans for Approval Checklist****.

The preliminary submittal of the ***Channelization Plan for Approval*** Package shall include a PDF of the ***Channelization Plan sheets*** and the completed ***WSDOT *Northwest Region Plans for Approval Checklist****.

The final submittal of the ***Channelization Plan for Approval***Package shall be electronic, with all comments resolved, and include one PDF of the package that is stamped and signed electronically.

2.12.3.5 Technical Memoranda

The Design-Builder shall provide technical memoranda that document decisions made during completion of the design regarding components not included in the Mandatory Standards. The technical memoranda shall be provided with associated preliminary Design Documents at the task force meetings. Technical memoranda shall be dated, indicate the Project title, and include the stamp and signature of a Professional Engineer. The technical memoranda shall follow the following format:

- Section 1 - Subject or purpose
- Section 2 - Background or existing conditions
- Section 3 - Discussion of alternatives
- Section 4 - Recommendations
- Section 5 - Conclusions

2.12.3.6 Calculations

All calculations shall be prepared and checked in accordance with the QMP. The calculations shall be submitted to the WSDOT Engineer for Review and Comment, concurrently or prior to the submittal of the corresponding Design Plans.

2.12.3.7 Design Analyses

The Design-Builder shall conduct all Work necessary to complete the Design Analyses for the Project. All Design Analyses shall be prepared by, or under the direct supervision of, a Professional Engineer. The cover of each Design Analysis shall carry the Professional Engineer's stamp and signature.

2.12.3.7.1 Pre-Approved Design Analyses

The Design Analyses that have been prepared and approved based on the ***Concept Channelization Plan for Approval* (Appendix M)*** are listed below and are included in the *Pre-Approved Design Analyses* (Appendix O):

- ***Design Analysis #1 - SR 18/SE 104th Street - At-Grade Intersection within a Limited Access Full Control Corridor
- Design Memorandum #2 – SR 18/SE 104th Street Intersection Pedestrian Crossing Evaluation
- Design Analysis #3 - SR 18 - Existing Type C Access Approaches
- Design Analysis #5 - I-90/SR 18 Westbound On-Ramp Peak-Use Shoulder Width, Turning Roadway Width, and Bicycle Use of Shoulders
- Design Analysis #6 - I-90/SR 18 Interchange - Westbound Off-Ramp Taper
- Design Analysis #7 – Not Used
- Design Decision #8 - Curve Lengths
- Design Analysis #9 – Not Used
- Design Analysis #10 - I-90/SR 18 - WB Off-Ramp Vertical Stopping Sight Distance
- Design Decision #11 – I-90/SR 18 – WB Off-Ramp Culvert Target Vertical Clearance***

2.12.3.7.2 Additional Design Analyses

The Design-Builder shall prepare and obtain the WSDOT Engineer approval and Local Agencies' approval as required, for all Design Analyses incorporated into the Project within the Project limits, and not included in the *Pre-Approved Design Analyses* (Appendix O) described in this Section. Although additional Design Analyses may be requested, the Design-Builder is advised that there is no assurance they will be approved.

If required, the Design-Builder shall update *Pre-Approved Design Analyses* (Appendix O). The Design-Builder shall prepare documentation that conforms to the WSDOT *Design Manual* and shall submit this documentation electronically to the WSDOT Engineer for review and approval.

If the WSDOT Engineer or the Design-Builder identifies that the Basic Configuration requires any Design Analyses that have not been approved for this Project at the time of Contract award, the Design-Builder shall prepare documentation for the Design Analyses which conforms to the WSDOT *Design Manual* and is in the same format as the *Pre-Approved Design Analyses* (Appendix O). ***The Design-Builder shall coordinate with WSDOT Engineer prior to beginning work on any additional design analyses.*** The Design-Builder shall submit this documentation electronically to the WSDOT Engineer

for Review and Comment. The Design-Builder shall not incorporate any Design Analyses into the Project without receiving the WSDOT Engineer approval and Local Agencies' approval as required. Impacts associated with implementing additional Design Analyses associated solely with the Basic Configuration shall be considered Necessary Basic Configuration Changes.

Design Analyses approved after Contract award shall be addressed in accordance with Section 1-04 of the *General Provisions*.

2.12.3.8 Maximum Extent Feasible

At locations where it is not feasible to meet WSDOT design criteria for pedestrian facility design elements, the Design-Builder shall prepare and submit a Maximum Extent Feasible (MEF) document ***and, if required, shall update the Pre-Approved MEF documentation that conforms to the WSDOT *Design Manual* and shall submit a draft MEF document*** for the WSDOT Engineer to Review and Comment. All MEF documents shall be submitted electronically and prepared by, or under the direct supervision of, a Professional Engineer. The cover of each MEF shall carry the Professional Engineer's stamp and signature. The Design-Builder shall coordinate with the WSDOT Engineer and the Regional Americans with Disabilities Act Coordinator prior to preparing and submitting the MEF document. The MEF document shall be prepared using the *Maximum Extent Feasible Template* (Appendix O). The MEF document shall be submitted for electronic approval by the WSDOT Engineer in accordance with Chapter 300 of the WSDOT *Design Manual*. Paving Plans that include areas with pedestrian access routes covered in the MEF shall not be stamped "Released for Construction" prior to the Design-Builder receiving confirmation from the WSDOT Engineer that all comments have been addressed on the MEF document.

*2.12.3.8.1 ***Pre-Approved Maximum Extents Feasible***

Signed copies of the Pre-Approved Maximum Extents Feasible documentation that have been prepared and approved based on the *Concept Plans* (Appendix M) are listed below and are included in the *Pre-Approved Maximum Extents Feasible Analyses* (Appendix O):

- Preliminary Maximum Extent Feasible: I-90/SR 18 I/C to Deep Creek - Interchange Improvements and Widening***

2.12.3.9 Final Design Documents

Prior to Physical Completion or termination of the Contract, the Design-Builder shall collect and submit all Design Documents prepared in the performance of the Contract. The Final Design Documents shall be compiled in an electronic format approved by the WSDOT Engineer and include, at a minimum, the following:

- PF
- DDP
    - PDA

    - DDP Supporting Documents
    - Reports and Technical Memoranda
- Updated electronic MicroStation and InRoads files in accordance with the WSDOT *Electronic Engineering Data Standards Manual*, including all RFC sheets, reference files, and base mapping (topography, including survey updates)

The Design-Builder shall ensure that the Final Design Documents reflect the actual condition of the constructed Work, to the same degree of detail as the RFC Documents.

The Final Design Documents shall include all changes and corrections to the documents that depict the final completed component, with relevant data shown (including copies of calculations not previously submitted with Working Drawings or with the Final Design Submittal).

The WSDOT Engineer will Review and Comment on the submittal and advise the Design-Builder of its acceptance of the Final Design Documents or will provide comments detailing issues to be resolved. The Design-Builder shall address all comments in a manner consistent with the comment resolution process outlined in the Design-Builder's QMP, and then resubmit the Final Design Documents to the WSDOT Engineer. The WSDOT Engineer approval is required prior to Completion.

2.12.4 *Construction Requirements*

The Design-Builder shall conduct all Work necessary to provide temporary and permanent final records for the Project in accordance with the WSDOT *Construction Manual* and this Section.

2.12.4.1 As Built Plans, Special Provisions, and Technical Specifications

Prior to Physical Completion of the Project, the Design-Builder shall update and re-release all RFC and Design Documents affected by Revisions made during construction in accordance with Section 2.28, *Quality Management Plan*. The electronic MicroStation and InRoads files shall be updated with all Revisions to show the as-constructed conditions, incorporating all revisions made during construction. The Design-Builder shall make all electronic MicroStation and InRoads files consistent with the software and drawing conformance requirements of the Technical Requirements and shall submit an electronic copy of the As Built Plans in accordance with the WSDOT *Construction Manual* and one complete electronic copy of the updated MicroStation and InRoads files.

All revisions of the RFC Documents shall be performed by, or under the direct supervision of, the Engineer of Record (EOR) for the documents. For Revisions, each re-issued sheet of the revised RFC Plans and the cover of each of the re-issued revised RFC Technical Specifications shall include the Professional Engineer's stamp and signature. The Design-Builder shall outline the threshold for these changes in their QMP.

The WSDOT Engineer shall be notified of design revisions made during construction. Plans, calculations, and other supporting documents shall be submitted to the WSDOT Engineer for Review and Comment prior to implementation of the revisions during construction. Calculations for design revisions made during construction shall be incorporated into the design calculation file when construction is completed in accordance with Section 2.28, *Quality Management Plan*.

The As Built Plans shall reflect the same degree of detail as the RFC Documents in accordance with Section 2.28, *Quality Management Plan*. Minor changes to RFC Plans (not requiring EOR reissue of RFC Plans or specifications) may be electronically marked with redline in PDF files of the RFC documents. Underground features, including but not limited to, buried or abandoned structures, shall be documented on the As Built Plans showing the location and elevation. The Design-Builder shall also provide reproducible originals of all Working Drawings.

The Design-Builder shall submit As Built Plans in accordance with the requirements of the WSDOT *Construction Manual*. As Builts shall be submitted as a complete package in sequence, including all RFC sheets, both those with Revisions and those without, in accordance with the numbering and naming conventions as defined in the WSDOT *Plans Preparation Manual*.

Traffic Control Plans and Temporary Erosion and Sediment Control Plans are exempt from the As Built Plan requirements.

The WSDOT Engineer will Review and Comment on the submittal and advise the Design-Builder of its acceptance of the Final Design Documents or will provide comments detailing issues to be resolved. The Design-Builder shall address all comments in a manner consistent with the comment resolution process outlined in the Design-Builder's QMP, and then resubmit the Final Design Documents to the WSDOT Engineer. The WSDOT Engineer's approval is required prior to Completion.

2.12.4.2 Final Records

The Design-Builder shall submit final records prior to Completion or termination of the Contract. The Design-Builder shall prepare and submit documentation for final records in accordance with the WSDOT *Construction Manual* and the *Contract File Index* (Appendix O), unless otherwise noted in this Section.

2.12.4.2.1 Permanent Final Records

All final record books prepared for permanent final records shall be numbered as outlined in the WSDOT *Construction Manual* and below:

- Final Record (Book No. 1)
  - The Design-Builder Personnel List (Section 2) – Containing the name and classification of managers, supervisors, foremen, testers, engineers, and any other Design-Builder personnel who were responsible for signing documents or forms or were responsible for

decision-making on the Project. Each person shall sign his or her identifying initials after his or her name on this list in the same manner as it appears in other Project documents.

  - Final Estimate Sheets (Section 4) – Will be prepared by the WSDOT Engineer and provided to the Design-Builder for review and signature
  - Record of Construction Materials (Section 8) – A tabulation showing the source of all construction materials

- Project Engineer's Diaries (Book No. 2)
- Daily Reports (Book No. 3)
- Traffic Surveillance and the Design-Builder's Daily Report of Control Summary and Log Surveillance (Book No. 4)
- Pile Driving Records (Book No. 5)
- Post Tensioning Records (Book No. 6)
- Contaminated Materials Disposal Bills (Book No. 7)
- Miscellaneous Records (Book No. 8)
  - Materials certification
  - As Built Plans
  - Completed shop drawings

2.12.4.2.1.1 Electronic Permanent Final Records

The Design-Builder shall submit all Permanent Final Records in electronic format.

The Design Builder shall submit an electronic records plan to the WSDOT Engineer for Review and Comment. The plan shall list all Permanent Final Records that will be created, the file structure, and specific naming conventions for each type and group. The electronic records plan shall comply with the requirements of the Final Records ECM User Guide.

Electronic Permanent Final Records electronic format shall meet the following:

A. Type/Format: All documents must be flattened PDFs. These shall be created electronically whenever possible, but scanned documents are acceptable. Original color shall be preserved with one exception – colored triplicate forms shall be scanned in black and white. Minimum resolution shall be 300 dpi. For archival purposes, the electronic file submitted by the Design-Builder shall be considered as the original.
B. All file names shall be formatted as such: YYYY-MM-DD~filename.pdf where the date is the date of the document, not the date it was filed. The files will not load properly to the Enterprise Content Management system if the files are not named accordingly.
C. File names shall include enough information to avoid any duplicate file names.

Example of file names for Contractor's Daily Report of Traffic Control:

- 2016-03-11~Jon Doe.pdf
  - "Contractor's Daily Report of Traffic Control" is not required in the filename because the folder structure provides that as metadata when it imports the file to the Enterprise Content Management system.

D. 2016-03-11~Contractor's Daily Report of Traffic Control Jon Doe.pdf
- Including the document type is acceptable. If this is how the file is named, then there is no need to rename it.

E. 2016-03-11~JMD.pdf
- If the initials are used, consider adding a middle initial to prevent duplicate file names.

Use this same format on all file types: unique file names with enough information to identify specific documents. YYYY-MM-DD~ must come first.

2.12.4.2.2 Temporary Final Records

Temporary final records consist of all Project records that are not kept as permanent final records. The Design-Builder shall submit the following temporary final records in electronic format, in addition to the requirements provided in Chapter 10 of the WSDOT *Construction Manual*:

- A list of all field design changes (Revisions and minor changes)
- Test reports for storm sewer, sanitary sewers, and water mains
  - The Design-Builder shall develop and complete a report for the testing of storm sewers, sanitary sewers, and water mains. This report shall include the type of pipe, the location of the pipe, all of the calculated factors for the testing, the test results, and whether it passes or fails.
- Construction survey
  - Copies of all survey calculations and survey notes including grade books and cross-section notes
- Material acceptance test reports
- Source of materials documentation
- Copies of Working Drawings
- Copies of certified payrolls (for Federally-funded projects or when requested in writing by the WSDOT Engineer)
- Horizontal and vertical alignment data

2.12.4.3 Close Out Task Force

The Design-Builder shall establish a Close Out Task Force to oversee and provide input on developing design documentation and final records and temporary final records. At a minimum, the Close Out Task Force meetings shall include the Project Quality Manager, Document Control Manager, Project Manager, Design

Manager, and the WSDOT Engineer. The Design-Builder shall submit the meeting schedule and draft agenda to all attendees prior to the first meeting. The meetings shall be held monthly starting ***60 Calendar Days*** after Notice to Proceed , or earlier as proposed by the Design-Builder, and continuing through Substantial Completion; and weekly from Substantial Completion through Completion.

2.12.5 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section. All miscellaneous design submittals shall be submitted electronically in a file format approved by the WSDOT Engineer.

End of Section

2.13 Bridges and Structures

2.13.1 *General*

The Design-Builder shall perform all Work necessary to complete the bridges and structures for the Project. Elements of Work shall include, at a minimum, the following as described in Section 2.1.1.4, Project Description:

- ***Design and construction of a new bridge over Deep Creek
- Design and construction of a new bridge over Raging River
- Design and construction of a new bridge over Lake Creek
- Design and construction of new fish stream channel structures at the I-90/SR 18 interchange
- Design and construction of new culverts and buried structures
- Design and construction of new retaining walls, barriers, moment slabs, bridge approach slabs, sign structures, signal structure foundations, electrical and ITS controller cabinet foundations, and illumination structures
- Removal of the existing HMA overlay, deck repair, installation of a waterproofing membrane, and placement of a new 3-inch HMA overlay at existing Bridge 18/34***

The Plans showing the existing bridges and other structures are located in the *As Builts* (Appendix N). The Plans are not guaranteed to be dimensionally accurate or complete. The Design-Builder shall field measure and verify existing dimensions as required for their Work.

2.13.1.1 *Forward Compatibility*

***This section is intentionally omitted. ***

2.13.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Bridge & Structures Office Design Memoranda* (Appendix D)

4. WSDOT *Bridge Design Manual LRFD* M 23-50 (Appendix D)
5. WSDOT *Geotechnical Design Manual* M 46-03 (Appendix D)
6. *AASHTO Guide Specifications for LRFD Seismic Bridge Design*
7. *FHWA Seismic Retrofitting Manual for Highway Structures: Part 1 - Bridges*
8. *AASHTO LRFD Bridge Design Specifications*
9. *FHWA Evaluating Scour at Bridges, HEC-18*
10. *AASHTO Manual for Bridge Evaluation*
11. WSDOT *Design Manual* M 22-01 (Appendix D)
12. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
13. WSDOT *Construction Manual* M 41-01 (Appendix D)
14. *AASHTO LRFD Bridge Construction Specifications*
15. *AASHTO Guide Design Specifications for Bridge Temporary Works*
16. WSDOT *Materials Manual* M 46-01 (Appendix D)
17. Standard Plans M 21-01 (Appendix D)
18. *Qualified Products List* (QPL)
    http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm
19. *LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*
20. *AWS Structural Welding Code - Steel* (AWS D1.1/D1.1M)
21. *AWS Structural Welding Code - Reinforcing Steel* (AWS D1.4/D1.4M)
22. *AASHTO/AWS Bridge Welding Code* (AWS D1.5M/D1.5)
23. *American Concrete Institute Code Requirements for Environmental Engineering Concrete Structures* (ACI 350)
24. *AASHTO* LRFD Road Tunnel Design and Construction Guide Specifications
25. I-90/SR 18 Architectural Design Criteria (Appendix L)
26. Goals, Guidance, and Standards for the I-90 Corridor MTSG National Scenic Byway (Appendix L)

2.13.2.1 *Bridge Design Manual Rights and Responsibilities*

The WSDOT *Bridge Design Manual*, as modified by the WSDOT *Bridge & Structures Office Design Memoranda*, allocates responsibilities as follows:

- Rights and Responsibilities - The following clarifies which rights and responsibilities discussed in the WSDOT *Bridge Design Manual* are applicable to the Design-Builder:
  - The Design-Builder shall complete all analyses, evaluations, load ratings, Plans, and specifications discussed in the WSDOT *Bridge Design Manual*.
  - All such analyses, evaluations, load ratings, Plans, and specifications are subject to Review and Comment by WSDOT.
  - All references to WSDOT Sections, offices, and engineers shall mean WSDOT.
- Where the WSDOT *Bridge Design Manual* or the WSDOT *Bridge & Structures Office Design Memoranda* requires approval by the WSDOT Bridge Design Engineer, the Design-Builder shall be responsible for obtaining approval from the WSDOT Engineer prior to proceeding with the design.

2.13.3 *Personnel Requirements*

The Design-Builder shall provide a Structural Lead Engineer (SLE) to manage, coordinate, and review all aspects of the structural Work completed for the Project. The SLE shall provide written certification that the design and construction of all permanent and temporary Work is in conformance with the Contract requirements and the Quality Management Plan for each structural drawing, calculation package, temporary structure package and design revision during construction.

The SLE shall have a minimum of 10 years of experience in the design of bridges, retaining walls, and other highway related structures. This individual shall be registered as a Structural Engineer in the State in accordance with RCW 18.43.040.

The Engineer of Record (EOR) for all structural engineering Design Documents for significant structures described in RCW 18.43.020(12) and for all bridges shall have a minimum of 10 years of experience in the design of bridges, retaining walls, and other highway related structures. The EOR shall be registered as a Structural Engineer in the State in accordance with RCW 18.43.040.

The EOR for all structural engineering Design Documents for all other structures in the Project shall be registered as a Professional Engineer or Structural Engineer in the State in accordance with RCW 18.43.040.

2.13.4 *Design Criteria*

The Design-Builder shall analyze and design all new permanent bridges and structures, and all existing structural elements whose load-carrying capacities are

altered by the Work, using Load and Resistance Factor Design (LRFD) as defined in the WSDOT *Bridge Design Manual* and the *AASHTO LRFD Bridge Design Specifications*.

The Design-Builder shall design and construct permanent bridges and structures to achieve a minimum design life of 75 years. Minimum clearances shall be as follows and shall be maintained at all times during and after construction:

- New structures over a roadway shall provide a minimum vertical clearance of 16’ - 6”.
- New bike/pedestrian structures crossing a roadway shall provide a minimum vertical clearance of 17’ - 6”.
- New structures over a railroad shall provide a minimum vertical clearance of 23’ - 6” measured to the top of the rail.
- New bike/pedestrian routes crossing under a structure shall have a minimum vertical clearance of 10’-0”.
- New overwater structures shall provide minimum clearances that meet the following requirements and as specified in Section 2.30, *Water Crossings*:
  - 3 feet of freeboard above the 100-year Mean Recurrence Interval (MRI) water surface to the lowest point of the spanning member, unless otherwise stated.
  - 6 feet above the thalweg taken perpendicular to the stream bearing to the controlling top elevation as defined in Section 2.30.1, *Water Crossings*, unless otherwise stated or shown otherwise on conceptual plans.
- For modified existing structures, the minimum vertical clearance shall not be less than the existing clearance.

When multiple minimum clearances are listed the required minimum vertical clearance shall be the greater value.

Minimum foundation cover requirements shall be as follows:

- The top of new structure foundations including pedestals, spread footings, pile caps and shaft caps shall be below the 100-year scour level, or it shall be located outside of the minimum hydraulic clear span width. Existing pedestals, spread footings, pile caps and shaft caps shall be protected against scour to the 100 year scour elevation.
- The bottom of new structure foundations including spread footings, pile caps and shaft caps (or bottom of seal, if used), and bottom of wall elements such as fascia panels, lagging, and leveling pads shall be 2 feet minimum below the calculated 500-year scour level, or shall be protected against scour to that level.

Refer to Section 2.11, *Roadway*, for design criteria regarding barrier type and height. All structure traffic barriers shall be ***single slope and*** a minimum 42 inches in height, measured from the top of finished roadway and bridge deck and shall meet the Test Level design criteria in accordance with the WSDOT *Bridge Design Manual*.

Fall protection shall be provided at the top of all retaining walls and retaining wall terraces in accordance with Section 730.04(7)(b) of the WSDOT *Design Manual*. Fall protection shall be a standard guardrail system, as described and in accordance with the requirements in the WAC 296-880-40005. Timber shall not be used as a material type for standard guardrail. The Standard Plan Chain Link Fence Types 3 and 4, and Glare Screen Types 1 and 2 are not acceptable fall protection systems. For fall protection features that are exposed to the public, design of railings shall be in accordance with Chapter 13 of the *AASHTO LRFD Bridge Design Specifications.*

2.13.4.1 *Bridge Design Criteria*

The following permanent bridge superstructure types are permitted for this Project:

- ***Precast Prestressed Concrete I-Girders with cast-in-place concrete slab
- Precast Prestressed Concrete Slab Girders with cast-in-place concrete topping slab (only for Lake Creek Bridge)
- Steel Plate Girders and Steel Box Girders with cast-in-place concrete slab
- Post-Tensioned Concrete Box Girders

For construction of the new Raging River Bridge located under the Bonneville Power Administration (BPA) transmission lines, see the constructability memo in Appendix S.***

Masonry or timber shall not be used as materials for permanent bridge superstructures or substructures.

For vehicular bridges, a minimum of three girder lines, with exception of two girders lines for tub girders, shall be used to provide redundant load paths. Intermediate hinges shall not be used with permanent bridge structures.

Non-redundant, fracture critical pier caps shall not be used.

2.13.4.1.1 Bridge Seismic Design Criteria

The seismic analyses and design for all new permanent bridge foundations shall be in accordance with the *AASHTO Guide Specifications for LRFD Seismic Bridge Design*, as modified by the WSDOT *Bridge Design Manual*, and the code-based response spectra and coefficients applicable to this Project as defined in Section 2.6, *Geotechnical, and the WSDOT Geotechnical Design Manual*.

All bridges on this project shall have an operational classification of Ordinary, except for the following bridges:

None

2.13.4.1.1.1 Liquefaction and Lateral Spread

The Design-builder shall follow the requirements of the Mandatory Standards for liquefaction and lateral spread design.

2.13.4.1.2 Bridge Widening Design Criteria

The Work on bridges to be widened shall be in accordance with the WSDOT Bridge Design Manual and shall include the following analysis and retrofit criteria:

- Determination of minor and major modifications and widening projects as defined in the WSDOT *Bridge Design Manual*.
- Determination of strength Capacity to Demand (C/D) ratios for the existing and modified structure and determination of displacement C/D ratios for the existing and modified structures using the pushover method of analysis. A summary of C/D ratios shall be provided for each structure.
- Where the C/D ratio for the existing structure is less than 1.0 or the C/D ratio for the modified structure is less than 1.0, design and construction of the retrofits is required to modify the structure to meet or exceed a C/D ratio of 1.0.
- Retrofit of the existing bridge foundations may be required in accordance with the differential settlement criteria in Section 2.6, *Geotechnical*.
- Analysis for seismic demand effects shall be separate from settlement due to liquefaction.

2.13.4.1.3 Existing Bridge Monitoring and Performance Criteria

The Design-Builder shall develop and implement a monitoring program for the existing bridges ***90/78N and 90/78S at the I-90/SR 18 interchange. The monitoring plan shall cover all activities associated with the construction of the stream channel structures for Stream LC-G and walls for the pedestrian access route. The monitoring plan shall meet the requirements of this Section and Section 2.6.9.3, *Geotechnical*. In addition, measures to protect these bridges shall meet the requirements of this Section***.

The monitoring program shall be used to assess the stability and safety of the existing bridges for public use by comparing baseline measurements to routine monitoring measurements upon commencement of the construction activities described above. The monitoring program shall include the following elements:

Pre-construction Condition Survey: There shall be two baseline bridge surveys. The first survey shall be performed at least 14 Calendar Days prior to commencement of any construction activities (soil/rock removal, pile driving, structural Work, etc.) for the ***bridges listed above***. The second survey shall be performed 24 hours prior to starting the construction activities in order to verify stability of the baseline measurements. Both surveys shall be performed on all spans and piers of the existing bridge and shall document visible cracks, defects, and any unusual conditions. The surveys shall provide a geometric baseline for the bridge deck and the location and elevation of bridge piers. Baseline measurements shall include estimated effects due to temperature, traffic impacts, etc. on the displacement measurements. The first survey shall include installation of survey targets on the existing spans and piers that will be used to track permanent bridge displacements. At a minimum, survey targets shall be located ***as follows:

- At each column of both bridges at Piers 2 and 3, within 2 feet vertical distance below the top of each column.
- At the front face of the abutment wall of Piers 1 and 4, within 2 feet vertical distance below the top of abutment wall. At a minimum, targets at Pier 1 of Bridge 90/78N shall be placed within 10 feet of the wall ends. Targets at Pier 1 of Bridge 90/78S and Pier 4 of Bridges 90/78N and 90/78S shall be spaced no more than 20 feet on-center across the length of the wall.***

See Appendix S for recent WSDOT condition inspection documents for the existing bridges.

Routine Monitoring: Monitoring of the survey targets on the existing bridges shall start 24 hours prior to commencement of any construction activities, then continue until ***construction of the stream channel structures and Pedestrian Access Route walls under the bridges are complete.*** Monitoring ***shall be conducted using equipment that can continuously measure movement of the bridges at all times. Readings shall be taken a minimum of every 30 minutes and be uploaded to an online database. The system shall be equipped with alarms to alert key staff as soon as trigger and maximum displacements are reached.*** Access to the online database shall be provided to WSDOT up to Substantial Completion of the Project.

- The trigger, maximum, and repair displacement values shown below define the threshold levels to implement additional monitoring requirements and adjust construction practices as required. Displacement measurements shall be taken to a precision of 0.01 feet.

Threshold Levels for Permanent ***Vertical and Horizontal*** Displacements			
Pier No.	Trigger Level	Maximum Level	Repair Level
1, 2, 3, and 4	***1/4-inch***	***1/2-inch***	***3/4-inch***

Damaged, missing, or non-functioning survey equipment or targets shall be replaced and re-baselined within 24 hours. The Design-Builder shall develop a Corrective Action Plan describing specific actions to be taken if permanent displacements exceed the threshold levels given above. This plan shall be submitted for Review and Comment at least 14 Calendar Days prior to any construction activities.

Structural damage to the existing bridges caused by the Design-Builder's construction activities, and creating safety concerns for public use on the existing bridges, shall be repaired regardless of the measured displacement levels. The Design-Builder shall be responsible for all associated design and repair costs, and implementation of repairs to restore stability and safety to the bridges for public use.

The monitoring program shall include the following elements:

- ***Piers 1, 2, 3, and 4 of both bridges***

The Design-Builder shall perform remedial measures for each threshold level as described below:

- Trigger Level: Alert the WSDOT Engineer the same Calendar Day that the trigger level has been exceeded. Report displacement measurements to the WSDOT Engineer until it is verified that movement has stopped. Monitor the adjacent targets until movements have stabilized. Implement procedures to limit additional movement and protect the affected facility.
- Maximum Level: ***Temporarily suspend construction activities and alert WSDOT.*** Report displacement measurements to the WSDOT Engineer. WSDOT may suspend ***construction*** activities and require the Design-Builder to submit alternative proposals for minimizing further movement. If Work is suspended, the Design-Builder shall obtain approval prior to restarting ***construction*** activities.
- Repair Level: All construction activities affecting the existing bridge shall be suspended immediately and WSDOT shall be notified immediately to assess the stability and safety of the existing bridge for public use. The Design-Builder, SLE, and WSDOT Engineer shall determine the extent of

temporary repairs required for the existing bridge before construction activities are allowed to resume. Structural repairs shall be designed and constructed by the Design-Builder and SLE to restore stability and safety of the existing bridge for public use.

***<u>**Protection Measures**</u>: To ensure that the existing bridges are protected from damage during construction, the Design-Builder shall meet the following additional requirements:

Stream Channel Wall Protection Measures:

Listed below are the stream channel wall protection measures that shall be implemented:

1. Design and construction staging shall be based on a three-dimensional deformation-based analysis that provides predicted displacements of the existing bridge Piers 3 and 4 during each stage of construction. Design and sequence of construction shall limit expected displacements of existing piers to less than the trigger levels listed above.
2. Design shall include unbalanced hydrostatic loading equal to the 100-year ground water surface elevation.
3. Excavation shall limit the duration of open face exposure to 12 hours. An open face is defined as any cut slope steeper than 1.5 horizontal:1 vertical.
4. Excavation shall limit the open face area to a maximum of 4 feet high by 10 feet wide, with at least 30 feet of continuously supported face or existing slope between sections of open face.
5. Walls adjacent to Pier 4 of the bridges shall be supported laterally by ground anchors. Minimum ground anchor requirements are as follows:
   - Anchors shall be drilled with full-length casing.
   - For up to 10 feet below the elevation of the bottom of the existing bridge footing, the bond zone shall be located behind a 2 vertical:1 horizontal downward projection from the back heel of the Pier 4 footing.
   - The bond zone shall be grouted with high-strength grout. The no-load zone shall be filled with low-strength grout or other low-strength material all the way to the face of the wall.
   - The minimum clear distance between the anchor and the bottom of bridge footing shall be 5 feet.
6. Prior to excavation and during construction, it shall be verified that the ground water level is at least 2 feet below the bottom of excavation.
7. The stream channel walls at Bridge 90/78N shall be constructed first to demonstrate that the proposed construction methods do not result in excessive bridge displacements prior to beginning construction of the stream channel walls at Bridge 90/78S.***

Pedestrian Access Route Wall Protection Measures:

Listed below are the pedestrian access route wall protection measures that shall be implemented:

1. Wall excavations within a 1.5 horizontal:1 vertical downward projection from the bottom edge of Pier 1 shall be supported by ground anchors meeting the following minimum requirements:
   - Anchors shall be drilled with full-length casing.
   - For up to 10 feet below the elevation of the bottom of the existing bridge footing, the bond zone shall be located behind a 2 vertical:1 horizontal downward projection from the back heel of the Pier 1 footing.
   - The bond zone shall be grouted with high-strength grout. The no-load zone shall be filled with low-strength grout or other low-strength material all the way to the face of the wall.
   - The minimum clear distance between the anchor and the bottom of bridge footing shall be 5 feet.
   - Excavation shall limit the duration of open face exposure to 12 hours. An open face is defined as any cut slope steeper than 1.5 horizontal:1 vertical.
   - Excavation shall limit the open face area to a maximum of 4 feet high by 10 feet wide, with at least 30 feet of continuously supported face or existing slope between sections of open face.
2. For wall excavations outside a 1.5 horizontal:1 vertical downward projection from the bottom edge of Pier 1, ground support shall not be located within 5 feet of the bottom of the Pier 1 footing and the holes for ground support shall be drilled with full-length casing.

2.13.4.1.4 Load Rating Report

All new bridges, widened bridges, modified bridges, rehabilitated bridges, and detour bridges that carry vehicular loads and are 20 feet or more in span length (measured from back to back of pavement seats along the centerline of the roadway) shall be load rated in accordance with the WSDOT *Bridge Design Manual*. Detour bridges, for the purpose of load rating, are defined as bridges that will be in place for more than 90 Calendar Days. The Design-Builder will not be required to retrofit the existing structures for a reduction in the load rating due to existing bridge overlay replacements, removal and replacement of traffic barriers, or both.

2.13.4.1.5 Precast Prestressed Concrete Girders

Precast prestressed concrete girders include both pre-tensioned and post-tensioned girders.

The Design-Builder shall provide continuity reinforcement at intermediate piers in the bridge deck to resist negative moments due to live load and superimposed dead loads. Prestressed concrete girders shall be designed as simple span for all single span and multi-span bridges.

2.13.4.1.6 Steel Plate Girders and Steel Box Girders

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

Drip plates shall be provided on the bottom flanges on the exterior side of the exterior steel plate girders to direct water runoff away from bearings and bridge seats.

With the exception of weathering steel that is used east of the Cascades, all structural steel shall be painted in accordance with Section 6-07 of the Standard Specifications.

2.13.4.1.7 Bridge Foundations

The Design-Builder shall construct bridge abutments, wingwalls, and curtain walls with precast or cast-in-place reinforced concrete. Where structural earth walls adjoin bridge abutments or curtain walls, the joint shall be a single vertical joint full height to the bottom of the traffic barrier. Curtain walls at bridge abutment wall corners shall be cast-in-place walls integral with the abutment walls and extending at least to the back of the footings. All girder seats at abutments and pier caps shall be sloped to drain moisture accumulation.

The Design-Builder shall use wingwalls, curtain walls, and retaining walls as required by slope geometry and under-bridge clearances. These walls shall prevent soil slopes from spilling onto girders and bearings. End slopes shall meet stability requirements defined in Section 2.6, *Geotechnical,* and the WSDOT *Geotechnical Design Manual*, and shall be no steeper than 1.5H:1V.

2.13.4.1.8 Bridge Decks and Expansion Joints

The Design-Builder shall design and construct all vehicular bridge decks using cast-in-place reinforced concrete or stay-in-place concrete deck panels in accordance with Section 15.5.5 of the WSDOT *Bridge Design Manual*. The bridge deck protection system for new and existing vehicular bridges shall be in

accordance with Section 15.5.5.D of the WSDOT *Bridge Design Manual*. Bituminous or bituminous-with-membrane overlays for permanent bridge deck construction on new vehicular bridges shall not be used.

The bridge deck for widened structures shall be continuous between expansion joints and shall match the existing expansion joint locations. Expansion joint headers shall be re-built the entire width of the new and existing bridge deck. Strip seals and compression seals shall be removed and replaced with new seals, in one continuous piece, for the entire width of the new and existing bridge deck.

The Design-Builder shall not use steel finger expansion joints on new bridges. All expansion joints shall be watertight. Longitudinal expansion joints shall not be used on new bridges or widened bridges. The maximum skew for expansion joints on new bridges shall be 30 degrees as measured perpendicular to the centerline of the bridge deck. Longitudinal joints in overlays on existing bridges needed for construction staging shall be placed along permanent lane lines.

2.13.4.1.9 Slope Protection

Slope protection shall 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 the requirements described in the WSDOT *Bridge Design Manual* and Section 2.15, *Roadside Restoration*.

2.13.4.1.10 Bridge Barriers and Railings

Vertical 32-inch height barrier and Bridge Railing Type BP shall be used on both sides of all new and widened bridges with pedestrian access. ***Along SR 18, exterior bridge barriers shall include Bridge Railing Type BP to achieve 54 inches in total height for bicycles.*** The Bridge Railing Type BP standard details may be modified by the Design-Builder to incorporate the aesthetic requirements of Section 2.15, *Roadside Restoration*, but shall not adversely affect the strength limit state, extreme event limit state, service limit state, and safety requirements for the traffic barriers and railings.

The Design-Builder shall not use precast concrete barriers for permanent applications on bridges or bridge approach slabs. Permanent barriers shall be reinforced concrete cast-in-place in the final position.

The Design-Builder shall cast a minimum of two 2-inch diameter conduit pipes with junction box pairs (one for each conduit pipe) spaced at 180 feet maximum into all new concrete bridge barriers for the full length of the barrier, including barriers on bridge approach slabs and barriers on walls that abut approach slabs or bridges. Each conduit pipe shall terminate at separate Type 1 junction boxes within 15 feet of the exit from a barrier. The Design-Builder shall furnish and install conduit expansion, deflection devices, or both at all expansion joints,

points where the conduit exits from the barrier and any other location where movement is expected.

2.13.4.1.11 Bridge-Mounted Utilities

Existing Utilities shall be removed from the existing bridge and relocated in coordination with the type of replacement structures. Utility ***and ITS system*** installation requirements on new and existing structures shall be in accordance with Section 2.10, *Utilities and Relocation Agreements*, ***Section 2.18, *Intelligent Transportation Systems****, Appendix U, and Section 15.10 of the WSDOT *Bridge Design Manual*.

2.13.4.1.12 Temporary Structures

Temporary structures refer to any temporary bridge, detour bridge, portion of a bridge, or buried structure that will not remain upon Physical Completion of the Project. Temporary structures shall accommodate vehicular and pedestrian traffic and meet the following criteria:

- The Design-Builder shall design temporary structures in accordance with the WSDOT *Bridge Design Manual*, WSDOT *Geotechnical Design Manual*, AASHTO *LRFD Bridge Design Specifications*, and AASHTO *Guide Specifications for LRFD Seismic Bridge Design*. Welding on any steel elements shall be in accordance with AWS D1.5. Components of temporary structures which will be incorporated into the permanent structures shall meet the requirements for the permanent structures. All temporary structures shall be designed for live load deflection less than or equal to L/800 as defined by AASHTO *LRFD Bridge Design Specifications*. Temporary structures with vehicular traffic shall be designed for minimum 75 percent of the HL-93 live load as defined in the AASHTO *LRFD Bridge Design Specifications*, except when there is no practical detour route available for freight, then 100 percent of the HL-93 live load shall be used.
- The driving surface of the temporary detour structure shall be durable and skid resistant lasting through the Project duration. Temporary traffic barriers shall be in accordance with Section 1610 of the WSDOT *Design Manual* and the WSDOT *Bridge Design Manual*.
- The Design-Builder may use new and salvaged structure members for the temporary structure, but it shall be the responsibility of the EOR to ensure all 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 structure members may be required in order to provide assurance that the appropriate requirements of material properties have been met. For salvaged steel materials where the grade of steel cannot

be positively identified, the design stresses for the steel shall conform to Section 6-02.3(17)B3 of the Standard Specifications. Salvaged structure members include previously-used members from other bridges or structures, members that have been fabricated but never installed in a structure, and members from a prefabricated structural system designed specifically for repeated temporary use. Concrete girder design sheets shall be provided indicating concrete strength, strand type and pattern, shear reinforcement, and other pertinent information. The Design-Builder shall provide supporting documentation for all selected temporary members to the WSDOT Engineer for Review and Comment.

- All foundations of the temporary structures shall be located outside the horizontal limits of the Ordinary High Water for ***Deep Creek, Lake Creek, and Raging River*** and the bottom of foundations shall be located a minimum of 2 feet below scour estimated for the 2-year MRI water flows. Before Substantial Completion of the Project, the foundations for temporary structures shall be completely removed.

Design Plans and specifications for all temporary detour structures shall be reviewed and approved by the SLE. Prior to opening to traffic, all temporary detour structures shall be reviewed in the field for compliance with the Plans and specifications by the SLE, who shall advise WSDOT of any deviations. The Design-Builder shall be responsible for the maintenance of all temporary structures.

2.13.4.2 *At-Grade Traffic Barriers*

At-grade traffic barriers shall be designed in accordance with the WSDOT *Bridge Design Manual* and shall use the design criteria for TL-4. Existing barriers that require modification shall be replaced by removing the existing barrier to the next joint.

2.13.4.3 *Retaining Wall Design Criteria*

The Design-Builder shall design and construct permanent retaining walls for the Project. Retaining walls shall be of the following types:

- Proprietary structural earth walls in accordance with Section 6-13 of the Standard Specifications.
- Standard permanent geosynthetic retaining walls in accordance with Sections D-3.09, D-3.10, and D-3.11 of the Standard Plans and Section 6-14 of the Standard Specifications.
- Standard reinforced concrete cantilevered retaining walls in accordance with Sections D-10.10 through D-10.45 of the Standard Plans and Section 6-11 of the Standard Specifications.

- Soil nail walls in accordance with Section 6-15 of the Standard Specifications.
- Soldier pile walls in accordance with Sections 6-16 and 6-17 of the Standard Specifications.
- Soldier pile tieback walls in accordance with Sections 6-16 and 6-17 of the Standard Specifications.
- ***Secant or tangent pile walls to support Pier 3 of Bridge 90/78S and 90/78N as part of the fish stream channel structures in accordance with Section 6-19 of the Standard Specifications.
- Anchored walls for the walls at Bridge 90/78N and Bridge 90/78S, in conformance with the requirements of Section 2.13.4.1.3.***

The Design-Builder shall design walls in accordance with Section 2.6, *Geotechnical*, the *WSDOT Geotechnical Design Manual*, the *WSDOT Bridge Design Manual*, and the *AASHTO LRFD Bridge Design Specifications*. The Design-Builder may modify the Standard Plan retaining walls to meet Project requirements, such as seismic design criteria and aesthetic requirements per Section 2.15, *Roadside Restoration,* by providing special design analysis. Aesthetic modifications shall not adversely affect the strength and safety requirements of the retaining walls. Special design retaining walls shall be stamped and signed by the EOR.

The Design-Builder shall evaluate potential impacts to Utilities and WSDOT owned facilities (stormwater pipe, Intelligent Transportation System [ITS] conduit, etc.) crossing under proposed walls and incorporate mitigation measures to avoid conflicts and detrimental effects including, but not limited to, settlement and surcharge loading.

Rock walls, gravity block walls, and gabion cribbing shall not be used for retaining earth or as retaining walls, except that a gravity block wall is allowed for Wall 2 at the Pedestrian Access Route under Bridge 90/78N.

2.13.4.3.1 Temporary Retaining Walls

Temporary retaining wall refers to any wall or portion of wall that retains earth adjacent to public vehicular traffic and will not remain functional upon Physical Completion of the Project.

The Design-Builder may reuse structural components of temporary retaining walls as part of permanent retaining wall systems, provided all of the structural support elements and materials of the temporary retaining walls are in as-new condition and meet the requirements of the permanent structure standards. Timber piles will be allowed as foundations for temporary retaining walls where allowed by the Project's permits. Maintenance of temporary retaining walls shall be the Design-Builder's responsibility.

The Design-Builder shall remove all portions of temporary retaining walls before Substantial Completion of the Project.

2.13.4.4 *Buried Structures Design Criteria*

The Design-Builder shall use only cast-in-place or precast reinforced concrete, or metal structural plate for buried structures.

Buried structures and associated headwalls, wingwalls and connected barriers, rails and fall protection shall be designed and constructed in accordance with the WSDOT *Geotechnical Design Manual*, WSDOT *Bridge Design Manual*, Standard Specifications, *AASHTO LRFD Bridge Design Specifications,* and the *AASHTO LRFD Bridge Construction Specifications*. The AASHTO operational classification load modifier for the buried structure shall be that for typical bridges unless noted otherwise.

Corrosion and abrasion shall be considered as specified in the WSDOT *Bridge Design Manual*.

The Structural Clear Span of a buried structure shall be used to determine the buried structure class. When supporting a roadway, the Structural Clear Span shall be the widest horizontal opening from interior face to interior face of the end walls measured parallel to the roadway centerline. When not supporting a roadway, the Structural Clear Span shall be the widest horizontal opening from interior face to interior face of the end walls measured perpendicular to the buried structure centerline.

Structure Class	Structural Clear Span
Class 1	Less than 20.0 feet
Class 2	20.0 feet and greater

Class 2 buried structures and associated headwalls and wingwalls shall include seismic design and ground failure mitigation in accordance with the *AASHTO LRFD Road Tunnel Design and Construction Guide Specifications.* Seismic analysis shall include the loading effects resulting from ground shaking and ground failure. This includes, at a minimum, design for the seismic effects of transient racking or ovaling deformations.

All buried structures and associated headwalls and wingwalls shall be designed for scour from the design flood (100 year flood event) and the check flood (500 year flood event) in accordance with the *WSDOT Bridge Design Manual* and the *AASHTO LRFD Bridge Design Specifications* unless additional design criteria is documented in the Final Hydraulic Design report. Channel migration shall be considered.

Headwalls are structure elements that are end treatments connected to buried structures, including, at a minimum, parapets, slope collars, cutoff walls and inverts. Headwalls shall be reinforced concrete.

Wingwalls are retaining wall structure elements adjacent to or above a buried structure end or headwall. Portions of wingwalls below the 100 year mean recurrence interval water surface shall be reinforced concrete or have a reinforced concrete fascia.

When supporting a roadway, the fill depth shall be defined as the total backfill and surfacing depth above the top of the buried structure. When not supporting a roadway, the fill depth shall be defined as the total backfill above the top of the buried structure.

Structural Earth Wall wingwalls shall not use metallic ground reinforcement below the 100 year mean recurrence interval water surface unless the pH of the water in front of the wall and of the groundwater are within the range of 5.0 and 10.0, in accordance with WSDOT T 417 in the WSDOT *Materials Manual*.

2.13.4.4.1 Concrete Structures

When the buried structure is located in a corrosive environment as defined in the WSDOT *Bridge Design Manual*, corrosion-resistant reinforcement defined in the WSDOT *Bridge Design Manual* shall be used. The minimum cover requirements for direct exposure to salt water and coastal situations of the *AASHTO LRFD Bridge Design Specifications* shall apply.

When the fill depth of the buried structure is less than 2 feet at any point above the Structure, all reinforcement in the top slab shall be corrosion-resistant as defined in the WSDOT Bridge Design Manual LRFD M 23-50. Reinforcement in the top slab need not be corrosion-resistant when a concrete deck meeting the requirements for a Type 4 Bridge Deck Protection System as defined in the WSDOT *Bridge Design Manual* is provided.

When the top of the buried structure is directly exposed to vehicular traffic, a concrete or HMA overlay or reinforced concrete deck shall be provided. For an HMA overlay, the minimum concrete cover from the top surface of the buried structure to the top mat of reinforcement shall be 2½ inches. For a concrete overlay or reinforced concrete deck, the minimum concrete cover from the top surface of the buried structure to the top mat of reinforcement shall be 2 inches. When the top of the buried structure is directly exposed to vehicular traffic, bridge approach slabs shall be provided.

All reinforcement in precast units shall be of the same type.

2.13.4.4.2 Metal Structural Plate Structures

Steel structural plate shall not be used in locations conforming to corrosive environments as defined in the WSDOT *Bridge Design Manual*. Galvanizing and zinc coatings shall not be used below the 100 year MRI water surface.

Where the buried structure supports a roadway and the minimum fill depth is less than 8 feet, the Contractor shall provide protection against roadway de-icing salts and chlorides by one of the following methods:

1. Providing an impermeable geomembrane with welded seams in the backfill over the Structure that is sloped to drain water away from the Structure. The membrane shall be a minimum 30 mil thick polyvinyl chloride, ethylene interpolymer alloy, or polyurethane polymer, or a combination of these polymers.
2. Preventing roadway drainage from entering into the fill above the buried structure.
3. Providing additional metal plate thickness.

2.13.4.4.3 Load Rating Report

For a Class 2 buried structure supporting a roadway, the Contractor shall submit a load rating report in accordance with the WSDOT *Bridge Design Manual*, except in the following cases:

- For a simple span (single barrel) buried structure, when the structural clear span is less than or equal to 24 feet and the minimum fill depth is greater than 13 feet.
- For a simple span (single barrel) buried structure, when the structural clear span is greater than 24 feet and the minimum fill depth exceeds the structural clear span.
- For a multiple span (multiple barrel) buried structure, when the fill depth exceeds the structural clear span.

2.13.4.4.4 Stormwater Vaults

New or modified stormwater vaults, vaults where the runoff volume is modified, and open top vaults shall be watertight and shall conform to the requirements for detention vaults in the WSDOT *Bridge Design Manual*. New stormwater vaults shall not be located in the roadway.

Stormwater vaults that may carry vehicular loads and that are 20 feet or more in span length (measured from inside face to inside face) shall be load rated in accordance with the WSDOT *Bridge Design Manual*.

Refer to Section 2.14, *Stormwater,* for additional design requirements.

2.13.4.5 *Noise Wall Design Criteria*

****This section is intentionally omitted.****

2.13.4.6 *Illumination, Intelligent Transportation System, Traffic Signal, and Overhead Sign Structures*

Overhead sign structures include monotube sign structures, bridge mounted signs, monotube sign structures mounted on bridges, and their foundations. Overhead sign structures may support static signs, variable message signs (VMS), toll rate signs (TRS), or tolling equipment (toll gantries).

Where light standards, ITS closed-circuit television (CCTV) standards, traffic signal standards (including for ramp meter systems), or overhead sign structures are mounted on bridges, the bridge structural elements shall be designed for the support reactions.

The Design-Builder shall design retaining walls and foundations to account for the placement of any illumination, ITS, traffic signal (including ramp meter), or overhead sign structure supports on or behind the retaining walls.

Handholes in closed members shall have reinforcement around the holes. Structural bolted splices or connections shall use ASTM A 325 high strength bolts. All fabricated structural components and hardware shall be galvanized after fabrication in accordance with AASHTO M 111. All bolts and related hardware shall be galvanized after fabrication per AASHTO M 232 except ASTM F 1554 GR 105 Anchor Rods shall be galvanized after fabrication per ASTM F 2329.

Overhead monotube sign structures shall be designed in accordance with the design criteria specified in Chapter 10 of the WSDOT *Bridge Design Manual*. Overhead monotube sign structure designs (including foundations) shall be stamped and signed by the EOR. Span lengths and loadings are as shown in Chapter 10 of the WSDOT *Bridge Design Manual*. Deviations from these designs shall be considered special designs. Special designs shall be designed using *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, the WSDOT *Bridge Design Manual*, and this Section. The Design-Builder shall prepare and submit detailed structural design calculations and plans to the WSDOT Engineer for Review and Comment.

Foundations for illumination, ITS, traffic signal, and overhead sign structures shall be designed in accordance with Section 2.6, *Geotechnical,* and WSDOT *Bridge Design Manual.*

Non-metallic support structures for lighting, ITS, traffic signal, or Toll Equipment shall not be used for permanent installations.

2.13.4.6.1 Variable Message Signs

VMS shall be supported on monotube sign bridges or monotube balanced tee cantilever sign structures.

The Design-Builder shall furnish and install all VMS. The Design-Builder shall design and construct all associated VMS housings, VMS mounting beams and brackets, maintenance walkways, support structures, and foundations (including all necessary hardware) to install VMS.

The VMS housing structural framing, face covering, and mounting members shall be designed to withstand a wind velocity of 115 mph and shall otherwise comply with the requirements of the *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*.

Prior to fabrication, the Design-Builder shall prepare and submit detailed structural design calculations and Plans for all associated VMS housings, VMS mounting beams and brackets, maintenance walkways, support structures, and foundations (including all necessary hardware) to WSDOT for Review and Comment.

2.13.4.6.2 Toll Rate Signs

This section is intentionally omitted.

2.13.4.6.3 Closed-Circuit Television

Where pre-approved CCTV support structures are not used, the analysis and design of CCTV camera support structures shall comply with the requirements of the WSDOT *Bridge Design Manual*. Fatigue design shall conform to Section 11 of the *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals using* Fatigue Category III.

2.13.4.6.4 Toll Gantries

This section is intentionally omitted.

2.13.5 *Construction Criteria*

Construction equipment exceeding the legal load shall not be operated on structures without WSDOT's written approval. Refer to Section 1-07 of the *General Provisions* for additional requirements.

2.13.6 *Bridge Maintenance Requirements*

2.13.6.1 *Existing Bridge Expansion Joint Rehabilitation*

The Design-Builder shall field measure all existing compression seal and strip seal expansion joints requiring replacement. The expansion joint headers and expansion joint materials of the existing bridge expansion joints shall be removed. The expansion joint headers shall be reconstructed with either elastomeric concrete or polyester concrete (in widths matching the existing headers and thickness 0.25 inches less than the replacement Hot Mix Asphalt (HMA) overlay), and the joint gland replaced with a compression seal, strip seal, or rapid-cure silicone expansion joint system designed for the gap and motion range of the joint. Strip seals and compression seals shall be removed and replaced with new seals, in one continuous piece, for the entire width of the new and existing bridge deck. New HMA overlay shall not be installed across the expansion joints. Transverse joint seals at the back of pavement seat and end of bridge approach slab shall be constructed in accordance with Standard Plan A-40.20. The transverse joint seals shall be located at the existing Raging River Bridge 18/34.

Bridge joint calculations shall be submitted to the WSDOT Engineer for Review and Comment.

2.13.6.2 *Bridge Inspection and Maintenance Access*

The Design-Builder shall design, detail, and construct all bridge superstructures, joints, and bearings to be accessible for WSDOT inspection and maintenance.

The Design-Builder shall design, detail, and construct all joints and bearings to be replaceable. All bearing locations shall be designed with jacking points and adequate clearances to facilitate future bearing replacement. Jacking points shall be designed to support 200 percent of the calculated lifting load.

All exterior surfaces of superstructures, including bearings and between girders, shall be accessible by an Aspen Aerial A-62 Under Bridge Inspection Truck, a 40-foot bucket truck, or a 15-foot ladder. “Accessible” is defined as within arm’s reach of an inspector. Technical details including the flight path for an Aspen Aerial A-62 can be located on the Aspen Aerials website.

Pipe railing shall be provided along steel plate girder webs for future maintenance and inspection access, and shall be located and detailed in accordance with sheet 6.4-A9 of the WSDOT *Bridge Design Manual*.

For box girders where permanent access is provided, access doors shall be provided at both ends of the bridge.

For steel box girders with permanent access, the Design-Builder shall paint the interior of steel box girders the color white (SAE AMS Standard 595, Color

No. 17925) and shall provide fluorescent inspection lighting and electrical power. Lighting fixtures, light switches and duplex receptacles shall be located inside the steel box girders in a manner consistent with the WSDOT *Design Manual*.

The Design-Builder shall notify WSDOT 30 Calendar Days prior to any new bridge or buried structure being open to traffic, so that WSDOT can schedule an inventory inspection by the WSDOT Bridge Preservation Office.

2.13.7 *Submittals*

2.13.7.1 *Structure Design Submittals*

Project Submittals shall include, at a minimum, the required Submittals in this Section.

2.13.7.1.1 Preliminary Design Submittal

The Design-Builder shall submit to WSDOT for Review and Comment preliminary design drawings on WSDOT standard sheets in accordance with the WSDOT *Bridge Design Manual* Preliminary Plan Checklist for all bridges and structures. The stamp of the EOR shall be applied in accordance with WAC 196-23-020.

2.13.7.1.2 Final Design Submittal

The Design-Builder shall submit to WSDOT for Review and Comment final design drawings on WSDOT standard sheets in accordance with the WSDOT *Bridge Design Manual*. The Design-Builder shall submit final Technical Specifications, design calculations, and supporting reports for all bridges and structures. The stamp of the EOR shall be applied in accordance with WAC 196-23-020.

2.13.7.1.3 Released for Construction Document Submittal

The Design-Builder shall submit Released for Construction (RFC) Documents to WSDOT for all structural Work related to bridge and structures construction, including drawings, Technical Specifications, design calculations, and supporting reports, along with verification that all written review comments for the Preliminary and Final Design Submittals have been resolved. The RFC Documents shall include the stamp and signature of the EOR in accordance with WAC 196-23-020.

2.13.7.1.4 Design Calculations

The Design-Builder shall submit to WSDOT for Review and Comment complete sets of legible calculations to support all structural engineering designs described

in this Section. Complete sets of calculations shall be included with each design review Submittal.

All RFC calculations shall include the stamp and signature of the EOR in accordance with WAC 196-23-020.

All calculation sets shall include the following:

- Cover Sheet - The name of the Project, structure name, designer/checker names, date (month, day, and year), and supervisor's name shall be listed. The stamp and signature of the EOR shall also be included.
- Index Sheets - These shall include an index by subject with the corresponding design calculation sheet numbers.
- Design Calculations - Design calculation sheets shall be numbered. The calculations shall include design criteria; loadings; structural analysis; results; member capacities; geotechnical calculations; horizontal and vertical settlement calculations; deflection diagrams; long term creep diagrams for horizontal flexural members; and all computer input and output data (reduced to an 8.5 by 11 inch sheet size). In addition, all electronic files of spreadsheets, computer models, analysis, design files of spreadsheets and computer input/output files used to support the design calculations shall be submitted.

2.13.7.2 *Working Drawings*

All Working Drawings shall be submitted as Type 2 Working Drawings in accordance with Section 1-05.3(5) unless otherwise noted.

2.13.7.2.1 Shop Drawings

The Design-Builder shall submit to WSDOT shop drawings for all steel elements, precast concrete elements, post-tensioning reinforcement, bearings, expansion joints, railings, barriers, luminaires, drainage structures, reinforcing steel, and piles/drilled shafts prior to implementing Work based on the shop drawings. The EOR shall review all shop drawings prior to Submittal to WSDOT. The Design-Builder shall submit the final approved shop drawings prior to Physical Completion as part of the As-Built Plans in accordance with Section 2.13.7.5.1. The shop drawings shall include, at a minimum, the following information:

- Size of member and fasteners
- Length dimensions
- Finish, such as galvanizing, anodizing, and painting
- Weld size and type and welding procedures
- Strand or steel reinforcing bar placement

- Post-tensioning reinforcement tensioning procedure, stress calculations, and elongations
- Post-tensioning anchorage details
- Fabrication-reaming, drilling, and assembly procedures
- Wall penetrations
- Erection procedures for steel elements
- Handling and erection procedures for precast concrete elements, including complete details of all temporary supports, bracing, and inserts placed for lifting, assembly, and erection
- Material specifications

2.13.7.2.2 Falsework, Forms, and other Temporary Structures

The Design-Builder shall submit to the WSDOT Engineer for Review and Comment Type 3 or Type 3E Working Drawings with supporting design calculations for falsework, forms, construction work bridges, temporary retaining walls, temporary bridges, and other temporary structures.

The Design-Builder shall submit to WSDOT for Review and Comment procedures and Working Drawings with supporting design calculations for critical construction processes. Critical construction processes include, at a minimum, bridge removal, bridge approach demolition, and jacking pits.

All Final Design Plans and calculations for the falsework, forms, construction work bridges, temporary retaining walls, temporary bridges, other temporary structures, demolition, erection, and installation shall bear the stamp and signature of a Professional Civil or Structural Engineer.

2.13.7.2.3 Shaft Construction Submittal

The Shaft Construction Submittals shall be submitted to the WSDOT Engineer for Review and Comment.

2.13.7.2.4 Anchored Wall Installation Plans

The Design-Builder shall submit a plan for construction of the anchored walls beneath the existing Bridge 90/78N&S structures that details:

1. Equipment and access
2. Staging and estimated time allotted for monitoring, dewatering, installing anchors, testing anchors, excavating, and constructing the wall in accordance with the requirements of Section 2.13.4.1.3

2.13.7.3 *Plan Revisions During Construction*

The Design-Builder shall incorporate calculations for revisions made during construction 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 shall be identical to the title blocks of the Contract they are for. Every revision shall be assigned a 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.

2.13.7.4 *Load Rating Report*

The Design-Builder shall complete and submit a load rating report as described in Section 15.12 of the WSDOT *Bridge Design Manual* to WSDOT for Review and Comment at least ***90*** Calendar Days before a structure is opened to vehicular traffic.

2.13.7.5 *End of Project Submittals*

All Design Documents overseen by the SLE shall be submitted prior to Physical Completion and shall bear the stamp and signature of the SLE except as otherwise required in this Section.

2.13.7.5.1 Plans

The Design-Builder shall prepare As Built Plans for bridges and structures on WSDOT standard sheets in accordance with the WSDOT *Bridge Design Manual*. Plans shall be submitted on 11 by 17 inch PDF and as electronic CADD files in accordance with Section 2.1, *General Information,* and this Section. Final approved shop drawings for structures shall be included in the As Built Plans.

2.13.7.5.2 Calculations

The Design-Builder shall revise all calculations as necessary for the design covered by the scope of Work to accommodate field changes. The calculations shall include all the items listed under “Design Calculations” previously specified in this Section.

2.13.7.6 *Cost Reporting for Permanent Noise Barrier*

This section is intentionally omitted.

2.13.7.7 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.14 Stormwater

2.14.1 *General*

The Design-Builder shall perform all Work necessary to design, document, and construct the stormwater drainage system for the Project. At a minimum, elements of Work shall include the following:

- Prepare a Preliminary, a Final, and an As Built Hydraulic Report for the constructed Project in accordance with the WSDOT *Hydraulics Manual*, WSDOT *Highway Runoff Manual*, and this Section.
- Prepare individual Best Management Practices (BMP) Maintenance Plans for **all*** stormwater treatment ***and flow control*** facilities ***constructed or modified by the Project***.
- Prepare evaluations of ***and create new or modify*** pavement drainage systems for both the permanent Project facilities and the temporary construction conditions.
- Prepare a Temporary Erosion and Sediment Control (TESC) Plan and implement TESC measures for the Project in accordance with the WSDOT *Temporary Erosion and Sediment Control Manual*. The TESC Plan shall include temporary drainage during construction staging.
- Create new or modify existing runoff treatment BMPs as required to meet the Mandatory Standards and the permit commitments for the Project.
- Create new or modify existing flow control BMPs as required to meet the Mandatory Standards and the permit commitments for the Project.
- Protecting, maintaining, extending, or replacing existing culverts, storm sewer, and associated drainage structures to maintain the existing on-site flows and off-site flows that pass through the Project area, including those that are impacted by the Work, to meet the Mandatory Standards and the requirements of this Section.
- Replacing, relocating, protecting, and maintaining the existing stormwater drainage system ***and subsurface drainage systems***.
- Prepare an evaluation of the existing culverts, storm sewers, associated drainage structures and BMPs to determine which existing facilities have sufficient capacity and are in reliable condition to support the project drainage when the contract is complete. The evaluation shall identify those drainage and stormwater assets that should be replaced, repaired, modified, or abandoned.

- ***Retrofit existing pavement to provide stormwater runoff treatment and flow control that meets the requirements of the WSDOT *Highway Runoff Manual,* the Mandatory Standards, the permit commitments for the Project.***
- ***Prepare a Stormwater Retrofit Cost-Effectiveness and Feasibility (RCEF) Analysis.***
- ***Realign and restore non-fish bearing streams through new reaches or reaches disturbed by construction in accordance with requirements in this Section, and the project commitments and permits.***
- Host over-the-shoulder task force and other meetings, as required, to coordinate the design with the WSDOT Engineer, WSDOT Headquarters (HQ) and Region hydraulics, maintenance, landscape architect, environmental staff; and Local Agency staff.

The stormwater drainage system is defined as all of the stormwater and hydraulic structures, facilities, elements, BMPs, and features that are listed or referred to in the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual* that exists on the Project or will be on the Project once the Project is completed. The stormwater drainage system may deal with on-site flows, off-site flows, or both. Off-site flows may be from different sources including (but not limited to) natural drainage courses consisting of natural seeps and springs, ***groundwater,*** fish bearing streams, non-fish bearing streams, or both. Stormwater drainage system designs shall meet the requirements of this Section, and the Project permits.

The Design-Builder shall convey runoff from flows originating from ***groundwater,*** off-site and cross-drainage in a way that separates them from WSDOT stormwater BMPs.

2.14.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

If the requirements of a Mandatory Standard, programmatic agreement, or permit issued for the Project conflict, then the provisions within the Project-specific permit shall take precedence.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Highway Runoff Manual* M 31-16 (Appendix D)
4. WSDOT *Hydraulics Manual* M 23-03 (Appendix D)
5. WSDOT *Temporary Erosion and Sediment Control Manual* M 3109 (Appendix D)
6. WSDOT *Geotechnical Design Manual* (GDM) M 46-03 (Appendix D)
7. WSDOT *Design Manual* M 22-01 (Appendix D)

8. WSDOT *Bridge & Structures Office Design Memoranda* (Appendix D)
9. WSDOT *Bridge Design Manual LRFD* M 23-50 (Appendix D)
10. Standard Plans M 21-01 (Appendix D)
11. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
12. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
13. WSDOT *Construction Manual* M 41-01 (Appendix D)
14. WSDOT *Materials Manual* M 46-01 (Appendix D)
15. *Qualified Products List* (QPL) (Appendix D)
    http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm
16. WSDOT *Environmental Manual* M 31-11 (Appendix D)
17. WSDOT *Guidance on Wildlife Habitat Structures in Wetland Mitigation Sites* (Appendix H)

2.14.2.1 *Computer Software*

The list of approved primary computer software accepted by WSDOT for hydraulic and stormwater analysis, calculations, and for use on the Project is in the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual*. Use of other computer software not listed or referred to in this section shall require approval from the WSDOT Engineer.

- Approved Software:
  - MGS Flood continuous simulation hydrologic model Version ***4.52*** or higher for runoff treatment and flow control BMP designs in western Washington.
  - FHWA Hydraulic Tool Box ***Version 5.1.1 or higher.***

***When MGS Flood is used, Darrington Station Data – Single Scaling Factor Approach method noted in WSDOT *Hydraulic Manual* shall be used. ***

2.14.2.2 *Acceptable Design Reference Documents*

The WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual* are the primary hydraulic and stormwater design manuals.

The following documents are accepted by WSDOT for use on the Project. If any conflicts occur in design criteria, the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual* supersede the design reference documents listed below. The Design-Builder shall obtain the WSDOT Engineer's approval prior to use of other design reference documents.

- *FHWA HEC-22 Urban Drainage Design Manual*
- *FHWA HEC-14, Hydraulic Design of Energy Dissipaters for Culverts and Channels*
- *FHWA HEC-15, Design of Roadside Channels with Flexible Linings*

- *FHWA HDS 5, Hydraulic Design of Highway Culverts*
- *FHWA HEC-21, Design of Bridge Deck Drainage*
- *FHWA Technical Manual for Design and Construction of Road Tunnels - Civil Elements* (Publication No. FHWA-NHI-10-034)
- *U.S. Army Corps of Engineers EM 1110-2-1601, Hydraulic Design of Flood Control Channels*
- *NCHRP Report 568, Rip Rap Design Criteria, Recommended Specifications, and Quality Control*
- *WSDOE Stormwater Management Manual for ***Western*** Washington*

2.14.3 *Personnel Requirements*

2.14.3.1 *Drainage Design Lead Engineer*

The Design-Builder shall designate a Drainage Design Lead Engineer. The stormwater drainage system design shall be prepared by, or under the direct supervision of, the Drainage Design Lead Engineer.

The Drainage Design Lead Engineer shall have a minimum of 10 years of experience in the design and construction of highway-related drainage elements, and a minimum of 3 years of specific WSDOT highway drainage design experience within the last 5 years. The Drainage Design Lead Engineer shall be a Professional Engineer and shall be in responsible charge of the stormwater design. The Drainage Design Lead Engineer shall also be responsible for all drainage design revisions made throughout the duration of the Contract.

The Drainage Design Lead Engineer shall obtain certification for completing the WSDOT *Highway Runoff Manual* training course prior to beginning the stormwater design.

The Drainage Design Lead Engineer shall have direct design experience and current knowledge of designing and implementing low impact development-type stormwater treatment techniques

2.14.3.2 *Peer Reviewer*

The Peer Reviewer shall be selected by the Design-Builder ***and included in the Quality Management Plan (QMP), according to Section 2.28, *Quality Management Plan****. The Design-Builder shall provide a submittal for Review and Comment to the WSDOT Engineer demonstrating how the Peer Reviewer meets the required qualifications. The Peer Reviewer shall be a Professional Engineer, have WSDOT HRM Certification, and have a minimum of 5 years total of design and construction experience in the areas of:

- Hydrologic and hydraulic design specifically related to collection and conveyance of on-site and off-site stormwater ***, flow control and treatment BMPs, RCEF analysis, and other designs related to stormwater management for WSDOT projects.***
- Drainage Inspection

The Peer Reviewer shall perform an independent expert review of the ***Preliminary Hydraulic Report,*** Final Hydraulic Report, As Built Hydraulic Report, and all intermediate drainage design packages. Review shall include quality assurance for each submittal to verify each submittal is complete and correct to the point where review can be performed. Review shall also include evaluating compliance to applicable Mandatory Standards. The Peer Reviewer shall also field verify the post construction As Built conditions of the stormwater drainage system ***which would include but not limited to the collection system, conveyance system, flow control facilities and treatment facilities to make sure these systems are built per plans***.

The Design-Builder shall submit the following information to WSDOT as they are developed for all Peer Reviews:

A. Files sent to the Peer Reviewer for a Peer Review

B. Files showing the Peer Reviewer's comments

C. Files showing the responses and resolution of the Peer Reviewer's comments

D. Drainage and stormwater designs proposed by the Design-Builder that do not comply with the relevant Mandatory Standards

E. Letter or memorandum carrying the Peer Reviewer's Professional Engineer's stamp and signature stating the Peer Reviewer's comments have been resolved. The letter or memorandum shall list the completion date of each file reviewed by the Peer Reviewer.

The Design-Builder shall be responsible for addressing all comments made by the Peer Reviewer. The WSDOT Engineer shall be invited to attend all meetings between the Design-Builder and the Peer Reviewer. The Peer Reviewer's comments shall be resolved prior to building intermediate drainage design packages that are Released For Construction (RFC). All letters or memorandums from the Peer Reviewer shall be included as an appendix in the Final Hydraulic Report and As Built Hydraulic Report.

2.14.4 *Design Requirements*

2.14.4.1 *Stormwater Design Criteria*

The Design-Builder shall use the Mandatory Standards, ***permit commitments,*** and the design criteria described in this Section and Section 2.15, *Roadside Restoration*, to develop the stormwater and hydraulic designs of the Project. If any of the design criteria are not achievable, the Design-Builder shall follow the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual* for deviations and submit documentation of what cannot be achieved to

the WSDOT Engineer. The Design-Builder shall provide an explanation of why it cannot be achieved, and a proposed alternative for Review and Comment.

The Design-Builder is encouraged to seek cost-effective solutions that provide equal or greater environmental benefits and reduced long-term maintenance. The final design shall maximize the innovative use of runoff treatment and flow control BMPs, low impact development type BMPs, reduction or reversion of existing impervious surfaces, and design features that lead to the increased infiltration of stormwater where practical and feasible.

*2.14.4.1.1 ***Highway Runoff Manual Deviation****

The stormwater management concepts identified in the *Conceptual Level Hydraulic Report* (Appendix H) assume that runoff will be redirected from the pre-project delineated Threshold Discharge Area (TDA) into different TDAs in the post-project conditions. Any change in natural drainage pathway including even small area shifts or redirection of any runoff from the pre-project TDA delineations requires approval from Department of Ecology through the Demonstrative Approach Team (DAT). An approved deviation for the known shifts in areas and runoff for the conceptual design is included in *Conceptual Level Hydraulic Report* (Appendix H).

The Design-Builder shall complete all work necessary to complete the stormwater design for the Project in accordance with all Mandatory Standards. The Design-Builder shall prepare a deviation from WSDOT *Highway Runoff Manual* Minimum Requirement 4 – Maintaining the Natural Drainage System to justify any shifts in area or runoff between TDAs, if applicable. The Design-Builder shall follow the steps outlined in the WSDOT *Highway Runoff Manual* for applying for and obtaining approval of deviation requests. Deviation requests shall be submitted with the Design Builder's Preliminary Hydraulic Report and the deviations shall be approved by Department of Ecology before issuance of the Final Hydraulic Report. The approved deviation shall be included in the Final Hydraulic Report.

*2.14.4.1.2 ***Stormwater Retrofit Requirement****

The Project is located in the high priority retrofit areas. The Design-Builder shall retrofit existing pavement to provide stormwater runoff treatment and flow control for a minimum aggregate target of 11 acres and meet the requirements of the WSDOT *Highway Runoff Manual.* The Design-Builder shall perform the *Stormwater Retrofit Cost-Effectiveness and Feasibility (RCEF)* Analysis in accordance with the WSDOT *Highway Runoff Manual* and submit the analysis to the WSDOT Engineer for Review and Comment. The backup calculations shall clearly demonstrate how the costs associated with the *RCEF* analysis were calculated.

The Design-Builder shall include stormwater retrofit documentation and *RCEF* analysis in the Preliminary Hydraulic Report. An updated stormwater retrofit

documentation and *RCEF* analysis shall be included in the Final Hydraulic Report to reflect the final stormwater design.

WSDOT has completed an initial *RCEF* analysis based on the conceptual drainage design presented in the *Conceptual Plans* (Appendix M). A copy of this analysis is provided in the *Conceptual Level Hydraulic Report* (Appendix H) as a reference document.

2.14.4.2 *Conceptual Level Hydraulic Report and the Design-Builder's Hydraulic Reports and Intermediate Drainage Designs*

A *Conceptual Level Hydraulic Report* (Appendix H) has been prepared for the Project based on the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual*, and provides one conceptual stormwater management solution for the Project, which is the basis for the Project's permits and land acquisition.

The *Conceptual Level Hydraulic Report* (Appendix H) is not complete and shall only be used as a reference. The Design-Builder has the option of using information from the *Conceptual Level Hydraulic Report* (Appendix H) to help to create the Design-Builder's Preliminary Hydraulic Report. The Design-Builder shall verify all data, assumptions, calculations, analyses, and conclusions from the *Conceptual Hydraulic Report* (Appendix H) if used in the Design-Builder's Preliminary Hydraulic Report, Final Hydraulic Report, As Built Hydraulic Report, or any intermediate drainage design packages. Any infiltration type stormwater BMP design in the *Conceptual Level Hydraulic Report* (Appendix H) made initial assumptions that shall be verified or substantiated by the Design-Builder if any infiltration type BMPs are proposed by the Design-Builder for the Project.

The Design-Builder also has the option to develop a Preliminary Hydraulic Report that does not follow the *Conceptual Level Hydraulic Report* (Appendix H) but still meets all of the requirements and commitments in this Section.

2.14.4.3 *Drainage Conveyance Systems*

Existing drainage conveyance systems (culverts, storm sewer, catch basins, manholes, inlets, and grates) within the Project limits that the Design-Builder ***hydraulically and structurally*** impacts or modifies shall be replaced unless otherwise specified. ***WSDOT has identified the existing drainage conveyance systems that need to be removed and/or replaced by this Project. This list is included in Appendix H, *Existing Drainage Plan.**** The list of existing drainage conveyance systems that do not need to be replaced is included in Appendix H ****Existing Drainage Plan* ***. Design and construction of the new drainage conveyance systems shall be in accordance with the Mandatory Standards.

The Design-Builder shall not construct drainage structures in traveled lanes. If roadway are widened or reconfigured so that existing drainage structures will be located in the traveled lanes, the Design-Builder shall relocate the existing drainage structures so that they are not in traveled lanes and shall repair the roadway. The Design-Builder shall not place drainage conveyance systems,

including provisions for future drainage facilities, in the reinforcement zone of reinforced earth, soil nail, and tie back type walls unless there is an approved deviation by the State Hydraulic Engineer in coordination with the WSDOT Bridge Design office and WSDOT HQ Geotechnical office. For each approved deviation locating drainage conveyance systems in wall reinforcement zones the Design-Builder shall provide designs and construction specifications designed by licensed structural and geotechnical engineers for the purpose of maintaining wall stability during maintenance repairs at the specific wall. The design shall include wall support systems, removing and reconstructing moment slabs or other structural appurtenances where applicable, and excavating and backfilling in the area of reinforcement elements.

If the Design-Builder proposes to route flows from a runoff treatment BMP to a flow control BMP, the Design-Builder shall demonstrate that the capacity of the system is sized appropriately so that runoff will be collected and conveyed to the detention BMP for the full range of storm design recurrences of the flow control BMP specified in the WSDOT *Highway Runoff Manual*.

Ductile iron pipe shall be used for storm drainage conveyance on bridge structures. All exposed drainage conveyance pipe supported by bridges shall be painted in accordance with Section 6-07 of the Standard Specifications. The primer coat on the ductile iron pipe shall be shop-applied and paint shall be field-applied. The paint shall match the color of the bridge structure noted in the *I-90/SR 18 Architectural Design Criteria* document in Appendix L. All drainage conveyance on the bridge shall be supported in accordance with the requirements for Utilities installed with new construction in Section 10 of the WSDOT *Bridge Design Manual.* Bridge deck drainage design, including any bridge drains and drainage conveyance pipes, including shop drawings shall be provided to WSDOT Hydraulics for review and comment as per requirements in Section 2.3.7 of the WSDOT *Bridge Design Manual.*

2.14.4.4 *Wall Drains*

Drainage shall be provided to ***at*** walls in accordance with the WSDOT *Geotechnical Design Manual*. Wall drainage systems shall be designed for ease of maintenance, shall not have elbows greater than 45 degrees, shall provide low-clogging minimal maintenance type structures, and shall include removable clean-out covers and ports. Retaining walls shall be designed to prevent surface water from flowing down the face of the wall.

The internal wall drainage system (perforated pipe underdrain system) will be connected directly to a stormwater drainage system structure (catch basin, inlet, or manhole). If the Design-Builder is unable to directly connect to a structure, the wall drainage system may be day-lighted with appropriate erosion protection in a way that avoids backwater into the underdrain pipes. When connecting the perforated pipe to the main conveyance system, the invert of the perforated pipe shall be at or above the top of the pipe of the mainline conveyance system. The minimum diameter of underdrain pipes shall be ***6 inches***.

Shallow groundwater is prevalent in the Project area. Refer to Section 2.6, *Geotechnical,* and Appendix G documents for soil condition and groundwater information. Discharge of groundwater to the surface drainage system may increase flow control and runoff treatment BMP sizes. If this occurs, the flow control and runoff treatment BMPs shall be sized appropriately to accommodate the groundwater discharge.

Placement of open "weep holes" through the exposed wall face acting as underdrain outlets will not be allowed. Underdrain outlet ends shall be fitted with flap-type anti-rodent entry fittings. Maintenance clean-out ports shall be provided where underdrain pipes are connected to drainage pipes outside of a drainage structure.

2.14.4.5 *Storm Sewer and Non-Fish ***Bearing*** Culverts*

A culvert is a closed conduit under a roadway or embankment used to maintain flow from a natural channel or a drainage ditch. A storm sewer is a closed conduit under a roadway or embankment used to maintain flow from a closed conduit system. See the WSDOT *Hydraulics Manual* for examples of culverts and storm sewers.

The Design-Builder shall retain, modify, protect ends with headwalls, or abandon the existing storm sewer and culverts to match revised roadway sections in accordance with the Mandatory Standards.

The Design-Builder shall notify the WSDOT Engineer immediately if the inspections identify actions that would violate the Project permits. In addition, the Design-Builder shall develop and implement an acceptable plan to resolve the violation.

The Design-Builder shall locate and determine the Work required to meet the Mandatory Standards if the Project connects to or modifies existing culverts and storm sewers in any way.

Storm sewers operated and maintained by others (e.g., city and county storm drain systems) shall be protected, kept separate from the Project stormwater drainage system, and maintained at their existing capacity and function.

All outlet protection erosion control measures for culverts and storm sewers shall be located with WSDOT ROW.

2.14.4.6 *Infiltration*

The design of infiltration type BMPs shall be in accordance with the WSDOT *Highway Runoff Manual*. Any stormwater BMP that uses infiltration within a floodplain requires a WSDOT *Highway Runoff Manual* deviation.

The Design-Builder shall perform supplemental infiltration capacity investigations in accordance with Chapter 4 of the WSDOT *Highway Runoff Manual* to meet the requirements of the Mandatory Standards. The Design-Builder's infiltration type BMP designs shall be based on the recommendations of the Design-Builder's Geotechnical Group Manager.

2.14.4.7 *Runoff Treatment and Flow Control*

Permanent highway flow control and runoff treatment BMPs shall be designed in accordance with the WSDOT *Highway Runoff Manual*.

If the Design-Builder proposes the use of emerging technologies, proprietary (vendor-supplied) stormwater BMPs, or proprietary flow control devices, the Design-Builder shall obtain the required approvals in accordance with Chapter 5 of the WSDOT *Highway Runoff Manual*. Appropriate documentation shall be submitted to the WSDOT Engineer for Review and Comment and coordination with Region Maintenance. All comments shall be resolved prior to incorporating the emerging technology, proprietary stormwater BMP, or proprietary flow control device into the Project design.

The Design-Builder shall not use galvanized products on the stormwater drainage system including pipes, grates, control structures, ladder rungs, debris cages on top of overflow structures, and other hydraulic structures. Two coats of paint shall be applied when aluminum pipe or pipe arch is in contact with cement concrete or Controlled Density Fill ***in accordance with Standard Specifications***.

When compost is used in stormwater BMPs, the Design-Builder shall follow the compost type specified in the WSDOT *Highway Runoff Manual*.

Construction timing for permanent stormwater BMPs ***and stormwater drainage systems*** shall be coordinated with the various other construction activities, including but not limited to landscaping, barrier installation, ***buried conduits, signing, signals, illumination, stream restoration, bridge construction, guardrail installation, roadway and embankment grading, base course placement, and completion of asphalt and/or concrete pavement.*** Once installed, the Design-Builder shall ***protect the stormwater BMPs with methods specified in the WSDOT *Temporary Erosion and Sediment Control Manual* (Appendix D) and*** not drive equipment over or cause sedimentation in the area of the permanent stormwater BMP.

Shallow groundwater is prevalent in the Project area. Refer to section 2.6, *Geotechnical,* and Appendix G documents for soil condition and groundwater information. Any detention pond(s) to be built where shallow groundwater would otherwise partially fill the pond storage volume, which would compromise its required flow control performance, will require a lining system to keep out the groundwater. The Design-Builder shall have the responsibility for evaluating liner options and designing and constructing a liner system to adequately preclude groundwater from compromising detention pond performance and any permanent stormwater BMPs. Refer to Section 5-4.3.3 Facility Liner of the WSDOT *Highway Runoff Manual* for facility liner requirements.

Wall surfaces within drainage facilities shall be designed to be aesthetically compatible or located at low visibility locations ***(refer to Section 2.15, *Roadside Restoration*)***.

Stormwater management BMPs shall be equipped with necessary hydraulic controls for ease of dewatering permanent wetpools as required for maintenance.

The Design-Builder shall submit maintenance access, pipe slope, drain systems, and other provisions for maintenance to WSDOT for Review and Comment.

***Underdrain systems shall not drain water from constructed stormwater treatment wetlands or other treatment BMPs unless specified in the design of those stormwater treatment BMPs.

Infiltration type BMPs shall not be used on top of walls unless approved by the WSDOT Engineer. If approved, BMPs on the top of walls may be integrated with the wall drainage system to provide the function of the BMP.***

2.14.4.8 *Analysis of the Existing Stormwater Drainage System*

For any structure, facility, element, BMP, or feature of the existing stormwater drainage system that is ***hydraulically and structurally*** impacted or modified by the Project, the Design-Builder shall:

- Document the existing condition of the existing stormwater drainage system that is impacted or modified by the Project. The documentation shall include maps and figures of the impacted or modified stormwater drainage system for easy identification of location, flow patterns, and other relevant pieces of the existing stormwater drainage system.
- Perform and document that the appropriate hydrologic and hydraulic design analysis for each impacted or modified piece of the stormwater drainage system in accordance with this Section and the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual*.
- Provide a downstream analysis for each impacted or modified stormwater drainage system for at least 0.25 miles downstream of each discharge location from WSDOT ROW in accordance with the WSDOT *Hydraulics Manual*. The Design-Builder shall provide a capacity analysis with backup calculations showing the downstream conveyance has adequate capacity to convey the Project's flows in the post-development condition. When the downstream conveyance system is under capacity, the Design-Builder shall upsize the conveyance system to meet the requirements in the WSDOT *Hydraulics Manual* or otherwise mitigate the increased flow at no additional cost to WSDOT.
- Provide a sizing analysis of all impacted or modified existing stormwater BMPs that show the appropriate pre-developed and post-developed conditions to ensure at a minimum that the same amount of area has the same or better level of runoff treatment, flow control, or both in accordance with the WSDOT *Highway Runoff Manual*. The Design-Builder shall also highlight any increases in flows from existing stormwater BMPs as a result from the Project and provide solutions to protect against downstream erosion.
- Document each design analysis in the Final Hydraulic Report and As Built Hydraulic Report.

The Project's impacts or modifications to the existing stormwater drainage system shall not increase the potential for flooding upstream or downstream of the Project.

The Project's impacts or modifications to the existing stormwater drainage system shall not decrease the amount and level of runoff treatment and flow control provided by existing stormwater BMPs.

2.14.4.9 *Outfalls and Discharge Locations*

All outfalls and discharge locations shall be protected from erosion. Appropriate erosion control measures shall be designed in accordance with the Mandatory Standards.

***The Project shall include new storm drain outfalls to the following streams:

- Stream LC-G, multiple outfalls
- Stream LC-C and Stream LC-I
- Stream LC-J, south of detention pond 3-1
- Lake Creek, south of detention pond 3-2
- Stream RR-C and Stream RR-D
- Stream DC-F

The Design-Builder shall design and construct the outfall that minimize impacts to the existing and new stream banks, riparian vegetation, and conveyance capacity of these streams. Bank stabilization techniques, such as those described in Chapter 6 of the *Integrated Streambank Protection Guidelines*, shall be used to stabilize disturbed stream banks against erosion, dissipate energy, and encourage native riparian vegetation growth in the vicinity of the new outfalls. Additional stream bank stabilization and planting requirements may be required in accordance with the Project Permits.

The Design-Builder shall analyze, design, and construction means to prevent fish from entering the storm drainage outfalls discharging to fish bearing streams. The Design-Builder shall coordinate this design with WSDOT Hydraulics, maintenance, and environmental staff, as well as the Stream Design Engineer. ***

2.14.4.10 *Maintenance Access*

The Design-Builder shall provide maintenance access to all new stormwater BMPs, non-fish ***bearing*** culverts, and storm sewer structures. Catch basins, inlets, and manholes on storm sewer systems shall be located at the outer edges of shoulders, in medians, or gore areas. Manholes, stormwater flow control structures, 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 BMPs shall have maintenance access in accordance with the WSDOT *Highway Runoff Manual* and this Section. Hydraulic control structures such as

weirs, orifices, valves, and gates that are used for the operation, monitoring, and maintenance of ponds and other treatment or flow control BMPs shall be provided with a maintenance access road. Maintenance access adjacent to the sedimentation cells of ponds shall include a working area suitable for the loading and maneuvering of sediment disposal equipment and trucks. When a shoulder is used for maintenance purposes, the shoulder shall be wide enough for maintenance activities, typically 15 feet.

Where stormwater BMPs 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 monitoring, inspections, mowing, and changing of filter or compost media.

Maintenance access roads shall be designed to be compatible with maintenance equipment in accordance with the following table:

BMPs **Type**	**Design Vehicle**	**Access Requirement**
Open ponds	SU, SU with trailer, WB-40	Vactor to clean outfall structure, Self-propelled crane (WB-40) with clam bucket to clean pond (this is a four-axle with two steering axles on the front and two rear driving axles on the rear). Dump truck with trailer for hauling spoils.
Media Filter Drain	SU, SU with trailer	Dump truck, trailer, and backhoe to change filter media. Truck and trailer with mower.
Biofiltration Swales	SU, SU with trailer	Truck and trailer with mower.

Maintenance access roads shall be designed in accordance with the WSDOT *Highway Runoff Manual*. Maintenance access roads shall be designed so that maintenance equipment can perform required maintenance without encroachment on the edge of pavement. A light use access road shall consist of a prepared subgrade in accordance with Section 2-06 of the Standard Specifications; shall be sloped and shaped for proper drainage, or provided with underdrains; and shall include a layer of construction geotextile***, crushed surfacing base course, and quarry spalls as specified in the *Pavement Design Report* (Appendix J)***. Landscaped areas adjacent to maintenance access roads shall be designed and constructed to fit with the landscaping theme, using alternative surfacing reinforcement such as soil grids and grow-through paver blocks. Maintenance access designs shall be submitted to WSDOT for Review and Comment prior to being incorporated into the Project.

***For stormwater outfalls, storm pipes, and drainage structures on slopes near Deep Creek and Raging River that are isolated from convenient maintenance and inspection, the Design-Builder shall provide:

- A minimum 7-foot wide grass or similar maintenance access path to access and maintain the outfall and drainage structures.

- Drainage structures that do not have a sump that can accumulate sediment.

The maintenance access road for stormwater facilities sited in the WSDOT Maintenance Yard shall be minimum 20-feet wide.***

WSDOT stormwater BMPs built or modified by the project shall have signage per the Standard Plans.

2.14.4.11 ****Non-Fish Bearing Streams****

The Design-Builder shall realign and restore the non-fish bearing streams impacted by the Project to maintain their form and function in accordance with the WSDOT *Hydraulic Manual,* the Mandatory Standards, and the permit commitments for the project. The non-fish bearing stream shall be designed as an open channel conveyance system and shall meet the requirements of Section 4-3 of the WSDOT *Hydraulic Manual.* Non-fish bearing streams designed as piped conveyance in accordance with the Project permits and commitments shall be designed in accordance with Section 6-2 of the WSDOT *Hydraulic Manual.* Non-fish stream channel lining shall be designed in accordance of *FHWA HEC-15 Design of Roadside Channels with Flexible Linings*.

The Design-Builder shall coordinate the design and construction of non-fish bearing stream work with fish bearing stream restoration and roadway improvement work. Stream classification is provided in the *Aquatic Resource Assessment Report* in Appendix E.

Stream RR-D:

The Design-Builder shall address the maintenance issues and landslide noted along Stream RR-D, a non-fish bearing stream delineated on the east side of SR 18 and south of the Raging River. The Design-Builder shall be responsible for establishing the embankment slopes to address the landslide at approximate SR 18 at MP 26.00, remove the stream and ditch delineated at the top of the existing embankment, and design and construction Stream RR-D channel adjacent to SR 18 roadway to collect and convey offsite flows. Refer to Appendix G documents for information and recommendation for the landslide area, the Conceptual Level Hydraulic Report in Appendix H, and the conceptual plans for Stream RR-D conceptual design based on known site information.

2.14.5 *Construction Requirements*

2.14.5.1 *Protection and Restoration of Sensitive Resource Areas*

Where infiltration is possible, pipe outfalls to natural waterways shall be completed using infiltration trenches with over-topping level spreader designs for a more natural dispersion type discharge. Where infiltration is not possible, pipe discharges shall be armored against erosion using bio-engineering techniques. All temporary Work areas for pipe or ditch Work shall be graded and vegetation restored to previous existing conditions.

2.14.5.2 *Maintenance of Existing and New Stormwater Drainage System*

The Design-Builder shall be responsible for annual inspections and maintenance of the existing and new stormwater drainage system, as required by WSDOT's National Pollutant Discharge Elimination System permit, within the maintenance responsibility limits described in Section 2.29, *Maintenance During Construction*. The Design-Builder shall coordinate the initial inspection with the WSDOT Engineer to determine the condition of the existing stormwater drainage system. At the Project close out, the Design-Builder shall restore all pieces of the stormwater drainage system (including catch basin, BMPs, and storm sewer) to the condition determined during the initial inspection. Maintenance of the stormwater drainage system shall include:

- Catch basins: Annually inspect and correct functional deficiencies as applicable within 6 months from the date the deficiency was identified or prior to Contract Substantial Completion, whichever is shorter.
- BMPs: Annually inspect and correct deficiencies as applicable within 1 year from the date the deficiency was identified or prior to Contract Substantial Completion, whichever is shorter.
- Clean catch basins, conveyance systems, culverts, and stormwater BMPs, such as ponds, using vactor trucks and/or other means.
- Proper handling and disposal of solids and liquids removed from catch basins and stormwater BMPs.
- Document all inspections and corrections and provide documentation to the Project Engineer upon Project close out.

2.14.5.3 *Catch Basins and Inlets Installation*

All catch basins and inlet openings shall be installed flush with the face of the curbs or barriers.

2.14.5.4 *Best Management Practice Sediment Depth Markers*

The Design-Builder shall coordinate with the WSDOT Engineer for the locations of the BMP sediment depth/water level markers to be installed in stormwater BMPs ***in accordance with*** WSDOT *Highway Runoff Manual*.

2.14.5.5 *Temporary Erosion and Sediment/Pollution Control*

TESC and Spill Prevention, Control, and Countermeasures Plans and narratives shall be prepared and implemented in accordance with Section 2.8, *Environmental*, the WSDOT *Temporary Erosion and Sediment Control Manual*, Section 1-07 of the *General Provisions*, Division 8 of the Standard Specifications, and the Project permits. Runoff from construction areas shall be collected, treated, and discharged consistent with the WSDOT *Temporary Erosion and Sediment Control Manual* and Project permits.

2.14.5.6 *Abandonment and Removal of Existing Drainage Structures*

Abandonment or removal of existing drainage structures and pipes shall be in accordance with Divisions 2 and 7 of the Standard Specifications. Any existing pipe or other structure, which will be abandoned and will remain under any pavement, shall be filled using methods and materials that ensure the pipe or structure is completely filled in a supported, non-void condition. The Design-Builder shall include the abandonment details, including any abandon-in-place filling methods and materials, with the drainage structure and pipe shop drawings.

2.14.6 *Submittals*

2.14.6.1 *General*

Submittals shall be complete with associated engineering documentation and backup calculations sufficient to verify that the design meets the Mandatory Standards, specifications, permits, and applicable agreements.

2.14.6.2 *Analysis of the Existing Stormwater Drainage System*

The Design-Builder shall submit an Analysis of the Existing Stormwater Drainage System in accordance with 2.14.4.8 and include this in in the Final Hydraulic Report and As Built Hydraulic Report.

2.14.6.3 *Design Plans*

The Design-Builder shall prepare plan sheets for the Project in accordance with Section 2.28, *Quality Management Plan*, WSDOT *Plans Preparation Manual*, and the Standard Specifications.

In addition to the items listed in the WSDOT *Plans Preparation Manual*, the Plans shall also show all Sensitive Areas, the stream and wetland ordinary high water elevation contours, and Federal Emergency Management Agency (FEMA) flood level contours, that are hydraulically connected to any stormwater drainage systems that are ***provided,*** impacted or modified by the Project, including fish passable structures, or stream restoration sites.

2.14.6.4 *Design Calculations*

The Design-Builder shall complete all calculations necessary for the design of the Work. The Design-Builder shall prepare calculations in accordance with the Mandatory Standards to support the stormwater and hydraulic designs shown in Preliminary Hydraulic Report, Final Hydraulic Report, As Built Hydraulic Report, intermediate drainage design packages, and in the Plans. The associated set of design calculations shall be submitted with each set of Drainage Plans submitted.

The design calculations shall also include, at a minimum, the following items:

- Index Sheets – The Design-Builder shall number all calculation sheets and prepare an index for the Project by subject with the corresponding sheet numbers. The Design-Builder shall list the name and number of the Project,

State Route number, designer/checker initials, date (month, day, and year), and supervisor's initials.

- Narrative – The Design-Builder shall include a narrative that describes the approach taken and the order of the calculations, including sections on the hydraulics and hydrology methodologies used (appropriateness and accuracy requirements), design decisions made, and final conclusions and summaries of the calculation results in both narrative and table formats.
- The calculations shall include electronic copies of the input and output from the supporting computer programs, spreadsheets, hand calculations, exhibits, and sketches. 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.
- Technical Specifications necessary for construction
- Drainage maps showing the existing and proposed stormwater drainage systems and other hydrologic features that are impacted by the Project, drainage basins, sub-basins, TDAs, existing and final conveyance and storm sewer 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 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 impact or be impacted by the drainage design.
- Other exhibits to provide details necessary to clarify and support the calculations
- ***Backwater Analysis***

2.14.6.5 *Hydraulic Reports*

The Design-Builder shall submit a Preliminary Hydraulic Report with the Design-Builder's changes in the Stormwater Design Documentation Spreadsheet relative to the Conceptual Level Hydraulic Design Report including the overall flow control, runoff treatment, and stormwater drainage system concepts for the Project. The Preliminary Hydraulic Report shall describe the Project's HRM Minimum Requirements, ***permit requirements,*** any applicable stormwater retrofit requirements, ***deviation requests,*** and any existing drainage problems within the project limits. The Preliminary Hydraulic Report shall be submitted prior to the first intermediate drainage design package. The Design-Builder's schedule shall allow ***30*** Calendar Days for the WSDOT Engineer's Review and Comment for the Preliminary Hydraulic Report.

The Design-Builder shall submit intermediate drainage design packages to the WSDOT Engineer for Review and Comment. The first intermediate drainage design package shall describe the specifics of the changes from the Preliminary Hydraulic Report to the proposed design. All subsequent intermediate drainage

design packages shall describe the specifics of the changes from the previous intermediate drainage design package(s) that covers the same drainage design being revised or updated. All intermediate drainage design packages shall be easily readable as stand-alone documents, show why the revisions were made and how they impact the final overall stormwater and drainage design, include any revised drawings and exhibits, include supporting assumptions and calculation and include any revised summaries and tables. All intermediate drainage design packages shall include the Drainage Design Lead Engineer's stamp and WSDOT *Highway Runoff Manual* training certificate number. The Design-Builder's schedule shall allow ***14*** Calendar Days for the WSDOT Engineer's Review and Comment for each intermediate drainage design package.

A Final Hydraulic Report for the Project shall be prepared by, or under the direct supervision of, the Drainage Design Lead Engineer to reflect the entire Project's final hydraulic design as it was at the completion of the last intermediate drainage design package. The Final Hydraulic Report for the Project shall be stamped and signed by the Drainage Design Lead Engineer. The Final Hydraulic Report shall be in accordance with the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual*. The Final Hydraulic Report shall be submitted with the Final Drainage Design Plans to the WSDOT Engineer within ***30*** Calendar Days of the submittal date of the last intermediate drainage design package. The Final Hydraulic Report shall follow the guidance, outline, and format as shown in Section 1-3 of the WSDOT *Hydraulics Manual*. The Design-Builder's schedule shall allow ***30*** Calendar Days for the WSDOT Engineer's Review and Comment for the Final Hydraulic Report.

After all stormwater and drainage related construction is complete, an As Built Hydraulic Report for the Project shall be prepared by, or under the direct supervision of, the Drainage Design Lead Engineer to reflect the Project's final hydraulic design as it was at the completion of the drainage construction. The As Built Hydraulic Report shall incorporate drainage related changes during construction that were not captured during the intermediate drainage design packages. The As Built Hydraulic Report shall incorporate the final As Built documentation including the updated report text, records of decision, associated design criteria, drainage maps, Drainage Plans, calculations, and details in accordance with Chapter 1 of the WSDOT *Hydraulics Manual*. The Design-Builder's schedule shall allow ***30*** Calendar Days for the WSDOT Engineer's Review and Comment for the As Built Hydraulic Report.

Before submitting the As Built Hydraulic Report to the WSDOT Engineer, the ***Drainage Design Lead Engineer*** shall field verify As Built conditions of the stormwater drainage system to make sure they match the As Built Plans and to verify the stormwater drainage system meets the intended design function. The Design-Builder shall coordinate with the WSDOT Engineer to invite the WSDOT Region Hydraulics Engineer, WSDOT Region Maintenance representative, and the Peer Reviewer to all drainage As Built verification meetings. The list of drainage items field verified to meet As Built conditions shall be signed by the

Drainage Design Lead Engineer and Peer Reviewer and included in the As Built Hydraulic Report.

The Design-Builder shall submit the As Built Hydraulic Report within ***30*** Calendar Days after Substantial Completion. The final submittal shall include the As Built Hydraulic Report in searchable PDF format, complete with all associated drawing files (MicroStation format), electronic versions of spreadsheets, calculations, documents (Microsoft Word format), and hydrologic/hydraulic models.

The As Built Hydraulic Report shall include the Drainage Design Lead Engineer's stamp and WSDOT *Highway Runoff Manual* training certificate number.

2.14.6.6 *Specialty Reports*

Refer to Section 2.30, *Water Crossings*, for Hydraulic Manual Specialty Design requirements, Specialty Report requirements, and submittal requirements. All other specialty reports refer to the WSDOT *Hydraulics Manual*.

The Final Specialty Reports and all supplemental attachments shall include the Drainage Design Lead Engineer or Stream Design Engineer or both Professional Engineer's stamp based on their areas of expertise.

2.14.6.7 *Shop Drawing Submittals*

Refer to Section 2.28, *Quality Management Plan*, for all shop drawing submittals for drainage structures and pipe elements.

2.14.6.8 *Stormwater and Hydraulic Design Revisions During Construction*

Calculations for revisions made during construction shall be incorporated into the As Built Hydraulic Report when construction is completed.

When new plan sheets or revised sheets are required as part of a construction revision, the revisions shall be made in accordance with Section 2.28, *Quality Management Plan*, and are subject to Review and Comment.

2.14.6.9 *Stormwater Best Management Practices Maintenance Plans*

The Design-Builder shall prepare a stormwater BMP maintenance plan for each new or modified stormwater BMP using the BMP maintenance plan **memo and examples provided*** in Appendix H. ***The Design-Builder may contact the WSDOT Regional Hydraulic Office for stormwater BMP maintenance plan templates.*** The Design-Builder shall submit the BMP maintenance plans that reflect the As Built conditions to the WSDOT Engineer for Review and Comment. After incorporating the WSDOT Engineer's review comments, the Design-Builder shall provide the BMP maintenance plans in a searchable PDF format.

2.14.6.10 *List of Submittals*

Project submittals include, at a minimum, the following:

- Analysis of the Existing Stormwater Drainage System
- Design Plans
- Design Calculations
- Preliminary Hydraulic Report
- Intermediate Drainage Design Packages
- Final Hydraulic Report
- Shop drawings
- Stormwater and Hydraulic Design Revisions During Construction
- As Built Hydraulic Report
- Stormwater BMP Maintenance Plans
- ***Specialty Reports***
- ***Peer Reviewer credentials***

2.14.6.11 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.15 Roadside Restoration

2.15.1 *General*

The Design-Builder shall perform all Work necessary to complete the roadside restoration and mitigation design and construction (planting and architectural treatments) for the Project. Elements of Work shall include, at a minimum, restoration of roadside areas, ***off-site tree replacement,*** mitigation, restoration of temporary Sensitive Area impacts, and architectural elements.

2.15.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. ****I-90/SR18 Design Criteria**** (Appendix L)
4. WSDOT *Design Manual* M 22-01 (Appendix D)
5. Standard Plans M 21-01 (Appendix D)
6. WSDOT *Roadside Policy Manual* M 3110 (Appendix D)
7. WSDOT *Roadside Manual* M 25-30 (Appendix D)
8. WSDOT *Traffic Manual* M 51-02 (Appendix D)
9. WSDOT *Local Agency Guidelines* M 36-63 (Appendix D)
10. *Washington State Bicycle Facilities and Pedestrian Walkways Plan*, 2008-2027
11. WSDOT *Integrated Roadside Vegetation Management Plans* (Appendix D)
12. *FHWA Flexibility in Highway Design* (Appendix L)
13. WSDOT *Highway Runoff Manual* M 31-16 (Appendix D)
14. WSDOT *Standard Concrete Finishes for Bridge & Structure Construction in Highway Projects* (Appendix L)
15. *Qualified Products List* (QPL) http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm

2.15.3 *Personnel Requirements*

The architectural treatments, roadside restoration, and mitigation design shall be prepared by or under the direct supervision of the Licensed Landscape Architect.

Urban design elements, soil, and planting design shall be prepared by, or under the direct supervision of the Licensed Landscape Architect. Refer to the WSDOT *Highway Runoff Manual* for additional design information for stormwater facilities. Preparation by the Project Landscape Architect shall include the configuration, grading, planting, construction, and plant establishment.

The Licensed Landscape Architect shall have a minimum 5 years of experience with wetland and stream mitigation and highway related roadside restoration.

2.15.4 *Design Criteria*

2.15.4.1 General

The Design-Builder shall develop the final Plans for the Project in accordance with the design criteria described in this Section, the ****I-90/SR 18 Design Criteria* (Appendix L), *Environmental* (Appendix E), *Plans* (Appendix M), and*** the Mandatory Standards. The Context Sensitive Solutions treatments used on the Project shall not decrease the structural integrity of Project elements. If any of the design criteria are not achievable, the Design-Builder shall submit clear documentation to the WSDOT Engineer showing what cannot be achieved and a proposed alternative for Review and Comment.

Prior to purchase, use, or manufacture of form liners, the Design-Builder shall provide the WSDOT Engineer with one form liner and three 5 by 5-foot concrete samples of each retaining wall finish for Review and Comment and all comments shall be resolved.

The concrete ***on the Project*** shall be sealed with pigmented sealer as noted *I-90/SR18 Design Criteria* (Appendix L) and shall be in accordance with the Standard Specifications.

2.15.4.2 Retaining Walls

The Design-Builder shall use Context Sensitive Design to determine the appropriate size, appearance, and layout of wall needed. All walls facing toward the roadway shall have the same exterior wall texture and pattern regardless of the wall type to achieve a consistent appearance throughout the corridor. All retaining walls shall be in accordance with the ****I-90/SR18 Design Criteria* (Appendix L)*** document guidance and according to the requirements of Section 2.13, *Bridges and Structures*.

The Design-Builder shall, while retaining existing native vegetation to the maximum extent feasible, minimize the visual dominance of the wall by implementing one or both of the following:

- Using wall profiles and alignments that blend with the natural terrain by stepping the tops of walls

- Using grading to reduce the need for walls, except in Sensitive Areas

2.15.4.2.1 *Retaining Walls Facing Away from the Roadway*

The Design-Builder may select any wall type that meets the requirements of Section 2.6 *Geotechnical*.

If the Design-Builder uses concrete for a retaining wall of any type, the concrete shall be in accordance with the ****I-90/SR18 Design Criteria* (Appendix L)***.

2.15.4.2.2 *Retaining Walls Visible from the Roadway*

For retaining walls visible from the roadway, the following wall types will not be allowed unless approved by the WSDOT Engineer:

- Gabion
- Gravity block
- Modular block
- Crib walls
- Ecology block
- Shotcrete

Concrete walls or concrete fascia panels are required for all walls facing the highway for visual quality. The Design-Builder shall use a form liner finish as specified in accordance with the ****I-90/SR 18 Architectural Design Criteria**** (Appendix L) for all wall types.

The concrete shall be sealed with pigmented sealer in accordance with the Standard Specifications ***and the *I-90/SR18 Design Criteria* (Appendix L).***

2.15.4.3 ***Noise Wall Aesthetics***

This Section is intentionally omitted.

2.15.4.4 Bridge Aesthetics

Bridges shall adhere to the urban design guidelines in the ****I-90/SR18 Design Criteria* (Appendix L)*** document for the Project. For all bridges, in addition to the aesthetic guidelines included in the urban design guidelines:

- Minimize superstructure depth. Refer to urban design guidelines for additional details of aesthetic treatments for bridges
- Maintain constant superstructure depths along the length of the bridge with necessary variations gradually and gracefully proportioned
- Locate columns under parallel bridges along a common line at each bent

2.15.4.4.1 *Abutment Wall Aesthetics*

The Design-Builder shall incorporate the aesthetic treatment for the abutment wall design in accordance with the ****I-90/SR18 Design Criteria* (Appendix L)***

document for the Project. Abutment wall types and aesthetic treatments shall be submitted as part of each abutment Submittal.

2.15.4.5 Barrier Aesthetics

The length of concrete barrier shall be a minimum of ***1,000*** feet before it transitions to a metal guardrail. ***Concrete barrier over culverts and bridges shall be exempt.*** The concrete shall be in accordance with the ****I-90/SR18 Design Criteria* (Appendix L)***.

2.15.4.6 Sign Structures and Toll Gantries Aesthetics

The Design-Builder shall incorporate the aesthetic treatment for sign structure, Toll Gantries, and overhead lighting in accordance with the ****I-90/SR18 Design Criteria* (Appendix L)*** document.

2.15.4.7 Right of Way and Fall Protection Fencing

Aesthetic treatment of ROW and fall protection fencing is shown in the ****I-90/SR18 Design Criteria* (Appendix L)*** document. The Design-Builder shall develop the ROW and fall protection fencing plans in accordance with the following:

- In locations where pedestrian gates are required, the Design-Builder shall provide lock or entry mechanisms consistent with WSDOT requirements and Standard Plan L-30.10.
- All new fencing shall be consistent in color. Refer to the ****I-90/SR18 Design Criteria* (Appendix L)*** document for the selected color, type, and details.
- Refer to the WSDOT *Design Manual* and Section 2.13, *Bridges and Structures,* for additional fall protection fencing requirements.
- ***The Design-Builder shall design and construct 1,200 feet of wildlife exclusion fence north and south of the Deep Creek bridge on both sides of SR 18. Fencing shall be minimum of 8 feet tall, 14 gauge welded wire with 2” X 4” mesh. Refer to *Conceptual Plans* (Appendix M), and the Mandatory Standards.
- The Design-Builder shall design and construct the ROW and wildlife exclusion fence avoiding impacts to trees greater than 4” diameter in breast height. If installation of ROW or wildlife exclusion fence is required outside the Impact Area Line, clearing brush to construct the fence location shall be limited to hand-held equipment and shall not exceed 5 feet total width paralleling the fence line for ROW and 8 feet for wildlife exclusion fence. Access points to ROW fence locations shall not create new clearing areas outside the Impact Area Line. Grubbing or root disturbance is not permitted outside the Impact Area Line.***

2.15.4.8 Color Aesthetics

Color shall be applied in accordance with the Standard Specifications to all surfaces including, at a minimum, the following:

- Bridge structures including all sides of every girder, all sides of the superstructure, all sides of every cap beam, and all above-grade portions of every column
- Retaining ***and*** abutment ***walls***
- Fencing
- Barriers
- Railings
- Sign structures and Toll Gantries
- Lighting
- New signal, toll, and Intelligent Transportation Systems (ITS) cabinets/enclosures
- Toll reader equipment
- Brackets, supports, fasteners, and lights attached to sign structures and Toll Gantries
- Downspout drains and scuppers on bridges
- All metal work, except stainless steel cabinets.

2.15.4.9 Lighting

Pedestrian and overhead lighting selections are shown in the ****I-90/SR18 Design Criteria* (Appendix L)*** document. Refer to Section 2.16, *Illumination* for additional illumination criteria.

2.15.4.10 Roadside and Sensitive Area Restoration

The Design-Builder shall design and construct roadside restoration, ***off-site tree replacement, sensitive areas,*** and temporary wetland and temporary buffer impact areas in accordance with this Section and the Mandatory Standards.

2.15.4.10.1 *Vegetation Protection*

The Design-Builder shall identify and develop Vegetation Protection Plans specifying all measures to preserve and protect existing native plant communities and existing forested areas. ***Plans shall identify vegetation to be protected with sight preservation line and shall provide high visibility fence or flagging locations.***. No soil or vegetation disturbance, including, at a minimum, vegetation and landscape material removal, staging of equipment and materials, machine access, or soil compaction shall occur within vegetation protection areas, except where weed control, vegetation restoration, or vegetation enhancement are specified (either individually or in combination) as the restoration, regardless of construction impacts. If the Design-Builder determines that the Project goals cannot be met without impact to vegetation protection areas, the Design-Builder

shall provide written justification to the WSDOT Engineer. The justification shall document all proposed impacts to vegetation protection areas (size and species of trees and square footage for shrubs) that would be impacted and identify and describe avoidance measures that have been evaluated., the Design-Builder shall notify the WSDOT Engineer to arrange for WSDOT field review and concurrence.

2.15.4.10.2 *Vegetation Removal Documentation*

The Design-Builder shall ***quantify*** and document all vegetation removal, vegetation disturbance, and soil compaction within the Project limits regardless of the location. ***At a minimum, the*** disturbance shall include:

- Critical Root Zone: changes within the critical root zone equal to two times the diameter of the dripline of trees, including excavation, trenching, cutting roots, placing fill materials, soil compaction, and changes in surface water and ground water
- Vegetation modification: changes to branches, foliage, and trunks including, at a minimum, abrasion, breakage, or scarring

The following categories of ***vegetation removal and disturbance shall*** be measured ***and documented as follows***:

- For shrubs and trees less than 4 inches DBH, provide the location and the square footage area of removed shrubs and trees.
- For ***trees*** greater than 4 inches DBH, document the location, quantity, ***DBH*** size, and species.
- Vegetation removal documentation is not required in mitigation areas ***or restoration areas as defined by Section 2.8, *Environmental*.***
- ***Vegetation removal documentation is not required for red alder or cottonwood.***
- The Design-Builder shall document all areas by location and square footage where Project activities may compact soils. Compacted soils documentation shall include the following at a minimum:
  - Equipment and materials staging locations
  - Lay-down areas
  - Access and construction routes

2.15.4.10.3 ****Off-Site Tree Replacement****

The Design-Builder shall plant a minimum of 3,040 two-gallon trees at the off-site tree replacement area, on center spacing shall be at 12 feet. The entire planting area as defined by *Plans* (Appendix M) shall be de-compacted. All planting and design requirements shown in in these specifications shall apply and shall be in accordance with *Conceptual Plans* (Appendix M) and *I-90/SR18 Design Criteria* (Appendix L). Tree replacement planting areas shall be from locations shown in *Plans* (Appendix M). The Design-Builder shall be responsible

for research, evaluation, and design of the off-site tree replacement planting areas. This includes, but is not limited to, avoiding impacts to existing utilities and sensitive areas. The Design-Builder shall be responsible for obtaining the necessary permits and approvals to perform the off-site tree replacement work.

As required in this Section, all off-site tree replacement planting areas shall be designed to account for the following:

- Safety clear zones
- Sight distances, location of signage
- Closed-Circuit Television (CCTV)

2.15.4.10.4 *Planting Design Requirements*

Planting design shall include the following requirements:

- Planting and soil restoration plans for temporary wetland and temporary buffer impact areas shall be developed to correct soil compaction and vegetation removal within Sensitive Areas. Temporary wetland and temporary buffer impact areas shall be restored in place, ***in accordance with Section 2.8, *Environmental****.
- The Licensed Landscape Architect shall develop soil restoration and roadside restoration, ***off-site tree replacement and sensitive area*** Plans to restore impacted areas. ***The Plans*** shall be in accordance with this Section, ***and Section 2.8, *Environmental*.***.
- Planting areas for roadside restoration and temporary impacts shall be located and designed based on Roadside Zones (Zones 1-3) as defined in the WSDOT *Roadside Policy Manual*.
- The Design-Builder shall ensure that ***all areas of construction impacts are restored within the project limits. Planting areas as shown in *Conceptual Plans* (Appendix M) shall be the minimum requirements.***.
- The Design-Builder shall develop Roadside Restoration Planting Plans, which provide screening of the highway as viewed from residences. The Design-Builder shall incorporate vine plantings on retaining walls behind highway barriers. Vines shall cover a minimum of 20 percent of the wall areas at maturity.
- The Design-Builder shall develop Roadside Restoration Plans for all pedestrian connection points and sidewalks constructed as part of the Project. Vegetation within 3 feet of sidewalks shall not exceed 3 feet in height at maturity. Crime Prevention Through Environmental Design principles shall guide design of pedestrian area vegetation.
- For areas disturbed within City ROW, all topsoil, plantings, and irrigation shall be restored to the original condition or shall be designed in accordance with the City's landscape standards. Plant selection and species shall be coordinated and approved by the City.

- All new vegetation within the City shall be irrigated and metered. Irrigation that is to be maintained by the City shall be in accordance with the City's standards. If existing irrigation is disrupted during construction, temporary irrigation shall be provided to existing landscape areas and the existing irrigation system shall be reconnected for continuous irrigation.
- All planting areas shall be designed to account for safety clear zones and appropriate sight distances as required in this Section. If roadside restoration planting areas ***with trees*** are constrained ***greater than 30 percent as defined by *Conceptual Plans* (Appendix M) *** by clear zone, sight distance, location of signage, Closed-Circuit Television (CCTV), roadway widening, or other factors; the Design-Builder shall develop ***equivalent*** planting areas ***with trees*** outside the disturbed areas. The Design-Builder shall use interchanges or gore areas for roadside restoration outside of disturbed areas, where available. All alternate planting areas shall be coordinated and approved by the WSDOT Engineer. Planting areas may be within the Impact Area Line but shall be outside of Sensitive Areas unless permitted.
- The Design-Builder shall develop Roadside Restoration Planting Plans on both sides and ends of retaining walls when concrete barrier is not adjacent to walls. Vines shall be planted on all walls at ***6*** feet on center spacing where a minimum of 2 feet ***by 2 feet*** of planting area exists. Vines shall also be planted on the community side of the wall, where walls are adjacent to and visible from residential areas. Vine species shall be approved by the WSDOT Engineer.
- The Design-Builder shall select plant species and root condition based on soil conditions, slopes, solar exposure, wetland indicator status, growth habits, sight lines, location of lighting, signage, and CCTV cameras, and maintenance and watering requirements. Plant material selection, spacing, and configurations shall be in accordance with this Section and Plant Materials List included in the ****Conceptual Plans* (Appendix M) and *I-90/SR18 Design Criteria* (Appendix L)***.
- The Design-Builder shall select plant communities, species, root condition, and minimum size from the Plant Materials List included in ****Conceptual Plans* (Appendix M) and *I-90/SR18 Design Criteria* (Appendix L)***. No bare root plant material shall be allowed.
- The Design-Builder shall incorporate pollinator friendly species where appropriate, including in seeded areas, and use best practices in creating pollinator habitat.
- Roadside restoration and temporary wetland and temporary buffer impact areas shall be planted with shrub species at ***4*** feet on center spacing and trees at ***12*** feet on center spacing ***unless otherwise indicated in *Environmental* (Appendix E), *I-90/SR18 Design Criteria* (Appendix L) *Conceptual Plans* (Appendix M).

- The Design-Builder shall stabilize the toe of stream bank edges with bioengineering. At a minimum, bioengineering and plants shall be ½ foot below OHW as indicated in *Environmental* (Appendix E).***
- The Design-Builder shall stabilize all slopes utilizing bioengineering, plant material, or seeding in combination with biodegradable materials such as compost, mulch, and erosion control materials.
- Vegetation Protection Plans, soil restoration, decompaction and staking details shall be included in the Plans. All conifers shall be staked. ***Stakes shall be removed after first year plant establishment.***

If turf reinforcement mat is installed, the Design-Builder shall spread topsoil over the turf reinforcement mat. Sub-soil preparation and incorporation is not required for topsoil. The topsoil shall fill the reinforced mat apertures to the full mat thickness. After settlement and watering of topsoil, the reinforced mat shall be covered with a minimum of 18 inches of topsoil. The slope shall be hydroseeded with erosion control grasses with pollinator forbs in accordance with Sections 8-01 and 9-14 of the Standard Specifications. Topsoil and seeded area soil preparation shall meet the requirements of this Section.

2.15.4.11 Mitigation ***and Sensitive Areas Restoration***

The Design-Builder shall develop and construct mitigation for permanent and temporary impacts to Sensitive Areas in accordance with this Section and Section 2.2, *Mandatory Standards*. Design and construction shall include, at a minimum, site access for construction and plant establishment, stream bypass and water management, anchoring for buoyancy, noxious weed control, erosion control, soil preparation, planting, plant establishment, and stream improvement/enhancement elements for all Sensitive Area mitigation and restoration areas in accordance with Section 2.8, *Environmental* ***and 2.30*, Water Crossings*.***

Temporarily impacted wetland, stream, jurisdictional ditch, and buffer areas shall be restored in place. The Design-Builder shall ensure a diverse native plant community. Planting areas shall be designed with site-appropriate plant mixes and all plant species selection shall be based on the correlation between the hydrologic conditions, the wetland indicator status of the plant(s), the restrictions of urban/engineered features, and according to the requirements in the environmental permits. The Design-Builder shall develop a Mitigation Planting Plan to accommodate impacts to Sensitive Areas within the Project limits.

All noxious weeds removed from Sensitive Areas shall be replaced with native plant species. Species shall be selected based on the correlation between the hydrologic conditions, the wetland indicator status of the plant(s), and the restrictions of urban/engineered features.

The Design-Builder shall remove and control all noxious weed species as defined in Section 8-02.3(3) of the Standard Specifications, as well as those designated below:

- ***King County Noxious Weed List Non-regulated Class B and C noxious weeds***

2.15.4.12 Grading

Grading shall reflect the natural forms and character of the surrounding area. In Sensitive Areas, grades shall match existing grades to within 1 inch, or as indicated in the *Plans* (Appendix M*)*.

Slopes shall be finished by rounding in accordance with Standard Plan A-20.10.

The Design-Builder shall design side slopes and embankments to minimize the use of barriers, metal guardrails, and fall restraint measures. Slopes in all planting areas shall not be steeper than 2H:1V (Horizontal to Vertical) ***unless approved by WSDOT***.

2.15.4.13 Planting and Seeding Preparation

The Design-Builder shall decompact all seeding, planting, and documented compacted soil areas prior to soil amendment incorporation or application of compost or topsoils. Decompaction shall be performed to a depth of 12 inches in seeded areas and 18 inches in planting areas.

All planting areas shall incorporate 4 inches depth of compost or install ***12*** inches of topsoil to prepare planting areas. Turf reinforced mat installation areas shall receive 18 inches of topsoil.

All seeding and planting areas shall be weed free prior to application of soil amendment, topsoil, and compost.

All planting areas shall be treated with an approved non-selective, non-residual, herbicide a minimum of 14 Calendar Days prior to planting. Undesirable vegetation in interplanted areas shall also be treated a minimum of 14 Calendar Days prior to planting. Planting shall not occur until all existing undesirable vegetation is dead.

For areas with reed canary grass, non-native knotweed or non-native blackberry, a second application of herbicide is required after a minimum of 42 Calendar Days or when remaining weeds have regrown to a height of 6 to 12 inches, whichever is earlier.

For reed canary grass, herbicide applications shall be made between the months of April and September. For knotweed and blackberry, herbicide applications shall occur no earlier than June 15. The Design-Builder shall not cut live non-native knotweed under any circumstances.

Herbicide applications shall follow all permit requirements and environmental commitments; see Section 2.8 *Environmental*; Section 2.30,*Water Crossings;* and the *Commitments* (Appendix C).

All emergent and aquatic planting shall occur between May 15 and July 15.

2.15.4.13.1 *Topsoil*

All topsoil shall contain a minimum of 10 percent organic matter in accordance with *AASHTO T267 Determination of Organic Content in Soils by Loss on Ignition*.

For Topsoil Type B, all non-native vegetation shall be chemically treated with a non-selective, non-residual herbicide. Once dead, top growth shall be removed from Topsoil Type B borrow areas prior to excavation.

For planting areas, sub-soil preparation for topsoil shall include cultivating the underlying soil to a depth of 12 inches, followed by a uniform placement of 12 inches of topsoil. Topsoil shall be placed in two non-compacted lifts. The first 6-inch lift shall be placed over existing soil and incorporated to a 10-inch depth. The second 6-inch lift of topsoil shall be placed over the existing incorporated soil to the finished grades shown in the Plans.

2.15.4.13.2 *Planting Area Soil Preparation*

Soil preparation for planting areas where topsoil is not being placed shall include decompaction to a depth of ***18*** inches in accordance with this Section, followed by a uniform placement of compost to a 4-inch non-compacted depth and incorporating compost into existing soils to a 10-inch depth.

Soil preparation for planting areas on slopes 2H:1V and steeper shall include the use of bioengineering techniques to stabilize loose surface material, such as wattles, fascines, or compost socks, keyed into and staked to the slopes to retain loose topsoil, amendments, and mulch.

2.15.4.13.3 *Seeded Area Soil Preparation*

Soil preparation for seeded areas shall include decompaction to a depth of 12 inches in accordance with this Section, followed by a uniform placement of compost to a 1-inch non-compacted depth.

2.15.4.13.4 *Bark or Wood Chip Mulch*

All planting areas shall be covered with a 3-inch layer of bark or wood chip mulch evenly applied to the entire area except where emergents and aquatics are to be planted.

Full-coverage bark or wood chip mulch shall not be placed below designed flood storage elevations, ordinary high water elevations, or wetland reconnaissance boundary elevations. The Design-Builder shall provide erosion control measures made of natural plant fibers unaltered by synthetic materials below the designed flood storage, ordinary high water, or invert elevations.

Trees and shrubs planted in seeded areas or interplanted among existing vegetation shall receive bark or wood chip mulch rings placed in a 2-foot radius to a depth of 3 inches around each individual tree and shrub. Bark shall not contact the stems of trees and shrubs. During the plant establishment period, no vegetation will be allowed within any bark or wood chip mulch area other than

the trees and shrubs installed as part of the Project. If native plants seed into planting areas, upon request to and approval by the WSDOT Engineer, they may be allowed to remain.

2.15.4.13.5 *Gravel, River Rock, and Boulders*

The Design-Builder shall incorporate rock and boulders into the landscape, particularly at loop ramps, under bridges, and at ramp gore areas, where plantings would not be exposed to sunlight or rainfall. The Design-Builder shall use these materials in combination with plant materials and grasses to minimize the overall water demands of the Project. Gravel shall only be used if approved by the WSDOT Engineer.

The gravel, river rock, and boulders shall be typical of the Pacific Northwest region and placed in a manner that promotes the character of the existing natural environment. Rocks shall vary in color from grays to tans. If rocks and boulders are used, the clear zone requirements shall be adhered to in accordance with the WSDOT *Design Manual*.

2.15.5 *Construction Criteria*

If construction activities impact vegetation, the Design-Builder shall promptly and properly restore the landscape according to the requirements of this Section.

2.15.5.1 Plant Establishment

The plant establishment period shall be ***3*** years for the Project and shall be in accordance with Section 8-02 of the Standard Specifications.

All costs for plant establishment Work shall be included in the Proposal Price.

During the plant establishment period, the WSDOT Engineer will meet with the Design-Builder's representative monthly to Review and Comment on the completed landscape installation and activities necessary for plant establishment. Plant material health, watering, mulching, weed and pest control, pruning, erosion control, plant replacement, litter control, and other maintenance concerns will be specifically identified, noted, and designated for the Design-Builder to correct during the plant establishment period.

The Design-Builder shall perform the plant establishment activities listed below:

- Watering – All planting areas shall be required to contain permanent or temporary irrigation. . At a minimum, provide 2 inches of water, including precipitation, to planting areas once every 14 Calendar Days from June 1 through September 15 for projects west of the Cascade Mountains and from April 15 through October 15 for projects east of the Cascade Mountains. Apply water at a rate that does not allow runoff to occur. Submit a plan for temporary watering methods and frequency to WSDOT for Review and Comment. If a temporary irrigation system is proposed, submit a watering schedule.

- Emergent and Aquatic Vegetation – Maintain sufficient water in the soils to support vegetation. At a minimum, soils shall be completely saturated; at a maximum, there shall be a water depth of ⅓ the height of the vegetation during the growing season.
- Stormwater Vegetation – Implement a Water Management Plan to ensure survival of vegetation in accordance with the WSDOT *Highway Runoff Manual*. Ensure an adequate supply of water is present for a minimum of 10 months of the year to ensure survival of emergent vegetation in accordance with the WSDOT *Highway Runoff Manual.*
- Mulching – Maintain a 3-inch layer of mulch in a weed free condition over all planting areas during the plant establishment period.
- Pruning – Restrict pruning of plant material shall be restricted to the removal of damaged branches on trees and shrubs to prevent injury or disease. Pruning shall be done in such a way that the natural habit of growth is maintained. No unnatural pruning or hedging will be permitted.
- Erosion Control – Repair eroded areas and replace mulch as needed to prevent continued erosion.
- Weed Control – Maintain planting, bioengineering and streambed areas in a weed free condition at all times, in accordance with Section 8-02.3(13) in the Standard Specifications and Special Provisions. The Contractor shall complete and use a Weed and Pest Control Plan in accordance with Standard Specifications, Section 8-02. Weed and pest control operations shall be performed according to the Mandatory Requirements.
- Litter Control –Remove litter and debris from all planting and seeding areas on a monthly basis.
- Use adaptive management of mitigation and roadside restoration planting areas. If at any time Site or hydrologic conditions change, adjust plant communities and species to meet the requirements in this Section.

2.15.5.2 Roadside Restoration and Mitigation Standards

The Design-Builder shall meet the following requirements for roadside restoration ***off-site tree replacement, stream and wetland mitigation and sensitive area restoration*** areas:

- First, second, and third years after planting:
  - 100 percent of the plants are alive, healthy, and vigorously growing as determined by WSDOT. All dead, dying, or unhealthy plants are replaced. At the end of the first year of plant establishment, if more than 20 percent of plants are not healthy and vigorous, as determined by WSDOT, the plant establishment period will be extended to include an additional year.
  - Planting and seeded areas are free of weeds and litter.
  - Seeded areas have a dense and healthy stand of the seeded species, free of noxious or undesirable species as defined by Section 8.02.3(3)

of the Standard Specifications and the Special Provisions. Vegetative coverage shall be a minimum of 95 percent by visual inspection.

- All years of plant establishment:
  - 100 percent of the plants are alive, healthy, and vigorously growing as determined by WSDOT. All dead, dying, or unhealthy plants are replaced.
  - Planting and seeded areas are free of weeds and litter.
  - Seeded areas have a dense and healthy stand of the seeded species, free of noxious or undesirable species as defined by Section 8.02.3(3) of the Standard Specifications and the Special Provisions. Vegetative coverage shall be a minimum of 95 percent by visual inspection.
  - Meet all criteria specified in Section 2.8, *Environmental*; ***Section*** 2.14, *Stormwater*; ***and Section 2.30, *Water Crossings**** pertaining to mitigation restoration.

2.15.5.3 Landscaping Warranty

2.15.5.4 Refer to Section 1-05.16(9) of the *General Provisions* for Landscape Warranty requirements. Architectural Treatments

The Design-Builder shall monitor the appearance of the architectural treatments on walls and structures for any defects, flaws, or vandalism during the construction and until Physical Completion. Refer to Section 2.29, *Maintenance During Construction*, relating to maintenance and appearance of architectural treatments. The Design-Builder shall note the defects, flaws, or vandalism, and promptly notify WSDOT. The Design-Builder shall remedy defects, flaws, and vandalism until Physical Completion. See the *General Provisions* for warranty requirements.

2.15.6 *Submittals*

2.15.6.1 Preliminary Submittals

The Design-Builder shall submit Preliminary Plans as described in this Section to WSDOT for Review and Comment as part of the Preliminary Design Submittal described in Section 2.28, *Quality Management Plan*.

- Preliminary Documentation, Vegetation Removal, and Soil Impact documentation must be submitted prior to clearing and grubbing.

Preliminary Design Submittals include, at a minimum, the following:

- Preliminary Plans and details of architectural features, including an Architectural Key Plan that indicates the extent of proposed treatments and finishes of retaining walls, piers, barriers, fencing, lighting, cabinets, and railings.
- Preliminary Landscape Planting Plans that shall include the following:
  - Sensitive Areas

- Vegetation Protection Plans
- Impact Area Line and clearing and grubbing line
- Clear zone and sight distance
- Locations of existing and new ITS, ***CCTV sight lines,*** illumination, and signing
- Roadside Restoration Plans
- ***Off-site Tree Replacement***area Plans
- ***Stream, Wetland, and Buffer Revegetation Plans
- Streambank bioengineering cross sections and details
- Wildlife exclusion fence plans and details***
- Remedial landscape/ irrigation areas
- Planting details including soil preparation and mulching
- If a Constructed Stormwater Treatment Wetland is proposed, a preliminary layout of the pond, including preliminary contour grading and planting

2.15.6.2 Final Design Submittal

The Design-Builder shall prepare plan sheets in accordance with the WSDOT *Plans Preparation Manual*. A Licensed Landscape Architect shall affix their original signature, date of signature, original seal, license number, and date of expiration to each plan sheet.

Final Design Submittals include, at a minimum, the following:

- Final Plans and details of aesthetic features
- Cut sheets of the selected form liner(s) for wall treatments
- Final Temporary Irrigation Plans or Watering Plans
- Final ***Roadside Restoration, Off-site Tree Replacement, Stream, Wetland, and Buffer Revegetation*** Planting Plans; planting details; ***streambank bioengineering cross sections and details; wildlife exclusion plans and details *** and Technical Specifications

Planting Plans shall include the following criteria:

- The plans shall be developed in accordance with this Section.
- The Plans shall identify and show all natural features such as watercourses, bodies of water, stands of trees, and existing vegetation and resource conservation areas to be preserved and protected.
- The Plans shall indicate the type, quantity, size, spacing, root condition, and location of all plantings. Each planting plan sheet shall include the square footage of each planting area, the quantities of each species for each planting area, and a summary plant material list with the details.
- ***Soil Preparation*** Planting details

2.15.6.3 Project Submittals During Construction

Project Submittals shall include, at a minimum, the following:

- Roadside Work Plan
- Weed and Pest Control Plan
- Plant Establishment Plans; including a Water Management Plan for all emergent vegetation
- Form Liner – The form liner for this Project shall be selected from the QPL or shall be approved by the WSDOT Engineer as an equal product. If the form liner is not in the current QPL, the Design-Builder shall submit a request to the WSDOT Engineer to use the material. In addition, the Design-Builder shall submit catalog cuts and other descriptive supporting information, and a 2-foot square physical sample.

2.15.6.4 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.16 Illumination

2.16.1 *General*

The Design-Builder shall perform all Work necessary to meet the requirements for temporary and permanent illumination for the Project, including the required illumination specified in Section 1040 of the WSDOT *Design Manual*, and as specified in this Section.

2.16.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. WSDOT ***Northwest Region*** *Electrical Special Provisions* (Appendix B)
2. Special Provisions (Appendix B)
3. Standard Specifications M 41-10 (Appendix B)
4. WSDOT ***Northwest Region*** *Current Practices in Electrical Design* (Appendix T)
5. WSDOT *AGi32 Basics for WSDOT Highway Lighting* (Appendix T)
6. WSDOT *Design Manual* M 22-01 (Appendix D)
7. WSDOT *Draft Power System Design* (Appendix T)
8. Standard Plans M 21-01 (Appendix D)
9. WSDOT *Materials Manual* M 46-01 (Appendix D)
10. WSDOT *Construction Manual* M 41-01 (Appendix D)
11. WSDOT *Illumination and Signal Details* (Appendix T)
12. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
13. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
14. WSDOT *Bridge Design Manual LRFD* M 23-50 (Appendix D)
15. *NFPA 70: National Electric Code* (NEC)
16. *AASHTO A Policy on Geometric Design of Highways and Streets*
17. *AASHTO Roadside Design Guide*

18. *IESNA American National Standard Practice for Roadway Lighting* (ANSI/IES RP-8-14)
19. *Service Agreement Request Checklist* (Appendix U)
20. ****Goals, Guidance, and Standards for the I-90 Corridor MTSG National Scenic Byway* (Appendix L)
21. *Puget Sound Energy (PSE) Electric Service Handbook for Permanent and Temporary Service on Commercial, Industrial, and Multifamily projects* (Appendix T)***
22. Roadside Electrical Systems Standard Detail for DDI Equipment Placement (Appendix T)

2.16.3 *Design and Construction Requirements*

***The Design-Builder shall coordinate the design of the illumination system with the design of all other disciplines, such that the design performance and assumptions are not compromised, impacted, or degraded due to the final design of other disciplines , and the *DDI Equipment Placement* (Appendix T) requirements for locating poles and cabinets.

At a minimum, coordination is necessary with the following Technical Requirements (TR) sections of this RFP:

- 2.10: *Utilities and Relocation Agreements*
- 2.11: *Roadway*
- 2.13: *Bridges and Structures*
- 2.14: *Hydraulics*
- 2.15: *Roadside Restoration*
- 2.17: *Traffic Signals*
- 2.18: *Intelligent Transportation Systems*
- 2.19: *Signing*
- 2.20: *Pavement Markings*
- 2.21: *Traffic Operations*
- 2.22: *Maintenance of Traffic*

The illumination system shall be designed concurrently with drainage, retention ponds, earthworks, and maintenance access features, and may require modification of these features to accommodate illumination system equipment. All illumination system equipment visible above ground shall not be placed in a location of lower elevation where they may be subject to flooding, ponding, or other collection of water.***

2.16.3.1 Software

The Design-Builder shall use the most current AGI32 Lighting Design Software, available from Lighting Analysts, Inc., Littleton, Colorado, 303-972-8852. The software shall use data files in Illuminating Engineering Society (IES) standard format for the luminaires. Lighting analysis shall be submitted to WSDOT electronically in both PDF and AGI file formats.

2.16.3.2 Traffic Task Force Meetings

The Design-Builder shall establish a Traffic Task Force to oversee and provide input on the design and construction of traffic-related design issues including, but not limited to, traffic signals, signing, lighting, pavement marking, Intelligent Transportation Systems (ITS), and Electrical Service Agreements. The Design-Builder shall schedule and chair the meetings during the design and construction stages until Substantial Completion. The Design-Builder shall prepare the agenda, meeting minutes, exhibits, and Design Plans necessary for each meeting. Meetings shall include representatives from WSDOT, Local Agencies *** Puget Sound Energy (PSE)***, and other representatives as requested by WSDOT.

Utility company representatives shall be included when work to support Electrical Service Agreements involves installation of utility company infrastructure, such as conduit and vaults, by the Design-Builder. WSDOT will include representatives from the appropriate WSDOT Region Utilities office.

2.16.3.3 WSDOT Electrical Inspector

The Washington State Department of Labor and Industries has authority over all electrical installations within the State. WSDOT has been granted authority over all electrical installations within the Right of Way of State highways, provided WSDOT maintains and enforces an equal, higher, or better standard of construction, materials, devices, appliances, and equipment than is required by Applicable laws. It is the role of the WSDOT Electrical Inspector to ensure that all electrical installations, including Illumination, Traffic Signal, and ITS installations, meet the requirements of the National Electric Code, and Applicable Laws and provisions.

The WSDOT Electrical Inspector will perform the following:

- Act as a resource for the electrical design team
- Assist with electrical plan reviews (as applicable)
- Perform periodic electrical inspections during construction
- Witness required field tests (as desired)
- Perform inspections required before energizing any new equipment or circuits
- Inspect and approve all electrical installations in accordance with this Contract.

2.16.3.4 Permanent Lighting Design Requirements

The Design-Builder shall provide illumination at all locations identified as required illumination in Chapter 1040 of the WSDOT *Design Manual*, Code of Federal Regulations (14 CFR) Part 77, and as specified in these TRs. The Design-Builder shall use the light levels, veiling luminance, and uniformity ratios presented in the WSDOT *Design Manual*, including the appropriate area classification.

All existing equipment within the Project Limits, including light standards, junction boxes, and conductors that are not required by the TR shall be disconnected from the permanent lighting system and shall be removed. Existing equipment that is removed including, but not limited to, light standards, light standard slip bases, cabinets, lamps, and luminaire fixtures shall be salvaged in accordance with this Section. Removed equipment shall not be reused for the permanent illumination system, except where allowed in this Section.

Existing light standards scheduled for removal shall also include complete removal of the existing foundation, conduit sweeps, associated junction box, and all wiring. Existing conduit can be abandoned in place after removal of wiring and conduit elbows.

The allowable line loss and minimum allowable wire size for illumination systems shall be in accordance with the WSDOT Draft Power System Design manual (Appendix T).

The Design-Builder shall not place light standards behind walls. Light standards shall be placed to facilitate maintenance accessibility and minimize exposure to vehicles. Associated junction boxes placed in structures and walls shall face the traveled way. Light standards shall not be installed in medians or any other location that cannot be reached from the right shoulder of a roadway.

The Design-Builder shall design and construct the illumination system to accommodate future maintenance. Luminaires shall be located such that they can be accessed by the WSDOT maintenance ***typical bucket truck***. Typical WSDOT maintenance bucket truck reach is indicated in the ****Northwest Region ITS Design Requirements****.

The Design-Builder shall provide illumination when required in accordance with these TR. The illumination system design shall use the lowest wattage luminaires and least number of luminaires necessary to meet the light level requirements of the WSDOT *Design Manual*.

Local road lighting shall be designed and constructed in accordance with Local Agency standards. Local roadway lighting meeting this requirement shall be connected to a non-WSDOT electrical service meeting the requirements of the Local Agency.

2.16.3.4.1 Photometric Analysis

The Design-Builder shall complete a photometric analysis that includes the following:

- Lighting intensities (foot candles) and uniformity (average/minimum); light pole locations and fixture mounting heights; luminaire types; wattage; and quantities of each.
- Lighting calculations for WSDOT lighting systems shall use High Pressure Sodium (HPS) luminaires and use the lamp lumen depreciation and lamp dirt depreciation values described in the *AGi32 Basics for WSDOT Highway Lighting*. This establishes the wattage class for selecting LED luminaires for installation.
- Lighting calculations using photometric files specifically including the effect of light shields when light shields are required as specified in this Section.
- Lighting contours for nighttime illumination shall show the distances from the light source at lighting levels 1.0, 0.5, and 0.2 foot-candle. Lighting contours of 0.1 and 0.05 foot-candle shall be provided for permanent surfaces adjacent to sensitive areas such as streams and rivers. Topographic plan features shall be shown at least 150 feet beyond the illumination contours.
- Lighting calculation grid spacing shall be 5 by 5 feet.
- Veiling luminance calculations

A surface shall be created for each lighting design area which matches the roadway contours.

Photometric analysis for temporary illumination may be performed using the specific temporary luminaire(s) selected by the Design-Builder.

2.16.3.4.2 Lighting Under and Inside of Structures

The Design-Builder shall evaluate the need for underdeck lighting. The Design-Builder shall furnish and install required underdeck luminaires for all roadways affected by this Project.

Underdeck luminaires shall be installed on a vertical or horizontal face of a structure. Pole mounted underdeck luminaires shall not be used.

Each underdeck lighting fixture shall be installed within 3 feet of a junction box.

2.16.3.4.3 Spillover Light

When adjacent to non-commercial areas, the maximum spillover light allowed shall be 0.2 foot-candles at ground level at the edge of the Right of Way (ROW), unless otherwise noted. The Design-Builder shall install light fixtures with backlight control to limit spillover light outside of the ROW. Temporary lights for night work will be directed away from waters with listed fish species to the greatest extent possible, with the intent to prevent light from shining on surface waters. When permanent lighting is needed on a bridge or road segment adjacent to surface waters with listed fish species, individual light fixtures with cutoff optics and light shields will be used to minimize spillover light, rather than area lights that illuminate larger areas. Lights will be directed away from waters with

listed fish species to the extent possible. Walkways and bicycle lanes on bridges will be lit at grade level if possible to minimize nighttime light exposure of waters with listed fish species.

2.16.3.4.4 Specific Requirements

The Design-Builder shall provide the following illumination:

- ***All areas listed under the Required Lighting section of Chapter 1040 of the WSDOT *Design Manual*, as applicable.
- Illumination of the chain-off area on southbound SR 18 for the entire length of the chain-off area. The illuminated area shall be the full roadway shoulder and the two adjacent roadway lanes.
- Illumination of the entirety of the pedestrian walkways within the limits of the Diverging Diamond Interchange (DDI). At a minimum, lighting shall extend to the pedestrian landing or receiving area at the extreme ends of the DDI (all quadrants).
- Illumination of the intersection of SR 18 and SE 104th Street.
- Illumination of the merge and diverge areas for all ramps on I-90.

The Design-Builder shall remove all existing high-mast luminaires and light standards, and the existing service cabinet at the WSDOT maintenance yard. Existing equipment to be removed is shown in the Conceptual Illumination Plans.***

2.16.3.4.4.1 Light Standards and Foundations

Light standards shall conform to the Standard Plans and the following:

- Light standards shall also meet the following requirements:
  - Top of barrier installation - base plates shall be modified to conform to the dimensions shown in the Standard Plans.
  - ***All light standards shall be Type 1 (Davit Arm) with a maximum installation height of 50 feet above the roadway. High-mast, pole top, and decorative light standards shall not be used.
  - All light standards shall be powder-coated in accordance with the WSDOT *Special Provisions*. The finish coat color shall be in accordance with the *Goals, Guidance, and Standards for the I-90 Corridor MTSG National Scenic Byway*. Slip surfaces of slip bases shall not be painted or powder-coated.***
- All openings shall be installed during fabrication. All openings in the pole shall have a water-tight, gasketed cover attached with stainless steel box bolts.
- No field welding will be permitted.
- The design of the light standard shall comply with the pre-approved shop drawings in accordance with the Special Provisions.

- Where pre-approved light standards are not used, light standards shall be designed in accordance with the WSDOT *Standard Specifications* and Section 2.13, *Bridges and Structures*.
- The Design-Builder shall perform a geotechnical analysis for each light standard location to determine the appropriate design criteria for light standard foundations. The geotechnical analysis shall include lateral bearing pressure, friction angle, and water table values at each light standard location and shall be submitted as part of the Preliminary Permanent Illumination Plans. Where Standard Plan foundations cannot be used, foundations shall be designed in accordance with Section 2.6, *Geotechnical*.

Where light standards are to be installed on structures, supports shall be designed in accordance with Section 2.13, *Bridges and Structures*.

Complete calculations for light standard structural design shall be prepared and submitted to WSDOT.

2.16.3.4.4.2 Luminaires

The Design-Builder shall furnish and install LED type fixtures for all new luminaires mounted on light standards considered part of a WSDOT lighting system. Underdeck and wall mounted lights shall be LED type fixtures.

All LED fixtures of a particular form (cobra-head, wall mount, etc.) shall be from the same manufacturer. LED luminaires for WSDOT systems shall be selected from the list of pre-approved LED Conventional Roadway Luminaires as described in WSDOT Standard Specification 9-29.10(1)B.

Luminaires shall be positioned above the fog line, within 2 feet lateral distance of the fog line.

Luminaires installed on Local Agency facilities shall follow the Local Agency standards.

2.16.3.4.5 Equipment Provided by WSDOT

This Section is intentionally omitted.

2.16.3.5 Permanent Illumination Construction Requirements

Illumination systems shall remain operational at all times during construction unless a temporary illumination system is provided to cover the affected area. All damage to illumination systems shall be repaired prior to hours of darkness on the following day.

Existing illumination systems to be replaced on the Project shall remain operational until new or temporary illumination systems are installed, tested, and fully operational. The Design-Builder shall notify WSDOT 14 Calendar Days prior to removing existing illumination systems or disrupting power to any illumination system.

All lighting conductors shall be installed using conduits containing only electrical conductors. New conduit and junction box systems shall be separated from traffic signal conduits and ITS communication conduits. A shared trench, shared power source, and shared cabinet foundations may be used.

Each ramp lighting system shall be assigned a separate lighting circuit. A minimum of two lighting circuits shall be assigned to each ramp terminal lighting system. Ramp lighting circuits may be used for ramp terminal lighting as long as a minimum of two circuits are provided for ramp terminal lighting.

Light standards shall be installed a minimum of 50 feet from sign bridge structures and other structures that might impede or distort the light distribution on the highway. Existing light standards located within 50 feet from a new sign structure or other structure that impedes or distorts the lighting on the traveled way shall be removed; and a new light standard shall be installed at a location that meets all lighting requirements for light levels, uniformity, and veiling luminance.

The Design-Builder shall coordinate with the Utility company to determine the separation between overhead Utilities and new or existing illumination structures. A minimum of 10 feet of circumferential clearance to all power lines including the neutral shall be maintained. A greater clearance may be required for higher voltages in accordance with the local Utility company requirements.

The Design-Builder shall perform the required testing for temporary and permanent illumination and electrical systems in accordance with the Special Provisions and Section 8-20 of the Standard Specifications. The Design-Builder shall incorporate all testing into the Baseline Contract Schedule and Monthly Contract Schedule Updates for submittal to WSDOT. The Design-Builder shall submit all testing procedures, pass/fail requirements, manufacturer's certification of compliances, and equipment documentation to WSDOT for Review and Comment and resolve all WSDOT comments a minimum of 14 Calendar Days prior to any testing. The Design-Builder shall submit test reports upon completion of each test in accordance with this Section and Section 2.28*, Quality Management Plan*. WSDOT may observe any tests and will audit test results. The Design-Builder shall notify WSDOT when all illumination and electrical requirements have been met in accordance with the Contract, including training, documentation, testing, and field installations. WSDOT will perform the final electrical inspection and acceptance of illumination systems in accordance with Washington Administrative Code 296-46B-010 upon Physical Completion.

When an existing bridge or wall requires placement of light standards, the Design-Builder may mount the light standard on the bridge or on the wall if the structure is adequate for the additional loads. The height of the light standard shall be specified to maintain the required luminaire height above the roadway. The Design-Builder shall provide calculations indicating that the bridge or wall (existing or new) is adequate for the additional loads.

Light standard foundations shall be located at least three feet from the bottom flow line of any ditch and shall be placed to minimize vehicle collisions. Light

standards that are within the slope of any ditch shall include the additional earthwork and culverts shown in the WSDOT *Standard Plans*.

2.16.3.5.1 Maintenance and Operation

Lighting must be maintained operational for all design areas required by the WSDOT *Design Manual*. Existing permanent, new permanent, or temporary lighting systems may be used for this purpose.

The Design-Builder shall provide maintenance and conduct repairs for all lighting within the Project Limits until Physical Completion. For systems that are partially located within the Project Limits, the Design-Builder shall coordinate with the WSDOT regional Signal and ITS Maintenance Supervisor/Superintendent regarding the division of maintenance responsibilities for those systems.

Maintenance of lighting is defined as performing the work necessary to maintain required lighting operational, including providing and replacing lamps and responding to and correcting electrical outages. Maintenance of lighting also includes performing locates for all equipment for which the Design-Builder has maintenance responsibility. WSDOT will perform the first set of locates requested by the Design-Builder for existing systems – refresh requests are the responsibility of the Design Builder.

2.16.3.5.2 Temporary Illumination Construction Requirements

Temporary illumination system(s) shall be designed and installed when required in accordance with this Section and Section 2.22, *Maintenance of Traffic*. Temporary lighting systems shall be modified, adjusted, or relocated in order to accommodate the Released for Construction (RFC) Traffic Control Plans, Staging Plans, order of Work, and detours. After the permanent lighting system is energized and made operational, the temporary lighting system shall be completely removed. All poles, temporary wiring, junction boxes, conduit sweeps, and cabinets shall be removed. Holes and voids shall be backfilled.

Temporary illumination shall meet all the TR for light levels, veiling luminance, and uniformity ratios presented in the WSDOT *Design Manual* for permanent illumination.

2.16.3.5.3 Electrical Service, Transformers, and Cabinets

The Design-Builder shall provide all necessary electrical service cabinets and transformer cabinets, including necessary modifications or replacements of existing electrical service and transformer cabinets, as required to supply power to all equipment within the Project limits.

Underground service laterals (conduit and conductors) shall be provided by the Design-Builder between the Utility power source and the service cabinet. Service laterals, from the Utility company transformer to the service cabinet, shall be isolated from other circuits by using a separate conduit. Junction boxes in this conduit run are not allowed. Electrical service connections shall meet Utility company requirements.

The Design-Builder shall also design, provide and install the following in coordination with the serving electrical utility:

The power distribution system shall start from SR 18/104th St to Deep Creek vicinity.

- Power distribution raceways (conduits)
- Power utility vaults.
- See Conceptual Plans for approximate limits of power utility system work.
- The Design-Builder shall establish roles and responsibilities with the serving electrical utility to formalize which entity is responsible for which work. Any role and responsibility requirements that have been pre-established with a utility in an existing Letter of Understanding shall be included in the final service agreement package(s) unless all parties agree to modifications. All work involving electrical utility equipment shall be included in the applicable electrical service agreement(s) and performed in accordance with serving electrical utility requirements. Please refer to section 2.16.3.5.3.1 for more detail.

The Design-Builder shall coordinate with WSDOT and submit the design calculations, including peak/continuous loads, breaker, and contactors sizing calculations for new and modified electrical services and transformers.

Electrical service cabinets for Local Agencies' electrical systems shall not be located within limited access ROW unless otherwise approved by WSDOT.

The Design-Builder shall coordinate placement of electrical services so that circuits from the service do not overlap or cross paths with circuits from other services. The circuits from respective services shall be separated geographically so that the electrical systems of one service do not cover the same section of roadway as another service.

Illumination branch breakers, including spare illumination branch breakers, shall be rated at a minimum of 20 amps.

The main breaker size for electrical services shall be 200 amps.

The service lateral conductors shall be sized to serve the full load capacity of the service main breaker.

Lighting contactors shall be rated equal to or greater than the branch breaker rating for the same circuit. A physically separate contactor is required for each lighting circuit.

All ITS, ramp meter, and traffic signal cabinets shall be powered from individual branch breaker circuits in either an electrical service cabinet or a transformer cabinet. Multiple cabinets powered through one branch circuit breaker will not be allowed. Transformer cabinet supply (line side) circuits are not considered powering multiple cabinets through a single branch breaker.

Electrical services shall include all branch breakers and contactors detailed in the applicable Standard Plan wiring schematics. Breakers and contactors not utilized shall be labeled as spares.

All WSDOT cabinets shall provide sufficient access from the ROW and shall not be installed in ditches or on slopes steeper than 4H:1V (Horizontal to Vertical).

All WSDOT cabinets shall be constructed so that a level, 3.5 foot clear space around the cabinet foundation exists on all sides for WSDOT access, except that the 3.5 feet of clear space is not required behind the cabinet if the back of the cabinet is located in a ROW fence line.

Transformers shall be installed in separate standalone cabinets. They may share a common pad or foundation with other cabinets. Wires providing power to a transformer cabinet shall be sized to serve the full load capacity rating of the transformer.

Step up transformers will not be permitted between electrical services and the equipment loads.

Transformer sizes shall be standardized at 5, 7.5, 10, 15, or 25 Kilo-Volt-Amps (KVA).

New transformers shall be sized at least 150 percent of the design peak load on the secondary side of the transformer.

When modifying existing transformers by adding additional load, the ultimate peak load shall not exceed 80 percent of the design peak load of the existing transformer.

The design peak load of new transformers and modified existing transformers shall include the maximum potential load of all ground-fault circuit interrupter (GFCI) receptacles located in all equipment cabinets, including the transformer cabinet, powered by the transformer. The standard cabinet loads provided in the *WSDOT Power System Design* (Appendix T) already include GFCI loads.

2.16.3.5.3.1 Electrical Service Agreements

The Design-Builder shall pay all costs charged by the serving electrical utility for the Electrical Service Agreement, including such items as permitting, meter installation, and utility inspection; this cost is understood to be included in the Design-Builders Proposal price. The Design-Builder shall also pay all costs for modifications or upgrades to the serving electrical utility's facilities to meet the requirements of the Electrical Service Agreement, such as new utility wiring, service connection terminations, utility transformer installation or replacement, or distribution system expansion. WSDOT will pay the monthly electric bills starting on the day Work begins for the existing lighting, and for the lighting installed under the Contract until Physical Completion.

The Design-Builder shall coordinate with WSDOT and submit an Electrical Service Agreement Request for each new and modified service required for the Project. In coordination with WSDOT, the Design-Builder shall initiate the

coordination process and negotiate with the serving electrical utility as needed to create a complete Electrical Service Agreement Request for submittal to WSDOT. This work shall be coordinated through the traffic Task Force meetings. The Electrical Service Agreement Request shall include the information listed in the *Service Agreement Request Checklist* (Appendix U) and the following:

- Location of existing or new service submitted in plan sheet format
- Location of utility infrastructure, including any new work required as part of the applicable Electrical Service Agreement
- Load calculations showing design peak loads, design continuous loads, and future loads in KVA and voltage required
- Request for modifications to existing services showing existing load, new load, and ultimate load
- Name of the Utility and the Service Agreement number (for existing services)

The Design-Builder shall submit the Electrical Service Agreement Request a minimum of 90 Calendar Days in advance of when the power connection is needed. WSDOT will begin procurement of the Electrical Service Agreement after the Electrical Service Agreement Request is accepted and determined complete by WSDOT. If changes to the Electrical Service Agreement are required by the Design-Builder, the Design-Builder shall pay all costs associated with the Electrical Service Agreement revisions. The 90 Calendar Day advance notice will begin when the revision to the Electrical Service Agreement Request is accepted and determined complete by WSDOT.

After the Electrical Service Agreement Request is submitted to WSDOT, the Design-Builder shall remain involved in negotiations between the serving electrical utility and WSDOT. The Design-Builder shall continue to provide WSDOT support as necessary to ensure the successful completion of required service requests.

If the Design-Builder proposes to remove an existing service, the Design-Builder shall notify WSDOT in writing at least 14 Calendar Days prior to the proposed removal, so that the service account can be cancelled. The written notification shall contain the Service Agreement number, location, and electrical load in KVA.

Where expansion or modification of the electrical utility power distribution system is necessary to support an Electrical Service Agreement, the Design-Builder shall submit the Electrical Service Agreement Request a minimum of 180 Calendar Days in advance of when the power connection is needed.

Any established Letters of Understanding between WSDOT and any applicable serving electrical utilities are provided in Appendix U. These letters may provide direction on one or more of the following:

- Roles and responsibilities of the electrical utility and the customer. Any roles and responsibilities assigned to the customer shall be met by the

Design-Builder on behalf of WSDOT, with the exception of items which can only be met by WSDOT.

- Work to be completed by the customer, including labor and materials. This work shall be completed by the Design-Builder on behalf of WSDOT.
- Work to be completed by the electrical utility, including labor and materials.

Any costs associated with work described in a Letter of Understanding to be performed by the electrical utility, including labor and materials, shall be paid by the Design-Builder.

2.16.3.5.4 Salvage

The following illumination equipment shall be salvaged and delivered to the agency designated:

- ***Light standards, mast arms, luminaires, and slip base hardware (not including embedded anchor bolts) – WSDOT
- Electrical service and transformer cabinets, including all equipment contained within - WSDOT***

Salvaged equipment shall be delivered to the applicable address below:

***

WSDOT NW Region Signal Shop
3700 9th Ave S
Seattle, WA 98134
(206) 442-2110

***

The Design-Builder shall provide a list of salvage items, their quantity, and current condition to the WSDOT regional Signal and ITS Maintenance Supervisor/Superintendent 14 Calendar Days prior to delivery of salvaged items. The Design-Builder shall give notice to the WSDOT regional Signal and ITS Maintenance Supervisor or Superintendent 7 Calendar Days prior to delivery. The same notices shall be provided to all other agencies with designated equipment to salvage. The Design-Builder shall provide all labor and equipment to transport, load, and unload the salvaged items.

2.16.3.5.5 Conduit System

The Design-Builder may use existing conduit if the conduit system meets all design requirements.

The Design-Builder shall not saw, cut, or open trench across the traveled way or paved shoulders.

When the conditions described above are encountered the Design-Builder shall install conduit using jacking, drilling, or boring methods.

New conduit shall be installed between a new light standard and any other light standard or electrical service.

All conduits shall have a minimum clearance of 3 feet from guardrail posts.

The minimum size conduit for illumination systems is a 2-inch diameter conduit, except a 1-inch diameter conduit shall be used between a light standard and the associated junction box, and a 0.75-inch flex conduit shall be used between an underdeck or wall mounted luminaire and the associated junction box.

Conduits shall be whole inch sizes with the exception of 0.75-inch flex conduit.

Conduit systems for lighting, signals, interconnect, tolling, and ITS systems shall be separated such that each conduit system has separate conduit, pull box, and junction box systems. Conduits may be installed in common trenches and may utilize common power sources.

The Design-Builder shall coordinate the placement of the conduit system with guardrail, noise walls, retaining walls, and Utilities.

The Design-Builder shall install a spare 2-inch conduit associated with every conduit crossing under pavement or through structures, including barriers and walls. The Design-Builder shall install a spare 2-inch conduit between each new electrical service or transformer cabinet and the first junction box.

In new conduits, conductors shall occupy a maximum of 26 percent of the cross-section of the conduit. In existing conduits conductor fill shall meet NEC requirements for conduit with three or more conductors and shall occupy a maximum of 40 percent of the conduit's cross-sectional area.

The Design-Builder shall install conduit/junction box systems (embedded in concrete) in each of the following newly constructed items:

- Bridge rail
- Median cast in place or slip formed barrier
- Roadside cast in place or slip formed barrier

The conduit/junction box installations shall be constructed in accordance with Section 2.13, *Bridges and Structures*, and the Standard Plans.

Conduit shall not be attached to the outside surface of a newly constructed barrier or bridge rail.

2.16.3.5.6 Junction Boxes, Pull Boxes, and Cable Vaults

Junction boxes, cable vaults, and pull boxes shall not be located within paved shoulders unless no other option is available. Junction boxes, cable vaults, and pull boxes located within paved shoulders shall meet the current Heavy Duty design standard. Existing junction boxes, cable vaults, or pull boxes located in the paved shoulder that do not meet the current Heavy Duty design standards shall be replaced with boxes that meet the current Heavy Duty design standard. The nearest edge of junction boxes, cable vaults, or pull boxes in the paved shoulder shall be at least 3 feet from the fog line. Existing junction boxes, cable vaults, and pull boxes located in the paved shoulder less than 3 feet from the fog line shall be

replaced and located to meet this requirement. The Design-Builder shall consult with WSDOT when considering installation of heavy duty junction boxes.

When a new barrier or wall section is installed adjacent to a paved shoulder at a junction box location, the junction box shall be a National Electrical Manufacturers Association (NEMA) type junction box installed in the new barrier or wall section. The NEMA box installation shall require the new barrier or wall section to be constructed using the slip form or cast in place method. NEMA boxes shall not be attached to the outside of new precast barrier or wall sections.

No junction boxes, cable vaults, or pull boxes shall remain or be placed in the traveled way, ramp, or auxiliary lanes. Existing junction boxes, cable vaults, or pull boxes in the traveled way shall be replaced and relocated to meet the requirements of this Section.

At Substantial Completion there shall be no junction boxes, cable vaults, or pull boxes in the traveled way within the Project limits.

Junction boxes, cable vaults, and pull boxes shall not be located in the sidewalk or walkway unless no other option is available. Junction boxes, cable vaults, and pull boxes installed in the sidewalk shall have skid resistant covers and shall meet all other Americans with Disabilities Act requirements for placement in sidewalk or walkway. Existing junction boxes, pull boxes, or cable vaults located in sidewalk or paved walkway shall be replaced with skid resistant junction boxes, pull boxes, or cable vaults.

Junction boxes, cable vaults, or pull boxes shall be installed within 10 feet of each directly connected light standard and within 5 feet of each directly connected cabinet.

The grounding and bonding systems for all existing junction boxes, cable vaults, and pull boxes within the Project limits and scheduled to remain in place shall be repaired and adjusted in accordance with these design requirements. Junction box lids damaged or deformed shall be replaced.

All existing junction boxes, cable vaults, and pull boxes within the Project limits and scheduled to remain in place that do not have locking or bolt down lids shall be replaced.

The Design-Builder shall install a 1 by 1-foot rectangular concrete collar around the perimeter of each new Type 1 and Type 2 junction box installed in grade. The exposed portions shall be formed to have a neat appearance. The top edges shall have a ¾-inch chamfer on the top edge of the foundation. The concrete mix design shall be commercial concrete per Standard Specification Section 6-02.3(2)B.

2.16.3.5.6.1 Junction Boxes

Junction boxes located outside of paved areas shall be Type 1, 2, or 8.

For conduit systems with electrical conductors, junction boxes shall be installed on both sides of each conduit roadway crossing and where conduit makes a 30 degree or greater change in direction.

The maximum spacing for junction boxes in traffic barrier, retaining wall, or structures shall be 180 feet within each raceway system and 200 feet in all other areas.

Junction boxes shall not be used for conduit runs containing fiber optic cable.

Junction boxes to be abandoned shall be removed in accordance with the Standard Specifications.

Prior to installing conduit or conductors, the Design-Builder shall clean and adjust to grade the existing junction boxes receiving the conduit or conductors.

2.16.3.5.6.2 Pull Boxes

When authorized for use, the maximum spacing for pull boxes in a power distribution run is 750 feet. When transitioning to conventional junction boxes (such as Type 1 junction boxes), the maximum distance between the pull box and the junction box is 200 feet.

The Design-Builder shall coil and rack a minimum of 25 feet of each conductor and cable at all pull boxes.

2.16.3.5.7 Utility Locates

Refer to Section 1-07 of the *General Provisions* and Section 2.10, *Utilities*, *and Relocation Agreements* for requirements.

2.16.4 *Submittals*

The Design-Builder shall submit Preliminary and Final Illumination Plans for Review and Comment and prepare Final Permanent Illumination Plans prior to issuance of the RFC Plans.

2.16.4.1 Preliminary Design Submittal

2.16.4.1.1 Photometric Analysis

Photometric analysis shall be performed for all illumination areas. The analysis shall identify the mounting height, light standard height (H1), mast arm length, offset, spacing, and lighting fixture data. Photometric data files in IES standard format for the luminaires shall be submitted to the WSDOT Engineer for Review and Comment. The Design-Builder shall provide the following analysis data for the design areas as required by Chapter 1040 of the WSDOT *Design Manual* (Appendix D):

- Minimum light level

- Minimum average light level
- Uniformity ratio (average/minimum)
- Maximum veiling luminance ratio

The Design-Builder shall submit a graphical report showing all design areas with calculation points. The report shall be legible and to scale, and shall list all photometric files, luminaire definitions, and their characteristics. The Design-Builder shall also submit a rendering for each lighting area requiring 3D lighting analysis.

The Design-Builder shall submit an electronic copy of the photometric analysis (in AGI32 format) to the WSDOT Engineer with the Preliminary Design Submittal for Review and Comment. Any changes affecting the placement of lights or the layout of required lighting areas require a new photometric analysis to be submitted for the affected area(s). Updated photometric analyses may be submitted as designed or as part of the Final Design Submittal package.

2.16.4.1.2 Plans

The Permanent Illumination Plans shall be prepared in accordance with the ***WSDOT *Northwest Region Current Practices in Electrical Design* (Appendix T)***, the photometric analysis, and the WSDOT *Plans Preparation Manual* (Appendix D). The Plans shall include, at a minimum, the following items:

- Existing Utilities
- Proposed channelization
- Location of light standards, service cabinets, conduit, and junction boxes required for the installation
- Luminaire schedule specifying mounting height, circuit, luminaire type, lamp, voltage, wattage, station and offset, and service number
- Identification of existing illumination to remain

The Design-Builder shall submit the Permanent Illumination Plans to the WSDOT Engineer for Review and Comment.

The Preliminary Plan Submittal shall include cross sections for each light standard installation.

Where expansion of the utility power distribution system is necessary to support an Electrical Service Agreement, the Design-Builder shall include electrical utility conduit, vaults, wiring, and any other equipment to be installed by the Design-Builder in the Permanent Illumination Plans.

2.16.4.2 Final Design Submittal

The Permanent Illumination Final Design Submittal shall be complete, and shall include, at a minimum, the following:

- All items from the Preliminary Illumination Design Submittal
- Existing Utilities

- Proposed channelization
- Light standards as specified, including foundation bases and anchorages
- Electrical wiring schematic for each lighting circuit
- Conduit and conductor schedule showing new wire and existing wire to remain
- Details and notes specifying how new illumination is tied into the existing illumination system
- Transformer schedules
- Sub-panel schedules
- Service cabinet types, as required, including photocells, breaker schedules, and wiring diagrams
- Conduit fill, line loss, and breaker size calculations
- Complete construction notes
- Wire notes (including identification of new and existing conductors and conduit)
- All wire, cable, and terminators that are needed for the complete operation of the lighting system
- Illumination details for non-standard design elements
- All references to the Standard Plans and electrical details
- Structural calculations

2.16.4.3 Released for Construction Illumination Plans

Refer to Sections 2.12, *Project Documentation*, and 2.28, *Quality Management Plan*, for requirements.

2.16.4.4 Working Drawings

Working Drawings and product data shall include, at a minimum, the following:

- Shop drawings for light standards and mast arms for each type and size
- Luminaires and lamps
- Wiring diagrams
- Electrical panels
- Splice enclosures
- Conduit
- Concrete for foundations
- Junction boxes
- Wiring

Refer to Sections 2.28, *Quality Management Plan* for additional requirements.

2.16.4.5 Other Submittals

The Design-Builder shall include the following items upon Physical Completion:

- All documentation, including test procedures and test reports
- Software and software documentation
- List of repair part vendors
- Product manuals

2.16.4.6 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer any Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section

2.17 Traffic Signals

2.17.1 *General*

The Design-Builder shall perform all Work necessary to meet the Contract requirements for the traffic signal systems. The traffic signal systems for the Project shall include, at a minimum, the following:

- Signal standards and mast arms
- Luminaires on signal standards
- Foundations
- Vehicle heads
- Accessible pedestrian signals ***(APS)***
- Accessible pedestrian pushbutton assemblies
- ***Rectangular Rapid Flashing Beacon (RRFB)***
- Vehicle detection
- Emergency vehicle preemption detectors
- Terminal cabinets
- Junction boxes
- Conduits and wirings
- Temporary vehicle detection system
- Temporary traffic signal system
- Uninterruptable Power Supply (UPS) system
- Traffic signal control cabinet and associated equipment
- Signal interconnect

The Design-Builder shall install electrical services or utilize existing services to provide power for all signal systems, in accordance with the Contract.

The Design-Builder shall maintain existing traffic signal systems during construction in accordance with Section 2.29, *Maintenance During Construction*.

2.17.1.1 ******Forward Compatibility******

Traffic signal equipment shall be placed to optimize operations and pedestrian access.

2.17.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

- Special Provisions (Appendix B)
- WSDOT ******Northwest Region*** Electrical Special Provisions*** (Appendix B)
- WSDOT *Electrical Equipment Specifications* (Appendix B)
- WSDOT *Construction Requirements for Light and Signal Standard Foundations Using Drilled Shaft Construction and Permanent Casing* (Appendix T)
- Standard Specifications M 41-10 (Appendix B)
- WSDOT ******Northwest Region*** Current Practices in Electrical Design*** (Appendix T)
- ***WSDOT *Northwest Region Illumination and Signal Details**** (Appendix T)
- ******Goals, Guidance, and Standards for the I-90 Corridor MTSG National Scenic Byway*** (Appendix L)***
- WSDOT *Design Manual* M 22-01 (Appendix D)
- Standard Plans M 21-01 (Appendix D)
- WSDOT *Traffic Manual* M 51-02 (Appendix D)
- *Washington State Modifications to the Manual on Uniform Traffic Control Devices* (WAC 468-95) (Appendix D)
- WSDOT *Materials Manual* M 46-01 (Appendix D)
- WSDOT *Construction Manual* M 41-01 (Appendix D)
- *NFPA 70: National Electrical Code (NEC)*, 2008
- *IESNA American National Standard Practice for Roadway Lighting (ANSI/IES RP-8-00)*
- WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
- WSDOT *Maintenance Manual* M 51-01 (Appendix D)
- *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, 2009 Edition with Revisions 1 and 2 dated May 2012 (Appendix D)
- WSDOT *Signal Turn-On Requirements* (Appendix T)
- *AASHTO A Policy on Geometric Design of Highways and Streets*

- WSDOT *Bridge Design Manual (LRFD)* M23-50 (Appendix D)
- *AASHTO Roadside Design Guide*
- *Transportation Research Board Highway Capacity Manual*
- *Roadside Electrical Systems Standard Detail for DDI Equipment Placement* (Appendix T)

2.17.3 *Design Requirements*

The Design-Builder shall perform all Work necessary to design and construct a permanent traffic or pedestrian signal system ***at the I-90 and SR 18 Diverging Diamond Interchange*** as follows:

- ***The Design-Builder shall provide a traffic signal system for the DDI. The Design-Builder shall use the *Conceptual Plans* (Appendix M) of the DDI, including phasing diagram, as a template for permanent traffic signal systems, and the *DDI Equipment Placement* (Appendix T) requirements for locating poles and cabinets. The Design-Builder shall submit type, size, location, and phasing diagram for the proposed DDI signal systems to WSDOT for review prior to submitting preliminary traffic signal plans for the following locations:
  - New traffic signal at eastbound I-90 ramps and SR 18
  - Signalized U-turn on SR 18 at south end of the DDI
  - New traffic signal at westbound I-90 ramps and SR 18
- Removal of existing traffic signal systems at I-90 and SR 18 interchange.
- Provide supplementary signal heads at curved approaches.
- The Design-Builder shall work with WSDOT to determine requirements and limitations on left and right turn on red for the DDI signal systems. This shall include the use of static signs to prohibit turn movements.
- Install RRFB at pedestrian crossings for all single-lane on-ramps. Install stop bar loops and advance loop and connect back to controller cabinet.
- Provide conduit including one 2-inch spare conduit and junction boxes for future traffic signal and wiring installation for all single-lane on-ramps. Conduit shall be provided from the signal controller cabinet to the RRFB locations. Conduit also shall extend 60 feet downstream from the crosswalk.
- The Design-Builder shall work with WSDOT to establish emergency vehicle preemption so there are no conflicts with DDI phasing. This may include the need for an additional emergency vehicle preemption phase, overlaps in the signal phasing, and/or the establishment of additional auxiliary emergency vehicle detectors in locations that are not typical for a standard traffic signal.***

The new traffic signal systems shall meet the following performance requirements:

- Optimize traffic flow and minimize delay

- Interconnect with signalized intersections on the main line and arterial roads within a mile of the new traffic signal system
- Accommodate pedestrians
- Function safely

***The Design-Builder shall place stop line and advance loop detectors in accordance with the *Special Provisions* (Appendix B).

If the Design-Builder determines that signal phasing other than assumed in the Synchro files is required, then additional analysis shall be performed and submitted to the WSDOT Engineer for Review and Comment.

All signals owned and operated by WSDOT shall be equipped with UPS and generator transfer switches in accordance with the WSDOT *Northwest Region Electrical Special Provisions* (Appendix B).

The Design-Builder shall coordinate the design of the signal systems with the design of other disciplines as necessary, such that the design performance and assumptions are not compromised, impacted, or degraded due to the final design of other disciplines. The coordination of signal design and the other civil design features shall include but are not limited to the following: channelization and pavement markings, structures, traffic signals, Intelligent Transportation Systems (ITS), traffic control, roadway, drainage, utilities, sign structures and signing. The design of the signal systems shall be coordinated with and not limited to the Technical Requirements (TRs) provided in the following sections: Section 2.10, *Utilities and Relocation Agreements*; Section 2.11, *Roadway*; Section 2.13, *Bridges and Structures*; Section 2.14, *Hydraulics*; Section 2.15, *Roadside Restoration*; Section 2.16, *Illumination*; Section 2.18, *Intelligent Transportation Systems*; Section 2.19, *Signing*; Section 2.20, *Pavement Markings*; Section 2.21, *Traffic Operations*; and Section 2.22, *Maintenance of Traffic*.

The Design-Builder shall design the signal systems to coordinate with drainage, retention ponds, earthworks, and maintenance access required for the Project. Signal controller cabinets, poles, and junction boxes shall not be located in areas of lower elevation, where they would be subject to flooding, ponding, or the collection of water. Where feasible, access roadways for drainage features may be used as access roads for signal facilities.***

2.17.3.1 *Operational Analysis Software*

Refer to Section 2.21, *Traffic Operations*, for software requirements pertaining to traffic signal operations modelling.

*** ***

2.17.3.2 *Design Documentation*

The Design-Builder shall provide all documents and information required for the Design Documentation Package.

2.17.3.3 *Foundations*

The Design-Builder shall conduct a soils investigation for each signal standard location. Foundations for signal standards shall require soil analysis and investigation to determine impacts to signal standard foundation design, including the lateral bearing pressure, friction angle, and water table. All underground Utilities within 5 feet of proposed signal foundations shall be located by potholing.

Where Standard Plan foundations cannot be used, foundations shall be designed in accordance with Section 2.6, *Geotechnical.*

Where foundation construction requires the use of drilled shafts and permanent casing, the foundation shall be constructed in accordance with the WSDOT *Construction Requirements for Light and Signal Standard Foundations Using Drilled Shaft Construction and Permanent Casing*.

Where signal poles are mounted on structures, the structure mounts shall be designed in accordance with Section 2.13, *Bridges and Structures.*

2.17.3.4 *Junction Boxes, Pull Boxes, and Cable Vaults*

One pull box and one small cable vault shall be installed adjacent to and within 5 feet of each double-wide signal controller cabinet (Type 332D or Type 342LX). The pull box shall route conduit and signal conductors to the traffic signal side of the cabinet. The small cable vault shall route conduit and communication cables to the communication side of the cabinet. The pull box and small cable vault shall be labeled accordingly and there shall be no conduit connection between the pull box and the small cable vault.

2.17.3.5 *Wiring*

The Design-Builder shall follow the requirements of the WSDOT *Design Manual* and the following:

- ***One five-conductor cable for each signal phase between the signal cabinet and a signal standard
- One five-conductor cable for each pedestrian signal display
- One two-conductor (shielded) cable for each pedestrian pushbutton assembly
- One four-conductor cable between each pedestrian assembly and the associated pedestrian signal display
- One three-conductor (shielded) cable for each emergency vehicle preemption detector
- The loop lead-in wire shall be two-conductor (shielded) cable in accordance with the Standard Specifications (Appendix B)***

2.17.3.6 *Signal Heads*

The Design-Builder shall use the following standards for signal heads:

- 12-inch signal lenses for all vehicle displays
- 16 by 18-inch lenses for all pedestrian displays
- Type ***M*** mounting for all vehicle heads mounted on mast arms. Other signal mounting shall conform to the Standard Plans
- A minimum of one overhead display for each approach lane. Dedicated right turn lanes may have the display mounted on the signal pole shaft in place of an overhead display
- A minimum of 8 feet separation between all signal displays for a given approach
- Light-Emitting Diode signal heads shall be installed for all vehicle and pedestrian signal indications
- Pedestrian signal heads shall include a countdown timing feature
- All arrow displays for left or right turn signals shall be used for protected-only operations
- Flashing yellow arrow displays shall be used for permissive turning movements with dedicated lanes

2.17.3.7 *Signal Standards*

The Design-Builder shall use the following standards for permanent signal standards:

- Signal standards with vehicle displays shall be Type I, Type II, or Type III standards. Type II and III signal standards may be single mast arm or dual mast arm. Dual mast arm signal standards shall only have mast arms oriented at 90 degrees from each other.
- Type PS pedestrian signal standards shall follow the guidelines of the WSDOT Design Manual when selecting fixed or slip bases.
- Type PPB posts shall be installed with a breakaway feature.
- Type II and Type III signal standards shall have a terminal cabinet with two 12-position terminal blocks.
- Signal standards which are not selected from the pre-approved list in the Special Provisions require a shop drawing and design calculation submittal in accordance with Standard Specification 9-29.6. All Type III signal standards shall only use Type 1 luminaire arms All signal standards shall be from the same manufacturer.
- Type II and Type III signal standards and foundations shall be designed to support additional future wind load in accordance with the requirements of the WSDOT *Design Manual.*

- A metal tag shall be permanently affixed to the top of foundation for each Type II, Type III, and special design signal standard indicating the foundation depth and diameter in accordance with Standard Plan J-26.15.

***Where pre-approved signal standards are not used, signal standards shall be designed in accordance with the requirements of the WSDOT *Standard Specifications* and Section 2.13, *Bridges and Structures.*

Signal standards shall be powder-coated in accordance with the *Special Provisions* (Appendix B), and the finish coat color shall be in accordance with *Goals, Guidance, and Standards for the I-90 Corridor MTSG National Scenic Byway* (Appendix L).***

2.17.3.8 ***Rectangular Rapid Flashing Beacon***

The Design-Builder shall install RRFB at pedestrian crossings for all single-lane on-ramps. RRFBs shall meet the following requirements:

- RRFB shall be in accordance with Rectangular Type, RFB Details and Pedestrian Crossing Details in WSDOT *Northwest Region Illumination and Signal Details* (Appendix T) and WSDOT *Northwest Region Electrical Special Provisions* (Appendix B).
- Install stop bar loops and advance loop and connect back to controller cabinet.
- Pedestrian pushbuttons shall be APS.

2.17.3.9 *Vehicle Detection*

Stop line vehicle detection shall be installed for all lanes including right turn and left turn lanes. ***Stop line vehicle detection shall be induction loops.

Placement of advance loops for traffic signals operated by WSDOT shall be in accordance with the WSDOT *Design Manual* (Appendix D) and the WSDOT *Northwest Region Current Practices in Electrical Design* (Appendix B).***

2.17.3.10 ***Traffic Signal Controller and Controller Cabinet Equipment***

Traffic signal control equipment shall meet the following requirements:

- Eagle Type 2070 L controller shall be used.
- Software for the 2070 L controller shall be Intelight MaxTime Version 1.9.9.
- The controller shall communicate centrally over the Internet Protocol (IP) network and locally at a baud rate greater than 38,400.

2.17.4 *Construction Requirements*

2.17.4.1 *General*

The Design-Builder shall construct all components of a traffic signal system necessary to provide a complete and functional system that meets the requirements specified in this Section.

The Design-Builder shall perform all Quality Assurance and Quality Control testing for temporary and permanent signal systems in accordance with the Request for Proposal Special Provisions and Mandatory Standards. The Design-Builder shall incorporate all testing into the Baseline Contract Schedule and Monthly Contract Schedule Updates for submittal to WSDOT. The Design-Builder shall submit all testing procedures, pass/fail requirements, and equipment documentation to WSDOT for Review and Comment and resolve all WSDOT comments a minimum of 14 Calendar Days prior to any testing. The Design-Builder shall submit test reports to WSDOT upon completion of each test in accordance with this Section and Section 2.28, *Quality Management Plan*. WSDOT may observe any tests and will audit test results. The Design-Builder shall notify WSDOT when all signal requirements have been met in accordance with the Contract, including training, documentation, testing, and field installations.

The WSDOT Engineer will perform the final electrical inspection and acceptance of traffic signal systems in accordance with WAC 296 46B, Electrical Safety Standards, Administration, and Installation.

The Design-Builder shall coordinate with the Utility Owner to determine the required separation between overhead Utilities and signal structures. The minimum separation between signal structures and equipment and overhead power lines, including the neutral, shall be 10 feet.

Signal cabinets and UPS cabinets installed with other cabinets shall be oriented so that the police panel and generator transfer switch are fully-accessible.

Signal cabinets shall be installed with the front doors opening away from the intersection so that an engineer facing the front of the cabinet will also be facing the intersection.

All existing traffic systems, including the detection and preemption systems, shall remain in place and operational at all times. The Design-Builder shall install a temporary traffic signal if any portion of the existing signal system will be removed or disabled.

For temporary traffic signal installations, the Design-Builder shall install temporary detection for stop bar loop locations and advance loop locations prior to disconnection of existing detection. Down time or fixed timing operation (no detection available) is not allowed without prior approval from the WSDOT Engineer and the WSDOT Signal Operations Engineer.

2.17.4.2 *WSDOT Electrical Inspector*

The Washington State Department of Labor and Industries has authority over all electrical installations within the State. WSDOT has been granted authority over all electrical installations within the Right of Way of State highways, provided WSDOT maintains and enforces an equal, higher, or better standard of construction, materials, devices, appliances, and equipment than is required by Applicable Laws. It is the role of the WSDOT Electrical Inspector to ensure that all electrical installations, including Illumination, Traffic Signal, and ITS installations, meet the requirements of the National Electric Code, and Applicable Laws and provisions.

The WSDOT Electrical Inspector will perform the following:

- Act as a resource for the electrical design team
- Assist with electrical system plan reviews (as applicable)
- Perform periodic electrical inspections during construction
- Witness required field tests (as desired)
- Perform inspections required before energizing any new equipment or circuits
- Inspect and approve all electrical installations in accordance with this Contract

2.17.4.3 *Operation and Maintenance*

Upon Notice to Proceed, the Design-Builder shall be responsible for maintaining all traffic signal system equipment outside of the controller cabinet, up to and including the landing of field wiring in the controller cabinet, for all traffic signal systems identified for modification or removal. The Design-Builder shall retain this maintenance responsibility until Physical Completion of the Project. WSDOT Region Traffic Signal Maintenance Staff shall retain maintenance responsibility for the equipment inside the traffic signal controller cabinet.

As part of maintenance responsibility, the Design-Builder shall be responsible for performing locates for all traffic signal systems included in the Work ***with the exception of the following:***

- WSDOT will perform the first set of locates requested by the Design-Builder for existing systems – refresh requests are the responsibility of the Design-Builder.

The Design-Builder shall be responsible for repairing, to the WSDOT Engineer's satisfaction and at no cost to WSDOT, any damage caused by the Design-Builder to traffic signal systems. The Design-Builder shall take all necessary action to ensure safe operation of the intersection. If the Design-Builder's Work impacts the operations of an existing traffic signal, the Design-Builder shall immediately rectify the impact and resume operation of the impacted signal. Liquidated damages will be assessed for unplanned signal system disruptions lasting more than 24 hours. Refer to Section 1-08.9 of the *General Provisions*.

The Design-Builder shall remove all ***existing and*** temporary signal system installations, if any, after the new permanent signal systems are completed and operational.

The Design-Builder is not authorized to program or operate any traffic signal system controller. Only WSDOT staff may program or operate a traffic signal controller, including placing a system into or out of flashing operations using the police panel. WSDOT staff authorized by the Region Signal Maintenance Manager, which may include WSDOT Engineer assistants and inspectors, may access the police panel and place a system into or out of flashing operations in coordination with the Design-Builder's Traffic Control Supervisor in support of traffic control operations.

2.17.4.3.1 Emergency Maintenance

The Design-Builder shall notify the Traffic Systems Management Center and the WSDOT Engineer in the event that a situation related to public safety is observed, such as a dark or flashing signal intersection, improper signal timing, misaligned signal heads, exposed wires, or knockdowns.

For systems included in the project, the Design-Builder shall perform all required emergency repairs on equipment outside of the traffic signal controller cabinet, up to and including the landing of field wiring in the controller cabinet. Repairs or temporary replacements shall be installed and operational within 8 hours of initial notification of a fault.

WSDOT Region Traffic Signal Maintenance Staff will respond for repairs to equipment inside the traffic signal controller cabinet.

2.17.4.4 *Permits*

When a new Traffic Signal Permit is required, the Design-Builder shall prepare and submit the traffic signal permit application in accordance with Chapter 1330 of the WSDOT *Design Manual*. The Design-Builder shall also provide supplemental information as described in Section 6.3 of the WSDOT *Traffic Manual*. No traffic signal construction may occur without an approved Traffic Signal permit. Modifications to existing WSDOT maintained traffic signals will require a traffic signal permit for a report of change.

2.17.4.5 *Signal System*

The Design-Builder shall satisfy the requirements of Section 8-20.3(11) of the Standard Specifications and document completion in accordance with the WSDOT *Signal Turn-On Requirements.* The Design-Builder shall submit the Signal Turn-On Checklist to the WSDOT Engineer for Review and Comment 5 Calendar Days prior to scheduling a turn-on date for that traffic signal system. Field Test 5 shall be completed a minimum of 1 Calendar Day prior to the desired turn-on date.

2.17.4.6 *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 the Project.

Materials shall meet the requirements specified in Section 9-29 of the Standard Specifications, and as supplemented and amended by this Section and the Special Provisions.

2.17.4.7 *Salvage*

The Design-Builder shall salvage existing signal equipment removed by the Design-Builder, and deliver to the WSDOT regional Signal Maintenance Superintendent at the following address:

3700 9th Avenue South

Seattle, Washington 98134

Telephone: (206) 442-2110

The Design-Builder shall salvage existing traffic signal equipment removed by the Design-Builder as described in this section.

The following traffic signal equipment shall be salvaged and delivered to the agency designated:

- Signal standards, mast arms, pushbuttons, emergency vehicle detectors, and signal displays
- Signal cabinets

Salvaged equipment shall be delivered to the applicable address below:

3700 9th Avenue South

Seattle, Washington 98134

Telephone: (206) 442-2110

Fourteen Calendar Days prior to delivery of salvaged items, the Design-Builder shall provide a list of salvage items, their quantity, and their current condition to the WSDOT Region Signal Maintenance Superintendent or applicable agency contact. The Design-Builder shall give a minimum of 7 Calendar Days' notice to the WSDOT Region Signal Maintenance Superintendent or applicable agency contact prior to delivery of salvaged equipment. The Design-Builder shall provide all labor and equipment to transport, load, and unload the salvaged equipment.

2.17.4.8 *Temporary Signals and Temporary Modifications*

Temporary signal system(s) and temporary modifications to existing signal systems shall be designed and installed when required in accordance with this Section and Section 2.22, *Maintenance of Traffic*. Temporary signal systems shall be modified, adjusted, or relocated in order to accommodate the Released for Construction

(RFC) Traffic Control Plans, Staging Plans, order of Work, and detours. After the permanent signal system is energized and made operational, or restored to original configuration and operation, the temporary signal system and/or temporary modifications shall be completely removed. All temporary system poles, wiring, junction boxes, conduit sweeps, and cabinets shall be removed. Holes and voids shall be backfilled.

Temporary signal systems and temporary modifications to existing signal systems shall meet all requirements for permanent traffic signal systems.

2.17.5 *Submittals*

All deliverables shall be in accordance with the requirements of Sections 2.12, *Project Documentation*, and 2.28*, Quality Management Plan*.

The Design-Builder shall submit type, size, location, and phasing diagram for the proposed DDI signal systems to WSDOT for review prior to submitting preliminary traffic signal plans.The Design-Builder shall also submit the following back-up data items with the Preliminary Design Submittal:

- Speed study data indicating 90th, 85th, and 10th percentile speeds for all approaches.
- Peak hour turning movement counts (a.m., midday, and p.m.).
- Detection zone placement calculations in accordance with the WSDOT *Design Manual* Phasing analysis to support protected or protected-permitted left-turn phasing. If protected-permitted left-turn phasing is planned, provide verification that conditions are suitable for this type of operation.
- A1 height calculations for proposed and future phasing to verify minimum/maximum allowed roadway clearances. Attach cross sections for review.
- In the case of temporary span wire installations, calculations and cross sections are required to verify that roadway clearances will be within the allowable range.

The Design-Builder shall also submit the following back-up data items with the Final Design Submittal:

- Wind load calculations for signal mast arms for proposed and future phasing conditions to support foundation sizing. Attach soils analysis for each signal standard to verify foundation design. Attach back-up design data for all special designs. In the case of temporary span wire installations, strain pole class and foundation selection calculations are required to support the design.
- Electrical load calculations in accordance with Section 2.16.3.5.3, unless these calculations are already included in submittals for Section 2.16, *Illumination*.
- Utility Agreement and Utility Relocation Requests.

- Conduit fill and junction box capacity calculations.

The Design-Builder shall submit a Signal Turn-On Checklist to the WSDOT Engineer for Review and Comment 5 Calendar Days prior to placing any new or modified traffic signal into operation.

2.17.5.1 *Working Drawings*

Working Drawings and product data shall include the following:

- Shop drawings for all poles, mast arms (by type and size), and pedestals
- Service cabinets
- Luminaires and lamps
- Ballasts and photoelectric controls
- Paint (prime and finish)
- Fuse holder kits, fuses, and insulating boots
- Loop detector splice kits
- Vehicle signal indications and lenses
- Pedestrian signal indications, lenses, and housings
- Emergency vehicle preemption equipment
- Video detection equipment

2.17.5.2 *Preliminary Signal Plan*

The Preliminary Signal Plans shall be prepared in accordance with the Mandatory Standards. The Plans shall include, at a minimum, the following items:

- Plan showing location of signal standards; controller cabinets; detection zones, loops, or both; detector locations; conduit; and junction boxes required for the installation
- Signal sequence/phasing diagram
- Identification of existing signal items to remain
- Title block, north arrow, and scale bar
- Legend of symbols
- Existing signal features and Utilities
- Proposed channelization
- Illumination
- Signals to be interconnected
- Cabinet locations and orientations

The Design-Builder shall submit the Preliminary Signal Plans to the WSDOT Engineer for Review and Comment as part of the Preliminary Design Submittal.

2.17.5.3 *Final Signal Plan*

Permanent Signal Plans shall be complete and include, at a minimum, all of the items from the Preliminary Signal Plan Submittal and the following:

- Conduit and conductor schedule showing new wire and existing wire to remain
- Field wiring diagram and cabinet wiring termination diagram for each signal system
- Complete construction notes
- All wire, cable, and terminations that are needed for the complete operation of the signal system
- Pole schedule specifying mounting height, attachment offsets, attachment angles, and foundation depths
- Cabinet input file detail sheet
- All references to Standard Plans and electrical details
- Structural calculations
- All signal details in accordance with, at a minimum, the WSDOT *Illumination and Signal Details*
- Pull box, cable vault, and junction box locations and details
- Interconnect Plans and details including cabinet electronics, wiring, and equipment installation
- Loop termination schedule
- Cabinet and pole foundation details
- Details for non-standard elements
- Wire notes (including identification of new and existing conductors, cable, and conduit)
- List/quantity of items to be salvaged
- Documentation regarding the power source and coordination with the local power company
- Design Documentation (such as clearance measures, loop test sheets, voltage drops, and conduit fill calculations)

2.17.5.4 *Released for Construction Documents*

The Design-Builder shall include the following items with the Released for Construction Documents:

- All elements required for the final signal design
- All resolved comments from the final signal design
- Additional design elements addressed

2.17.5.5 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.18 Intelligent Transportation Systems

2.18.1 *General*

The Design-Builder shall perform all Work necessary to meet the requirements for Intelligent Transportation Systems (ITS) in accordance with this Request for Proposal (RFP) and shall keep the existing ITS functioning throughout construction of the Project.

The Design-Builder shall maintain electrical power to all ITS devices during construction. The Design-Builder shall maintain communications between all ITS devices and the Traffic Management Center (TMC) during construction.

The Design-Builder shall design, furnish, and install complete ITS including, at a minimum the following elements:

- Communication conduit system
  - Two 4-inch mainline conduits (each with four 1-inch innerducts) and lateral conduits for fiber optic cables to ITS devices. One 2-inch mainline communication conduit system, in the median of I-90 at MP 19.93 in the vicinity of SE Highpoint Way to 23.84.
- Communication cables and interfaces
  - Fiber optic mainline and distribution cables. Pre-terminated patch panels and ancillary equipment for fiber splicing, as required.
  - 48-strand SMFO mainline cable starts from existing cable vault located at MP 23.84 along I-90 and terminates in the new communication HUB at the I-90/SR18 interchange.
  - 48-strand SMFO mainline cable shall be spliced to existing ITS system at the vicinity of I-90 at SE Highpoint Way.
- Closed-Circuit Television (CCTV) system
  - Cameras and camera control cabinets
- Traffic data accumulation and ramp metering system
  - Ramp meters, data stations, and traffic detection equipment
- ***Highway Advisory Radio (HAR) System
  - HAR Transmitter (HART), HAR Sign (HARS), and control cabinets***
- Environmental Sensor Station (ESS)
- Interconnect to traffic signal controllers
- Variable Message Signs (VMS)
- Intersection Conflict Warning System (ICWS)

- SR18 and SE 104th St

- Signs, structures, and control cabinets

-- Associated video, voice, and data distribution and transmission equipment; and communication equipment in ITS, traffic signal

- Transformer cabinet, junction boxes, pull boxes, cable vaults, conduit, and any ancillary equipment required to create a fully-functioning and operable ITS as defined by the Mandatory Standards
- System and equipment testing as required
- ***Installation of new generators and I-90 / SR 18 Communication HUB***
- Foundations, property restoration, and incidental Work

2.18.1.1 *Forward Compatibility*

The Design-Builder shall design the following ITS elements to be Forward Compatible in accordance with the *General Provisions*:

- Communication conduit system
- Communication HUB
- Cabinets
- VMS
- Cameras and camera poles
- Communication cables and interfaces
- ***Ramp meter loops and cabinet on SR 18 ramp to eastbound I-90***
- Fiber optic communication Connection, I-90 MP 19.93 to 23.84

2.18.1.2 *Testing of Existing Equipment*

To ensure that all existing equipment is in proper working order, the Design-Builder may request a meeting on-site with the WSDOT Engineer and the agency with current maintenance responsibility, prior to the performance of any Work at the Site. At the time of this meeting, all cabinet components and operations may be tested by the Design-Builder. The Design-Builder shall be responsible for requesting, coordinating, and conducting the on-site meeting, and for providing all labor, materials, test equipment, and test documentation. All testing shall be non-destructive. If the Design-Builder begins Work without arranging this pre-testing, WSDOT will assume that all cabinet components and operations were in proper working order prior to the performance of any Work, and the Design-Builder shall be responsible for ensuring that all cabinet components and operations are in proper working order during and upon the completion of the Work. If no pre-testing is completed, any equipment that is not functioning upon completion of the Work will be assumed to have been in proper working order as of the date of Notice to Proceed (NTP), and shall be replaced at the Design-Builder's expense. The Design-Builder shall submit the results of all pre-tests in

writing to the WSDOT Engineer ***prior to beginning work on the ITS System.***

2.18.1.3 *Coordination with Adjoining Projects*

The Design-Builder shall obtain the ITS Design Plans for adjacent projects and determine the coordination requirements for continuous functioning of the ITS equipment for the Project. This shall include coordination with the WSDOT Engineer. The Design-Builder shall also adjust the design and construction schedule to coordinate the installation of the required components, while continuously maintaining the ITS.

2.18.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. ***WSDOT *Northwest Region ITS Special Provisions**** (Appendix B)
3. Standard Specifications M 41-10 (Appendix B)
4. WSDOT *Design Manual* M 22-01 (Appendix D)
5. ***WSDOT *Intelligent Transportation System Northwest Region Design Requirements**** (Appendix T)
6. WSDOT Northwest Region ITS Details (Appendix T)
7. WSDOT Northwest Region Signal and Illumination Details (Appendix T)
8. Standard Plans M 21-01 (Appendix D)
9. WSDOT *Traffic Manual* M 51-02 (Appendix D)
10. WAC 468-95 *Washington State Modifications to the Manual on Uniform Traffic Control Devices* (Appendix D)
11. WSDOT *Materials Manual* M 46-01 (Appendix D)
12. WSDOT *Construction Manual* M 41-01 (Appendix D)
13. *NFPA 70: National Electrical Code (NEC)*
14. *AASHTO A Policy on Geometric Design of Highways and Streets*
15. *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*
16. *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, 2009 Edition with Revisions 1 & 2 dated May 2012 (Appendix D)
17. *AASHTO Roadside Design Guide*
18. *US DOT National ITS Architecture*
19. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)

20. Roadside Electrical Systems Standard Detail for DDI Equipment Placement (Appendix T)

2.18.3 *WSDOT Personnel*

The Design-Builder shall coordinate the Work with the WSDOT Engineer. The WSDOT Engineer will designate a WSDOT ITS Engineer and WSDOT Electrical Inspector. The Design-Builder shall coordinate ITS Work with the following WSDOT staff designated by the WSDOT:

- WSDOT ITS Engineer
- WSDOT Electrical Inspector

2.18.3.1 *WSDOT Intelligent Transportation Systems Engineer*

The WSDOT ITS Engineer will perform the following:

- Review the certification of test device calibration (to American National Standards Institute (ANSI) specified guidelines).
- Review and make recommendations for acceptance to the Design-Builder of the required documentation including specifications, shop drawings, and all measured and recorded values for the system and for each cabinet.
- Review splice vault, CCTV, cabinet, and communication hub locations once surveyed and staked in the field.
- Oversee connections to the existing ITS communication network.
- Review Plans and component Submittal packages and assist the design team.
- Make recommendations to the Design-Builder for the acceptance of ITS based on the Submittal and other documentation packages.

2.18.3.2 *WSDOT Electrical Inspector*

The Washington State Department of Labor and Industries has authority over all electrical installations within the State. WSDOT has been granted authority over all electrical installations within the Right of Way (ROW) of State highways, provided WSDOT maintains and enforces an equal, higher, or better standard of construction, materials, devices, appliances, and equipment than is required by Applicable Laws. It is the role of the WSDOT Electrical Inspector to ensure that all electrical installations, including Illumination, Traffic Signal, and ITS installations, meet the requirements of the National Electric Code, and Applicable Laws and provisions.

The WSDOT Electrical Inspector will perform the following:

- Act as a resource for the electrical design team
- Assist with electrical system plan reviews (as applicable)
- Perform periodic electrical inspections during construction
- Witness required field tests (as desired)

- Perform inspections required before energizing any new equipment or circuits
- Inspect and approve all electrical installations in accordance with this Contract

2.18.4 *Design and Construction Requirements*

2.18.4.1 *General Requirements*

The ITS shall provide for ***fiber optic communication, real-time CCTV surveillance, data collection, VMS, Ramp Metering, and*** all associated traffic control devices.

The Design-Builder shall provide a complete, operational, and maintainable ITS and components. The ITS and its components shall be compatible with the existing system. The Design-Builder shall furnish, install, and maintain all electrical power service and communications necessary for the ITS system. The Design-Builder shall provide an ITS that meets the following requirements:

- ***Complete electrical system to energize ITS electrical equipment, transformers, and cabinets in accordance with this Section and Section 2.16, *Illumination*
- Maintenance pullouts for maintenance vehicle access as required by the Mandatory Standards and this Section
- Complete fiber optic communication system
- Fiber optic communication connection on I-90 MP 19.93 to HUB***
- Cabinet layouts in accordance with the ***WSDOT *Northwest Region ITS Details* (Appendix T)***
- 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
- Hazard-free ITS components mounted along the side of the road outside of the clear zone or in protected areas
- If ITS components are mounted in the clear zone, they shall be constructed and protected in accordance with the WSDOT *Design Manual*
- The *DDI Equipment Placement* (Appendix T) requirements for locating poles and cabinets.

***The Design-Builder shall coordinate the design of the ITS with the design of other disciplines as necessary, such that the design performance and assumptions are not compromised, impacted, or degraded due to the final design of other disciplines. The coordination of ITS design and the other civil design features shall include but not be limited to the following; channelization and pavement markings, structures, illumination, traffic signals, traffic control, roadway, drainage, utilities, sign structures, shared use maintenance pull outs, and signing.

The design of the ITS shall be coordinated with and not limited to the following Technical Requirements provided in the following sections: Section 2.10, *Utilities and Relocation Agreements*; Section 2.11, *Roadway*; Section 2.13, *Bridges and Structures*; Section 2.14, *Hydraulics*; Section 2.15, *Roadside Restoration*; Section 2.16, *Illumination*; Section 2.17, *Traffic Signals*; Section 2.19, *Signing*; Section 2.20, *Pavement Markings*; Section 2.21, *Traffic Operations*; and Section 2.22, *Maintenance of Traffic*.

The Design-Builder shall design the ITS to coordinate with drainage, retention ponds, earthworks, and maintenance access required for the Project. Where feasible, access roadways for drainage features may be coordinated access roads for ITS facilities. ITS cabinets, poles, and junction boxes shall not be located in areas of lower elevation where they would be subject to flooding, ponding, or the collection of water. Landscape features shall be coordinated to not impact ITS equipment. Landscape features and trees shall not restrict the camera views at mature plant size.***

The Design-Builder shall use stainless steel mounting hardware such as 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.

The Design-Builder shall round and smooth sharp corners and edges on all ITS components that the Design-Builder furnishes and installs.

All material, equipment, and components furnished by the Design-Builder 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 existing system.

The Design-Builder shall not install cameras or HART on sign bridges.

The Design-Builder shall install all cabinets so that they are easily accessible to maintenance personnel from the roadway. The Design-Builder shall locate the ITS elements so that the need for future relocation is eliminated based on Forward Compatibility requirements, if any.

The Design-Builder shall design and construct a temporary ITS that provides for continuous operation of all existing ITS components during construction. The temporary ITS shall be prepared on separate plan sheets than that of the permanent ITS Plans.

The Design-Builder shall be responsible for removal, salvage, and delivery of existing temporary ITS equipment within the Project area in accordance with the WSDOT *Northwest Region ITS Special Provisions* (Appendix B).

The Design-Builder shall label all new and existing ITS devices in accordance with the ***WSDOT *Northwest Region ITS Special Provisions* (Appendix B) and the WSDOT *Intelligent Transportation System Northwest Region Design Requirements* (Appendix T).***

At the preliminary design level, the Design-Builder shall design the ITS as a whole before installation of any individual field component. The Design-Builder shall notify the WSDOT Engineer a minimum of 7 Calendar Days in advance of staking locations for ITS devices for Review and Comment, as well as making final connections of the newly-installed or temporary ITS components to the existing system.

Existing ITS cabinets within the Project limits shall be replaced as required by WSDOT ******Intelligent Transportation System Northwest Region Design Requirements.******

2.18.4.2 *Vehicle Detection*

The Design-Builder shall provide permanent vehicle detection which measures vehicular volume and lane occupancy on the highway. The Design-Builder shall place permanent mainline detection in accordance with the WSDOT ******Intelligent Transportation System Northwest Region Design Requirements.****** The Design-Builder shall place permanent detection in all ramps, all auxiliary lanes, and all mainline lanes.

The Design-Builder shall maintain and re-establish operation of all loops outside the Project limits if they connect to a controller cabinet within the Project limits.

The Design-Builder shall include a maximum of 32 detector inputs per cabinet.

Where existing loops will be reused and routed into a new data station or ramp meter cabinet, the Design-Builder shall ensure that all existing loops are connected to the new cabinet location. To achieve this, the Design-Builder shall comply with this Contract and the following requirements:

- No splices will be allowed in the detector lead-ins (2C(SH) cables). In the event that existing cables are too short, the Design-Builder shall replace the lead-in cables.
- Existing loops shall be tested in accordance with the Standard Specifications and the WSDOT ******Northwest Region ITS Special Provisions******, and shall be replaced if they fail the induction loop test.

2.18.4.2.1 Permanent Vehicle Detection

The Design-Builder shall install induction loop detectors for permanent detection in accordance with this Section.

In areas where new pavement will be constructed, the Design-Builder shall install the loops in the pavement base prior to the final lift of the pavement surfacing, unless otherwise approved by the WSDOT Engineer. The Design-Builder shall coordinate installation of detector loops with the base and paving operations.

All lanes, ramps, and special use facilities within the Project limits shall have fully functioning induction loop detectors upon Physical Completion. All broken loops and all loops that do not pass the testing requirements shall be replaced regardless of their operational status at NTP.

2.18.4.2.2 Temporary Vehicle Detection

Temporary detection shall be in accordance with the WSDOT ******Intelligent Transportation System Northwest Region Design Requirements******. Temporary vehicle detection shall be required if construction activities cause the center of an existing or new permanent loop location to deviate more than 1 foot from the center of the travel lane.

2.18.4.2.3 Loop Detectors

The Design-Builder shall furnish and install R1, R2, and WR induction loop detectors in accordance with ***this Section, the WSDOT *Northwest Region ITS Details,* and the WSDOT *Intelligent Transportation System Northwest Region Design Requirements.****

2.18.4.2.5 Intersection Conflict Warning System (ICWS)

The Design-Builder shall install an ICWS at SR 18 and SE 104th St. The ICWS shall provide warning indications to drivers on northbound SR 18, warning of turning traffic from SR 18 southbound to SE 104th St and from SE 104th St to northbound SR 18. The design builder shall provide and install the ICWS to meet the following requirements:

- The ICWS shall be in accordance with ICWS Road Warning Details, WSDOT *Intelligent Transportation System Northwest Region Design Requirements* (Appendix T), and the WSDOT *Design Manual*.
- Loop detection shall be installed in the left turn lane of southbound SR 18 and the right turn lane of SE 104th St. There shall be a minimum of two loops, spaced at seventeen feet apart (center to center) for each detection location. Each loop shall be wired separately, with each lead-in brought back to the ICWS control cabinet.
- Two Flashing Beacon (FB) Poles shall be installed on northbound SR 18, one on the right shoulder and one in the median. Foundations shall be in accordance with Standard Plan J-21.16. Flashing beacons on each pole shall operate using alternating flashing.
- Flashing beacons shall use two-channel cap flashers installed at the FB poles.
- Yellow LED enforcement lights (Tattle Tale Verification) shall be installed on the back of sign such that they are visible from the intersection. Each enforcement light shall be wired in parallel with one of the flashing beacons on that sign.
- One control cabinet shall be provided for ICWS control equipment. The cabinet shall include the following, at a minimum:
    - One flasher cabinet with four position detector rack – 120 VAC, model/item #6280025002.
    - One 2P-15A circuit breaker.
    - One 3-Amp rack mount Power Supply (PS175), model/item# 5070070175.

- One loop amplifier, Reno A&E model C-1103-SS, rack mount (2-channel).
- One solid state relay.
- Terminal blocks for power and field wiring (loop inputs and sign outputs).

The ICWS shall operate as follows:

- Upon detection of a vehicle in the right turn lane of SE 104th St, the flashers on northbound SR 18 shall immediately activate. The flashers shall continue to operate until six seconds after a vehicle is no longer detected.
- Upon detection of a vehicle in the left turn lane of southbound SR 18, the flashers on northbound SR 18 shall activate after a two second delay. The flashers shall continue to operate until six seconds after a vehicle is no longer detected.

2.18.4.3 *Ramp Metering/Data Stations*

The Design-Builder shall furnish and install new data stations and cabinets in accordance with the WSDOT ******Intelligent Transportation System Northwest Region Design Requirements.******

The Design-Builder shall furnish and install all equipment necessary to create a fully-functioning and operable ramp metering and data station system.

The Design-Builder shall furnish and install ramp meter poles and associated signal heads, advanced warning signs and flashers, cabling, junction boxes, pull boxes, cable vaults and foundations, and signing to accommodate the change in roadway geometry.

***<u>Highway Light Poles, Camera Poles, and Ramp Meter Signal Poles:</u>

In some cases, a transition into local styles and colors will be necessary and should be coordinated through the Northwest Region Landscape Architect and State Bridge and Structures Architect; otherwise the following standard shall apply:

- Standard colors for all poles: AMS-STD-595™ EA-200040 (dark brown paint/powder coating) or AMS-STD-595t™ EA-37056 (Bronze Brown anodized). ***

The Design-Builder shall furnish and install new cabinets and foundations.

The Design-Builder shall install new ramp meter at the following location:

- ***SR 18 to eastbound I-90 on-ramp (install all infrastructure to meter 2 lanes, except for the ramp meter pole and the advance warning sign pole(s).)***

The Design-Builder shall rebuild existing ramp meter system in accordance with the WSDOT ******Intelligent Transportation System Design Requirements* and the WSDOT *Northwest Region ITS Details****** at the following location:

- ***SR 18 to westbound I-90 on ramp (meter two lanes)***

2.18.4.3.1 Ramp Meter Advance Warning Sign

Ramp meter advance warning signs shall include the proper advance signing with flashing beacons. The Design-Builder shall install the ramp meter flasher poles in accordance with the Standard Plans, the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements,* and the WSDOT *Northwest Region ITS Details.**** Flashing beacons shall include back plates for the display with no reflective tape.

2.18.4.3.2 Ramp Meter Signal Foundation

The Design-Builder shall furnish and install the pole base and the pole shaft for the ramp meter signal poles and advance warning sign poles.

2.18.4.3.3 Grounding

The Design-Builder shall perform grounding in accordance with the WSDOT ****Northwest Region ITS Special Provisions**** (Appendix B).

2.18.4.3.4 Ramp Meter Pole

The ramp meter pole shall be in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements.****

2.18.4.3.5 Ramp Meter Signal Head Assembly

The Design-Builder shall install aluminum signal heads with powder-coated cast aluminum backplates on the upper heads. The Design-Builder shall not install a backplate on the lower heads. Backplates shall not include any reflective tape.

2.18.4.3.6 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 International Municipal Signal Association specifications for the control cables.

2.18.4.3.7 Ramp Meter Signing

The Design-Builder shall provide all necessary ramp meter signing in accordance with this Section, the WSDOT *Intelligent Transportation System Northwest Region Design Requirements* (Appendix T), and the WSDOT *Design Manual*.

2.18.4.4 *Closed-Circuit Television System*

The Design-Builder shall furnish and install a CCTV system in accordance with the WSDOT *Intelligent Transportation System Design Requirements* (Appendix T). The system shall include CCTV cameras, camera cables, camera control cabinets, Ethernet switches, AC/DC adaptors, camera poles, foundations, and all other accessories and components to make the cameras fully-functioning and operable. The Design-Builder shall also furnish all equipment necessary to

install the components, and connections to create a fully-functioning and operable system.

The Design-Builder shall ensure that all accessories and components are fully compatible with the existing ITS equipment.

The Design-Builder shall replace all existing cameras within the Project limits with new CCTV cameras.

Existing CCTV cameras removed within the Project limits shall be salvaged and delivered to the WSDOT Engineer.

CCTV cameras installed within the Project limits shall meet the following requirements:

- At interchanges, cameras shall be located to provide a full view of the intersecting arterial, ramps and ramp meter signal displays.
- All pavement surfaces within the limited access and within the Project limits shall be completely visible by CCTV cameras.
- The view of all paved surfaces outside of the project limits shall be maximized provided that all camera equipment required to do so stays within the project limits.
- Existing views of pavement surfaces within or outside the Project limits shall not be degraded. Any paved surfaces that were visible by CCTV prior to the contract shall be preserved.
- ***The CCTV shall provide a readable view of the front of all VMS from an angle within the LED cone of vision for that sign.***
- The CCTV shall provide a readable view of the front of the AWS from and angle within the LED cone of vision for that sign.
- The CCTV shall provide a front view of all flashing beacon warning signs. Where a blank out sign is present the blank out sign shall also be readable.

The Design-Builder shall consult with the WSDOT Engineer on the placement of CCTV hardware. Camera views, accessibility, and maintainability are issues of concern. The Design-Builder shall inspect the view for all proposed camera locations from a bucket truck, unmanned aerial vehicle or three dimensional modeling and provide video and still images of that view to the WSDOT Engineer for Review and Comment during the design process.

2.18.4.4.1 Closed-Circuit Television Camera Pole

CCTV poles and foundations shall follow the requirements of the Standard Plans. Camera pole sites shall be in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements.****

2.18.4.4.2 Closed-Circuit Television Control Cabinet

The Design-Builder shall furnish and install the CCTV control cabinets ***in accordance with the *Northwest Region ITS Special Provisions*, WSDOT *Intelligent Transportation System Northwest Region Design Requirements,* and

*Northwest Region ITS Details**** and shall provide all necessary tools and equipment to connect the cabinets to the cameras, electrical source, and communications system.

2.18.4.4.3 Access to Closed-Circuit Television

The Design-Builder shall provide access in accordance with the WSDOT *Intelligent Transportation System Design Requirements* (Appendix T). Maintenance vehicles, such as bucket trucks, shall have the ability to park adjacent to the CCTV structure for maintenance of the CCTV and shall have adequate access on and off of the roadway. Maintenance access shall be designed such that maintenance vehicles do not have to back into traffic.

2.18.4.5 Full Size Variable Message Signs

The Design-Builder shall furnish and install VMS at approximately the following location:

- ***Eastbound SR 18 5,700 feet South of SE 104th Street.***

The Design-Builder shall furnish, install, and test the VMS structures, foundations, power, software, local control panel assembly, and all other ancillary equipment and components, to create a fully-functioning and operable VMS system.

The Design-Builder shall position the signs to achieve the optimum sight line and maximum visibility for the vehicles approaching the sign. The minimum visibility requirement shall be 1,000 feet. The Design-Builder shall consider the sign-viewing angle for the VMS location and install the VMS in accordance with manufacturer's recommendations and this Section.

WSDOT TMC personnel will remotely operate the messages on the signs.

The Design-Builder shall design the support structure in accordance with the requirements of the ****Mandatory Standards****. The Design-Builder shall mount the VMS to the support structure. The new VMS shall not be mounted on or supported by roadway bridges.

The Design-Builder shall furnish and install the VMS, VMS controller cabinets and accessories in accordance with this Section and as required to make the VMS fully-functioning and operable. Installation shall be in accordance with this Section and the WSDOT *Intelligent Transportation System ****Northwest Region**** Design Requirements* (Appendix T). The Design-Builder shall notify the WSDOT Engineer when installation and testing of the VMS hardware is complete, so that the WSDOT Engineer can verify VMS operations.

The Design-Builder shall supply all equipment and personnel needed to load, transport, and unload the VMS. The Design-Builder shall provide power to each VMS within 10 Calendar Days of delivery of the VMS, or house the VMS in a controlled atmosphere facility.

- ***VMS shall be walk-in type. Front access VMS shall not be used.

- Three flashing beacons, each with three amber LED lamps, shall be furnished and installed on top of VMS.
- DAKTRONICS model shall be VF-2020-96X336-20-RGB or latest equivalent model and shall be capable of displaying three lines of text with 18-inch character height and a minimum of 17 characters per line.
- All full-size VMS shall be 20mm pixel pitch, full matrix fill color.

2.18.4.5.1 Access to Variable Message Signs

The Design-Builder shall provide access in accordance with the WSDOT ******Intelligent Transportation System Northwest Region Design Requirements.****** Maintenance vehicles, such as bucket trucks, shall have the ability to park adjacent to the VMS structure for repairs to the VMS and shall have adequate access on and off of the freeway. Maintenance access shall be designed such that maintenance vehicles do not have to back into traffic.

2.18.4.5.2 Maintaining Variable Message Signs During Construction

The VMS are used to inform drivers of incidents prior to, within, and beyond the Project limits. Existing or new VMS shall remain operational at all times. If an existing VMS is removed, a temporary VMS shall be installed and operational before removing the existing VMS. Temporary VMS shall meet the technical requirements for new VMS systems.

2.18.4.6 *Highway Advisory Radio*

Remove existing HART and associated equipment located in the median of I-90, just west of SR 18.

2.18.4.6.1 Highway Advisory Radio Sign

This Section is intentionally omitted.

2.18.4.6.2 Highway Advisory Radio Transmitter

Remove existing HART and associated equipment located in the median of I-90, just west of SR 18.

2.18.4.7 *Environmental Sensor Station*

The existing Environmental Sensor Station shall be protected and connected to the new communication network.

2.18.4.8 *Communication Conduit System*

The Design-Builder shall design and construct a complete conduit system, including all associated conduit, cables, junction boxes, pull boxes, cable vaults, and accessories in accordance with ***this Section, the WSDOT *Northwest Region ITS Details,* and the WSDOT *Intelligent Transportation System Northwest Region Design Requirements.****

The Design-Builder shall design and install mainline conduits at the following locations:

- ***Along SR 18 from North of Deep Creek Bridge to the new communication HUB in the I-90/SR 18 interchange Along I-90 from the new communication HUB in the I-90/SR 18 interchange to existing VMS on westbound I-90 approximately 3,000 feet east of the interchange
- Along I-90 from the new communication HUB in the I-90/SR18 interchange to the existing vault adjacent to the ITS cabinet 090es02543.***
- A single new 2-inch mainline communication conduit system beginning at the existing cable vault located in the median of I-90 at MP 19.93 SE Highpoint Way vicinity and ending at an existing pull box located in the median on I-90 at MP 23.84.

The mainline conduit shall consist of two 4-inch conduits with each conduit containing four 1.12-inch factory silicon-lined and smooth-walled innerducts. The Design-Builder shall install all communications cables within the conduit system. Direct-buried or exposed cables will not be permitted. Innerduct conduit shall only be used for fiber optic distribution and transmission cables.

The Design-Builder shall install mainline conduit systems with consideration to access, maintainability, and Forward Compatibility on the freeway side of noise walls and ROW fences. The Design-Builder shall minimize the number of transverse crossings of the freeway.

The ITS 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. The two 4-inch conduits installed for the fiber optic communication system shall be backfilled with Control Density Fill or clean granular material and detectable orange warning tape shall be placed above the conduits. All conduits trenched under pavement and backfilled with clean granular material shall be compacted in accordance with Method C of the Standard Specifications. The paving shall be replaced with paving materials that match existing pavement. A trace wire shall be included with all conduits installed for fiber optic cable. When communication cable is installed as part of a new system, the communication cable shall be kept separate from all other wiring.

The Design-Builder shall furnish and install conduit and cabling to interconnect all traffic signal controller cabinets within Project limits and WSDOT limited access. At each interchange the interconnect conduit system shall connect each WSDOT signal controller cabinet together with one 2-inch diameter conduit between cable vaults adjacent to each signal controller cabinet. The signal controller cabinet nearest an ITS camera cabinet shall be connected to the camera cabinet with one 2-inch diameter conduit and the interconnect fiber. If there is not a camera cabinet within the interchange, the signal interconnect shall be connected to the nearest ITS cabinet containing the distribution fiber.

The Design-Builder shall immediately cap all open ends of installed conduit until cables are installed.

Standard bell ends shall be installed on all conduit ends by the Design-Builder to prevent damage to the installed cable.

With open trench installations of conduit under pavement, the Design-Builder shall place the conduit a minimum of 3 feet below finished grade. All other conduit placed underground shall be placed a minimum of 24 inches below the finished grade. Open trench installation of conduit across roadways will not be allowed.

The Design-Builder shall install warning tape and ground wire in accordance with Section 8-20 of the Standard Specifications and the WSDOT ******Northwest Region ITS Special Provisions.******

2.18.4.8.1 Existing Conduit Systems

The Design-Builder shall ***not*** use existing communication conduit system (***2 inch*** conduit). All existing communication conduit without innerduct shall be replaced with new conduit meeting the Mandatory Standards.

The Design-Builder may use all other existing conduit systems if the existing conduit systems meet all design requirements stated in this Section and the Mandatory Standards.

Existing conduit systems consist of stick PVC, stick polyethylene, continuous polyethylene, or rigid steel conduit. Where existing conduit is replaced, abandoned, or is otherwise not acceptable, the Design-Builder shall furnish and install new conduit. The Design-Builder shall not relocate or use salvaged conduit.

When installing fiber optic cable 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 of the conduit 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 which violate the fiber optic cable bending radius limitations, the Design-Builder shall install new conduit to provide a smooth transition.

The Design-Builder shall clean the existing conduit of debris prior to pulling fiber optic or copper cable through it in accordance with Section 8-20 of the Standard Specifications and this Section.

2.18.4.8.2 Conduit on Structures

Conduit installed on structures shall be Rigid Galvanized Steel conduit. Where the mainline communication conduit system is routed across bridge structures, the Design-Builder shall design, furnish, and install a structural hanger system and accompanying conduit sweeps and joints to convey conduit under the bridge structure. Conduits mounted under bridge structures shall be located between girders or within a box girder.

Where conduits transition from the ground to a structure, the Design-Builder shall furnish and install conduit expansion and deflection fittings. Conduits routed across bridges shall be higher than the ground, associated pull boxes, cable vaults, and junction boxes to facilitate drainage of the conduit system. Cable vaults, and junction boxes at the end of bridges or under the bridge shall have adequate drains to prevent any water from accumulating within the unburied conduits.

The Design-Builder shall furnish and install conduit expansion fittings. The expansion fittings shall be sized to match the movement and expansion requirements of the structure.

The Design-Builder shall furnish and install two 2-inch Rigid Galvanized Steel Conduits for the fiber optic communication connection under each existing bridge along I-90 between MP 19.93 to MP 23.84.

2.18.4.8.3 Junction Boxes, Pull Boxes, and Cable Vaults

The Design-Builder shall place junction boxes, pull boxes, and cable vaults in accordance with ***this Section, the WSDOT *Northwest Region ITS Details,* and the WSDOT *Intelligent Transportation System Northwest Region Design Requirements.****

Pull boxes shall be used for intermediate pull points where cable vaults are not needed. No splices will be allowed in pull boxes.

The Design-Builder shall clean all pull boxes and cable vaults, including existing boxes and vaults, of dirt and debris prior to pulling fiber and again prior to Substantial Completion. They shall be kept clean during the fiber pulling operation.

The Design-Builder shall include a drainage system, grounding provisions, enclosure hanger bracket assembly, and a ground rod marker in the construction of a fiber optic splice vault.

Drainage systems for pull boxes and vaults shall be designed and constructed in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements.****

The maximum spacing for pull boxes containing fiber-optic cable is 1,000 feet. The maximum spacing for cable vaults containing fiber-optic cable is 1 mile, with pull boxes used as intermediate access points every 1,000 feet. The Design-Builder shall coil and rack a minimum of ***50*** feet of fiber-optic cable in each pull box and ***50*** feet of fiber-optic cable in each cable vault.

The Design-Builder shall coil, at a minimum, 400 ft of 48 SMFO in the junction box, cable vault or pull box on each side of the existing bridge crossings supporting the new fiber optic communication connection along I-90 between MP 19.93 to MP 23.84.

2.18.4.9 *Communication Cables and Interfaces*

The Design-Builder shall provide a complete communication cable and interface system to all ITS, and signal along ***SR 18*** within the Project limits using new Single Mode Fiber Optics (SMFO) cable. The existing communication cable and interface system includes the following:

- I-90 fiber optic communication connection between, MP 19.93 – and the new I-90/SR 18 Interchange HUB
- ***I-90 west Distribution cable (24 SMFO)
- Communication end equipment
- Splice vaults, splice closures, and fiber optic connection components ***

Specifications for communication cable and testing requirements are described in this Section.

The Design-Builder shall perform the following:

- Ensure the existing communications are functional at all times during the construction period;
- Design and construct a fully-functioning and operable communications network to serve the ITS and signal components within the Project; and
- Propose solutions to achieve design objectives based on WSDOT functional, technical, operational, and maintenance requirements.

The Design-Builder shall furnish and install communication gear in all new and existing ***ITS and Traffic signal cabinets*** within the Project limits in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements.****

The Design-Builder shall not substitute, apply any part, or attach any piece of equipment contrary to the manufacturer's recommendations and standard practices.

The Design-Builder shall not use leased telephone lines, microwave, or wireless communications for permanent or temporary communications systems.

All locations containing identical equipment shall be configured and wired in an identical manner, including internal wiring and harnesses, wiring color codes, labeling terminal block positions, termination strips, power service configuration, and panel and equipment mounting and locations.

2.18.4.9.1 Fiber Optic Cable

The Design-Builder shall furnish, install, test, and maintain the following SMFO cable for mainline distribution and signal interconnect:

- ***New continuous 48-strand SMFO Mainline cable along SR 18 between the new communication HUB at the I-90/SR 18 interchange and the westernmost ITS cabinet on SR 18. The cable shall be spliced to a 48-port preterm panel in this ITS cabinet.

- New 36- strand SMFO distribution cable connecting to all new and existing ITS and signal cabinets along SR 18 between the new communication HUB and the westernmost ITS cabinet on SR 18. The cable shall be spliced to a 48-port preterm panel in this ITS cabinet.
- New 24-strand SMFO distribution cable connection to all new and existing ITS and signal cabinets along I-90 between the new communication HUB and easternmost ITS cabinet on SR 18. The cable shall be spliced to a 48-port preterm panel in this ITS cabinet.
- New 24-strand SMFO distribution cable connecting to all new and existing ITS and signal cabinets along I-90 between the new communication HUB and the existing ITS cabinet 090es02543 to the west. The cable shall be spliced to existing fiber optic infrastructure at this ITS cabinet.
- A continuous 48-strand SMFO mainline cable beginning at an existing cable vault located at MP 19.93 along I-90 and terminates in the new communication HUB at the I-90/SR 18 interchange. The new cable shall be spliced to existing ITS system at the vicinity of I-90 at SE High point way.

The Design-Builder shall splice the SMFO distribution cable to the pre-terminated patch panel stub cable for all ***ITS and traffic signal cabinets*** in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements.****

When fiber optic mainline cable parallels overhead electrical transmission lines, the Design-Builder shall locate the fiber optic cable as far from the transmission lines as possible. The Design-Builder shall not place the fiber optic cable within 3 feet of a ditch or culvert clean-out areas. The Design-Builder shall design a temporary fiber optic cable system to maintain continuous communication of all ITS components throughout construction.

All fiber optic cable shall be designed and routed through pull boxes and cable vaults. The Design-Builder shall remove all existing cables that are no longer needed to operate the ITS.

Splices in distribution cable shall be performed inside cable vaults placed adjacent to ITS cabinets. The splices shall connect the distribution fiber to ITS cabinets with pre-terminated patch panel.

The Design-Builder shall replace each fiber optic cable that is nicked, severed, or otherwise rendered unusable due to Work performed as part of the Contract. Spliced fiber optic cable shall be replaced with new, unspliced cable, unless otherwise provided for in this Contract. Liquidated Damages may apply in accordance with Section 1-08 of the *General Provisions*. The Design-Builder shall notify the WSDOT Engineer immediately after cable damage is discovered.

The Design-Builder shall exercise caution and excavate manually using hand-held tools when exposing an existing fiber optic cable. The Design-Builder shall report all nicks or abrasions to the WSDOT Engineer prior to replacement. The Design-

Builder shall not exceed the bending radius while handling and re-routing the cable.

The Design-Builder shall use lubricants during cable-pulling operations, in accordance with the WSDOT ***Northwest Region ITS Special Provisions.*

*** In the event a cable is severed or otherwise rendered not usable because of Work performed as part of the Contract, the Design-Builder shall perform the following activities:

- Use fusion splices to make the initial emergency repair to fiber optic cable
- Install the splices in existing splice vaults. The fusion splices shall meet the requirements of this Section
- Install new cable between existing terminations or splices to replace the damaged cable
- Install new cable between existing terminations or splices for nicks or abrasions on cable caused by the Design-Builder

2.18.4.9.1.1 *Fiber Optic Cable Installation*

The Design-Builder shall install cable in accordance with the ***WSDOT *Northwest Region ITS Special Provisions**** for pulling requirements.

2.18.4.9.1.2 *Fiber Optic Cable Identification Requirements*

The Design-Builder shall identify all fiber optic cable at all terminals, and whenever the cable is entering or leaving a vault, junction box, housing, or enclosure using permanent plastic, yellow-colored labels fastened securely to the cables in accordance with the WSDOT ***Northwest Region ITS Special Provisions.****

The surface of the outer jackets shall be printed with the manufacturer's identification, date of manufacture, and part number.

2.18.4.9.1.3 *Fiber Optic Connection Components*

Fiber optic connection components may be required to connect cable installed to the ITS communications network for the Project. The Design-Builder shall follow the requirements of the WSDOT ***Northwest Region ITS Special Provisions.****

2.18.4.9.1.4 *Indoor Patch Cords*

The Design-Builder shall supply all patch cords in accordance with this RFP. The patch cords shall have less than 2 feet of slack at all locations.

2.18.4.9.1.4.1 *Fiber ***Optic*** Connectors*

The Design-Builder shall use factory-installed Lucent Connector-Ultra-Physical Contact (LC-UPC) connectors with yellow or blue boots for single-mode fibers and shall follow these requirements:

- LC-UPC connector loss shall be less than 0.3 dB; maximum reflectance value shall be -55 dB
- Connector ratings shall be from -22 to 140°F for operation; and from -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 zirconia ceramic ferrules
- Boots shall be glued in place to prevent spinning

2.18.4.9.1.5 *Patch Panel Components*

The Design-Builder shall furnish and install new pre-terminated patch panels at the following locations:

- All ***new ITS, and traffic signal cabinets*** within the Project limits
- ***The existing VMS (090vm02623) and weather station/ESS (090ws02630) east of the I-90/SR 18 interchange
- New communication HUB in the I-90/SR 18 interchange***
- Existing pull box on I-90 at MP 19.93 at the vicinity oof SE Highpoint Way.

Refer to this Section and the WSDOT ****Northwest Region ITS Special Provisions**** for patch panel component requirements.

2.18.4.9.1.6 *Outdoor Fiber Splice Closure*

The Design-Builder shall provide an outdoor fiber splice closure, which includes an outer enclosure and plastic splice trays. The temperature rating for the splice closure shall be -22 to 140°F.

The Design-Builder shall install sufficient desiccant (packaged silica) in the enclosure to reduce possible damage from moisture, in accordance with the manufacturer's recommendations.

2.18.4.9.1.6.1 *Outer Enclosure*

The Design-Builder shall provide an outer enclosure, which meets the following requirements:

- Protects splices from damage
- Is composed of salt corrosion-resistant material and compatible materials not supporting galvanic cell action
- Is re-enterable
- Permits splicing without circuit disruption
- Has a grounding lug (ground all fiber optic cable shields)

- Has cable (trunk and pigtail) strain relief and is compatible with the inner enclosure, splice trays, and cables

2.18.4.9.1.6.2 *Splice Tray*

The Design-Builder shall provide a plastic splice tray (inner enclosure), which meets the following requirements:

- Allows entry to individual fibers
- Is stackable
- Holds 12 splices and 24 fibers
- Does not violate the bare fiber bend radius
- Has room for identification of the splice on the cover

The Design-Builder shall mount all splices on the splice tray. Polyethylene tubes shall protect the fibers, and ethylene vinyl acetate sleeves with stainless steel rods shall protect the splices. Vinyl markers shall identify each fiber in the enclosure.

2.18.4.9.1.7 *Fiber Optic Cable Splicing*

The Design-Builder shall splice fiber optic cable as specified in this Section.

The Design-Builder shall fusion-splice the fiber optic cable only. Cable splices will be allowed if approved by the WSDOT Engineer; only at the location specified; and only when there are no practical alternatives. Splices shall be made in cable vaults using splice closures approved by the WSDOT Engineer.

The Design-Builder shall 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 it from the Site, and dispose of it in accordance with State and Federal laws.

2.18.4.9.1.8 *Wireless Communications*

The Design-Builder shall not use wireless communications between field devices and communication nodes.

2.18.4.9.1.9 *Twisted Pair Media*

This Section is intentionally omitted.

2.18.4.10 *Electric, Electronic, Video, and Telephone Cables*

Electric, electronic, video, and telephone cables may exist within the Project limits and may be impacted by construction activities and require replacement. The Design-Builder shall exercise caution when working near existing cables. When exposing existing cables, the Design-Builder shall excavate manually using only hand-held tools.

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 splice kits meeting the technical requirements to repair any cable damaged by construction activities.

For cable damaged by Work performed as part of the Contract, the Design-Builder shall install new cable between existing terminations or splices.

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 underlying material with a cast epoxy kit using 3M Scotchcast kits and 3M Scotch #23 rubberized splicing tape that have met the requirements for cable jacket repair, or by using an equivalent approved by the WSDOT Engineer.

All cables connecting equipment such as VMS, CCTV cameras, and cabinets shall conform to the equipment manufacturer's specifications, the ****Northwest Region ITS Special Provisions**** (Appendix B), and the Standard Specifications.

2.18.4.10.1 Electric and Electronic Cable

The Design-Builder shall not splice electric or electronic cables without the WSDOT Electrical Inspector's approval. The Design-Builder shall use one-piece cables between termination points for power, communications control, and Radio-Frequency cables.

When using crimp-on connectors, the Design-Builder shall install the insulation of electrical cables deep enough into the lug so that the insulation acts as a strain relief.

The Design-Builder shall maintain the electrical continuity of the cable shields. The Design-Builder shall ground all cable shields entering cabinets and splice closures in accordance with the Special Provisions. The Design-Builder shall comply with Section 3.3 of the USDA RUS Splicing Standard PC-2 for shield bonding. The Design-Builder shall use bonding connectors complying with RUS standard PE-33 (Cable Shield Connectors).

2.18.4.10.2 Video/Control Cable and Accessories for Closed-Circuit Television Camera

The Design-Builder shall furnish and install CCTV control cable and all other necessary cables and accessories in accordance with this Section and the manufacturer's specifications, to make the CCTV cameras operational.

2.18.4.10.3 Grounding

The Design-Builder shall install a grounding system and protection devices that are suitable for the specific installation and equipment being supplied, in accordance with this Section, Section 8-20 of the Standard Specifications, and Standard Plan J-60.05.

2.18.4.10.4 Control Cabinets

The Design-Builder shall furnish and install the control cabinets, and make them functional.

The Design-Builder shall ensure that the existing control cabinets are operational at all times, outside of the allowable working hours identified in this Section.

The Design-Builder shall use industry-standard fiber management practices and techniques in all control cabinets.

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 and sealing the cabinet on its foundation, terminating the power cables, grounding the cabinet, and terminating the communications cables, signal cables, control cables, and loop lead-ins.

2.18.4.11 *Video, Voice, and Data Distribution and Transmission System*

The Design-Builder shall furnish and install all of the necessary fiber optic distribution and transmission system equipment to provide a fully-functioning ITS, including the following:

- Six distinct fiber optic networks along the ***SR 18 and I-90*** corridors for communication between each field device and the ITS hub:
  - ***Two on SR 18, one for ITS and one for CCTV
  - Two on I-90 westbound, one for ITS and one for CCTV
  - Two on I-90 eastbound, one for ITS and one for CCTV***
- Fiber optic communications between the ITS hub(s) and the ***TMC in Shoreline.***
- New communications equipment provided in all ITS and traffic signal cabinets in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements* and this Section.***

The Design-Builder shall ensure that all ITS components and devices are connected to the hub and the TMC and are fully-functional in accordance with this Section. All material and equipment shall be compatible with the existing ITS.

Existing and new ITS devices shall be connected to the new SMFO system.

In addition to the items being installed in the hubs for communication with field equipment, the Design-Builder shall furnish and install the following in the hub:

- ***Optical Network System equipment meeting the requirements of the Special Provisions
- Cisco 3650 switch (model WS-C3650-24TS-E)***

All existing HUBs shall remain fully-operational at all times.

2.18.4.12 ****Intelligent Transportation Systems HUBs****

Communication HUBs shall be designed for use as data gathering points in the field. The HUBs shall function as enclosures with a controlled environment and shall be suitable for the installation of system equipment and regular, safe inspection and maintenance by personnel. The Design-Builder shall give consideration to future equipment expansion needs. Data from the field devices shall be transmitted to the HUB through SMFO cables. The following shall be provided by the Design-Builder:

- New generator, concrete generator pad, generator transfer switch, and new fencing. New fencing shall encompass the HUB and the new generator pad.
- New HUB, generator, concrete HUB pad, concrete generator pad, generator transfer switch, fencing, and access road to I-90. The access road shall be gravel and accommodate a single-unit 13 vehicle to re-fuel the generator.
- Access plan that shows how the WSDOT personnel will park and access the HUB and fuel and service the generator.
- New pre-terminated fiber optic panels.
- All concrete pads shall extend a minimum of 2 feet beyond the footprint of the HUB and generator. Fencing shall surround the HUB building and generator and shall provide a minimum of 4 feet of clearance to the HUB and generator. A gate shall be provided in the fence for access to the HUB and generator.
- The Design-Builder shall connect the inverter, power, and other electrical systems and connect ventilation, air-conditioning, and an atmospheric sensor within 10 Calendar Days of receiving the new HUB at the Project site.
- The Design-Builder shall coordinate HUB equipment layout with the ITS Engineer.***

2.18.4.13 *Maintaining Intelligent Transportation Systems during Construction*

Existing ITS elements, including CCTV cameras, ramp meters, VMS, HAR, and data stations, shall remain operational during construction of the Project, except during the allowable working hours on the ITS. Prior to the installation of new equipment, the Design-Builder shall provide temporary equipment for locations where the existing equipment will be removed, unless otherwise permitted in this Contract.

2.18.4.13.1 Allowable Working Hours on the Intelligent Transportation Systems

All ITS, whether inside or outside of the Project limits, shall not be taken out of operation by the Design-Builder, and shall remain operational during all phases of construction.

The Design-Builder shall work on active ITS elements from ***9:00 pm to 5:00 a.m.***.

Unless otherwise specified in this Contract, the Design-Builder shall contact the WSDOT Engineer a minimum of 7 Calendar Days prior to performing any Work on existing and active ITS devices and 30 Calendar Days in advance of performing any Work on ***or in an existing HUB***. The Design-Builder shall perform all Work in a manner ensuring the integrity and proper performance of all ITS components.

Liquidated damages will be assessed for unplanned ITS disruptions. Refer to Section 1-08 of the *General Provisions*.

2.18.4.13.2 Maintaining Ramp Metering During Construction

Existing ramp meter equipment shall remain operational until a new or temporary ramp meter is installed.

When any in-place ramp meter is to be off-line due to construction during any time in which the ramp meter is normally in operation, the Design-Builder shall install a temporary ramp meter. Temporary ramp meters shall meet all ramp meter design requirements in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements****; be compatible with the existing system; communicate in real-time with the TMC; and include all associated signing, detection, and pavement marking for ramp meter operations.

2.18.4.13.3 Maintaining Camera Surveillance During Construction

The existing cameras shall remain operational or temporary cameras shall be installed. When an existing camera needs to be off-line due to construction for greater than the allowable working hours on the ITS, the Design-Builder shall install a temporary camera. The temporary camera shall be installed and operational prior to taking the existing camera off-line. Temporary cameras shall be compatible with the existing system; and shall have the same functionality and coverage as the existing system.

The Design-Builder shall maintain power and fiber optic connections to all cameras during construction.

2.18.4.14 *Intelligent Transportation Systems Testing*

The Design-Builder shall follow all testing requirements in accordance with the WSDOT ******Northwest Region ITS Special Provisions******.

The Design-Builder shall coordinate ITS testing with the WSDOT Engineer. Prior to any testing, the Design-Builder shall provide 30 Calendar Days' notice to the WSDOT Engineer.

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 12 months. The Design-Builder shall have all testing equipment calibrated annually for the duration of the Contract. Measurements recorded during the tests shall be supplied to the WSDOT Engineer.

The Design-Builder shall have in its possession a certification of test device calibration in accordance with the ANSI guidelines. The testing device shall 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, made operational, and relocated at a later time. Highway ITS components shall undergo all series of tests when relocated.

The Design-Builder shall incorporate all testing into the Baseline Contract Schedule and Monthly Contract Schedule Updates for Submittal to the WSDOT Engineer. The Design-Builder shall provide a schedule for all testing so that the WSDOT Engineer may observe the testing. Times and locations for all tests shall be provided to the WSDOT Engineer a minimum of 7 Calendar Days in advance of any test.

The Design-Builder shall perform the required testing for temporary and permanent ITS systems in accordance with the Mandatory Standards and this Section. The Design-Builder shall develop all ITS testing procedures and pass/fail requirements and shall submit all test procedures and pass/fail requirements, manufacturer's certification of compliances, and equipment documentation to the WSDOT Engineer for Review and Comment and resolve all the WSDOT Engineer comments a minimum of 14 Calendar Days prior to any testing. Testing procedures and requirements must be accepted by the WSDOT Engineer prior to any testing. The WSDOT Engineer may observe any tests and will audit test results. The Design-Builder shall submit test reports upon completion of each test in accordance with this Section and Section 2.28, *Quality Management Plan*. The Design-Builder shall notify the WSDOT Engineer when all ITS requirements have been met in accordance with the Contract, including training, documentation, testing and field installations.

The WSDOT Engineer will perform the final inspection and acceptance of ITS systems after verifying the proper operation of all ITS components at Physical Completion of the Project.

2.18.4.14.1 Fiber Optic Splicing and Testing Plan

The Design-Builder shall submit a Fiber Optic Splicing and Testing Plan to the WSDOT Engineer for Review and Comment prior to beginning Work on the ITS. The Fiber Optic Splicing and Testing Plan shall be in Microsoft Word format and shall include the following:

- Location of all proposed fiber optic splices, including what is being spliced
- Location of all temporary fiber optic splices
- Scheduled date of splices and testing
- Tests to be performed
- Equipment to be used for the testing
- Calibration results of testing equipment
- List of Project contacts (including phone numbers) for the Design-Builder and WSDOT staff

The Fiber Optic Splicing and Testing Plan shall be submitted with each final plan Submittal that includes ITS Work. The Fiber Optic Splicing and Testing Plan shall be updated with each design change affecting testing type and location.

2.18.4.14.2 Power and Control Cable Testing

The Design-Builder shall test power and control cables according to the requirements of Section 8-20 of the Standard Specifications and this Section.

2.18.4.14.3 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 the WSDOT Engineer for acceptance.

The Design-Builder shall notify the WSDOT Engineer when all ITS requirements have been met. The WSDOT Engineer will accept the ITS after verifying the proper operation of all components.

2.18.4.14.3.1 ***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; and any testing documentation required in accordance with this Section and the WSDOT ******Northwest Region ITS Special Provisions******.

The Design-Builder shall use WSDOT's file naming convention in accordance with the WSDOT ******Intelligent Transportation System Requirements****** for all test files.

The Design-Builder shall provide a test summary describing the final measurements that are out of range; any approved changes in specified methods; and actual dates of tests performed by both power meter and optical time domain reflectometer. The Design-Builder shall take corrective actions on portions of the fiber determined to be out of range in accordance with the WSDOT ******Northwest Region ITS Special Provisions******.

Upon completion of the Project, the Design-Builder shall provide the WSDOT Engineer with an electronic copy of the manufacturer's reel test documentation.

2.18.4.14.3.2 ***Variable Message Sign Testing***

All VMS signs, control software, control equipment, and cabinets shall be inspected and tested prior to shipment from the factory. The Design-Builder shall provide all factory test reports to the WSDOT Engineer for Review and Comment 7 Calendar Days prior to shipment. Test reports shall demonstrate that all VMS signs, control software, control equipment, and cabinets meet the Mandatory Standards.

After factory testing is completed by the Design-Builder, the Design-Builder shall deliver the VMS signs to WSDOT Signal Maintenance for inspection and the 14-day National Transportation Communications for ITS Protocol (NTCIP) testing by WSDOT. The Design-Builder shall also provide temporary mounting brackets to facilitate the testing. The temporary mounting brackets shall support each VMS in the upright position at ground level. The Design-Builder shall provide mounting brackets for each VMS that is tested at the maintenance yard. The sign shall be hooked up to the control equipment in the permanent configuration prior to the beginning of NTCIP testing.

All signs shall be lifted, loaded, and unloaded in accordance with manufacturers' recommendations. Large VMS signs shall be lifted from lift eyes using a spreader bar.

The Design-Builder shall limit the quantity of signs at the WSDOT Signal Shop at any one time to the following:

- A maximum of two large VMS and associated control equipment.

After the 14-day NTCIP test is completed and passed and associated compliance repairs are made, the Design-Builder shall pick up the VMS at the WSDOT Signal Shop within 7 Calendar Days. The Design-Builder may deliver the VMS to the Project site for installation, store the VMS in an environmentally controlled storage building, or plug the VMS into a power supply and run the environmental controls at an off-site location until the VMS sign is ready for installation.

See the WSDOT *Northwest Region ITS Special Provisions* for additional VMS testing requirements.

2.18.5 *Maintenance and Operation of Intelligent Transportation Systems Components*

The Design-Builder shall provide maintenance of all existing and new highway ITS components within project limits as part of the Project until Physical Completion or unless otherwise noted.

Upon NTP of the Contract, the Design-Builder shall be responsible for all highway ITS and communications components that the Design-Builder performs Work on, including those components already in place. The Design-Builder shall maintain the components through Physical Completion.

Maintenance and operation includes the response to faults. The three categories of faults – urgent, priority, and minor – are described as follows:

- **Urgent** – Any fault that causes a total failure, disruption, safety impact, or system-wide disruption of the communications links and equipment; and ramp metering or CCTV facilities. The response time for urgent faults of ITS components shall be less than 2 hours. The repair time for urgent faults of ITS components shall be less than 4 hours.
- **Priority** – Any fault that causes a failure or disruption of an operator workstation, local control unit for VMS, or the VMS itself. The response time shall be noon of the next Calendar Day. The repair time shall be less than 4 hours.
- **Minor** – Any other fault. The response time shall be midnight of the next Calendar Day. The repair time shall be less than 4 hours.

The Design-Builder shall provide a plan for maintenance of existing and new ITS components within the Project limits. The plan shall include the following:

- Details of the proposed preventive maintenance program, including frequency, for each highway ITS component.
- A general description of the proposed emergency maintenance and operation response program for each highway ITS component. This description shall include the categories of faults and how the faults will be detected.
- Maintenance and operation activities.

The Design-Builder shall replace, not repair, hardware or equipment if any of the following occurs:

- The Design-Builder has attempted to repair the 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
- The WSDOT Engineer decides that replacement is necessary in the interest of public safety

The Design-Builder shall maintain a log documenting maintenance activities and all repairs performed on ITS equipment. The maintenance log shall be made available to the WSDOT Engineer upon request.

During construction, the Design-Builder shall identify local vendors for repair parts for all ITS components, so that the parts can be obtained within 4 hours. The Design-Builder shall provide a list of vendors to the WSDOT Engineer within 60 Calendar Days of execution of the Contract.

As part of maintenance responsibility, the Design-Builder shall be responsible for performing locates for all ITS systems included in the work. WSDOT will perform the first set of locates requested by the Design-Builder for existing systems – refresh requests are the responsibility of the Design-Builder.

2.18.5.1 *Maintenance and Operations Plan*

The Design-Builder shall submit to the WSDOT Engineer for Review and Comment a written plan for providing maintenance and operation of ITS components furnished and installed by the Design-Builder, a minimum of 21 Calendar Days prior to performing Work on any portion of the ITS.

2.18.5.2 *Maintenance Access Requirements*

All ITS devices shall be designed and constructed so that they are accessible and maintainable using current maintenance methods and materials.

At all new CCTV, VMS, HART, ramp meter, data station, and ESS installations, the Design-Builder shall design and construct shoulder widening or off-shoulder access to accommodate a maintenance vehicle in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements****. The parking surface outside of the roadway shoulder shall be pervious, and shall not have a slope greater than 6 percent in any direction.

Type 2 maintenance pullouts located on roadways with a posted speed of 35 mph or less shall have a 15:1 entrance taper and a 35:1 exit taper. All other characteristics of Type 2 maintenance pullouts shall be in accordance with the WSDOT ****Intelligent Transportation System Northwest Region Design Requirements****.

The Design-Builder shall design and construct a 3-foot level work zone clear of obstacles on all sides of new ITS installations.

For ESS and HART, maintenance vehicles shall have the ability to park adjacent to the ESS/HART and shall have adequate access on and off of the freeway.

2.18.5.3 *Intelligent Transportation Systems Training*

For all ITS equipment furnished and installed as part of this Project, the Design-Builder shall demonstrate the full functionality and conduct a minimum of two 8-hour training sessions by a manufacturer certified instructor for up to 10 WSDOT personnel.

The Design-Builder shall provide a schedule, syllabus, product manuals, and documentation for all training sessions a minimum of 7 Calendar Days in advance of each training session. The training shall be provided at a facility as determined by the WSDOT Engineer. At a minimum, the training shall focus on removal and

replacement of equipment components and the manufacturer's standard operating and troubleshooting procedures, including all hardware and software.

All training sessions must be provided prior to Physical Completion of the Project.

2.18.5.4 *Intelligent Transportation Systems Preliminary Design Submittal*

The ITS Preliminary Plans, Fiber Optic System Test, and other test Plans described in this Section shall be submitted to the WSDOT Engineer for Review and Comment as part of the Preliminary Design Submittal described in Section 2.28, *Quality Management Plan*.

The ITS Preliminary Plans Submittal shall include the devices described in this Section, in addition to the following:

- Title block, north arrow, and scale bar
- Legend of symbols
- Existing ITS features and Utilities
- Proposed channelization
- Proposed Fiber Optic Cable/Conduit Location Plan
- Cabinet locations

2.18.5.5 *Intelligent Transportation Systems Final Design Submittal*

The Design-Builder shall provide an ITS Final Design Submittal in accordance with Section 2.28, *Quality Management Plan*, that addresses the comments received from the ITS Preliminary Design Submittal review, and any issues raised during the ITS task force meetings.

The ITS Final Design Plans shall be submitted in a single, complete package and include the following:

- All items from the ITS Preliminary Plans
- All ITS details in accordance with the WSDOT ******Northwest Region ITS Details******
- All ITS labels
- Temporary ITS Plan
- Pull box, cable vault, and junction box locations and details
- Communication schematics network diagram (including IP settings)
- Fiber distribution diagrams with patch panel layout details
- Fiber optic splice details
- Loop termination schedule
- Transformer/breaker schedule
- Cabinet foundation details
- Fiber termination cabinet details

- CCTV camera pole structure details
- Foundation details for CCTV camera poles
- Details for non-standard elements
- Wire notes (including identification of new and existing conductors and cable) and construction notes
- Calculations to support transformer sizing and transformer over current protection devices
- Conduit fill and junction box capacity calculations

The Design-Builder shall submit a Fiber Optic Splicing and Testing Plan prior to the ITS Work.

2.18.5.6 *Other Submittals*

The Design-Builder shall submit testing and software documentation, test samples and operating software (including firmware) to the WSDOT Engineer upon completion of each test as specified in this Section.

The Design-Builder shall submit the following items upon Physical Completion of the Project:

- Component, test procedures, test report and other Project documentation (including National Transportation Communications for ITS Protocol documentation)
- Fiber optic cable test documentation
- Maintenance and Operations Plan
- Product manuals

The Design-Builder shall provide the WSDOT Engineer with the x, y, and z GPS coordinates of the newly installed ITS components including, at a minimum, the following elements:

- CCTV systems, VMS, Road/Weather Information Systems, HARS, and HART
- Ramp metering systems
- Data stations systems
- Communication conduit system.
- Communication cable and interface systems
- Video, voice, and data distribution and transmission systems
- Communication hubs
- Permanent traffic recorder stations
- Environmental sensor stations
- Loop detectors
- Control cabinets
- All junction and pull boxes, and cable vaults

- Mainline fiber optic cable (every 50 feet)
- Fiber optic splices, vaults, and pull boxes
- Stand-alone electric service pads

The Design-Builder shall also provide the WSDOT Engineer with the x, y, and z GPS coordinates of existing components when they are connected to the new components. GPS coordinates shall be submitted on a USB flash drive and include ITS devices and x, y, and z GPS coordinates for each device.

2.18.5.7 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.19 Signing

2.19.1 *General*

The Design-Builder shall conduct all Work necessary to meet the requirements for permanent signing for the Project. Refer to Section 2.22, *Maintenance of Traffic*, for additional signing requirements.

***The Design-Builder shall provide signing in accordance with the mandatory standards within the Project limits. These requirements are supplemented with the following paragraphs.

The Design-Builder shall provide signing for the diverging diamond interchange (DDI). The Design-Builder shall use the conceptual plans of the DDI as template for permanent signing. The Design-Builder shall submit preliminary DDI signing plans to WSDOT for review prior to submitting preliminary signing plans.***

The Design-Builder shall replace all signs on ***I-90 and SR 18*** within the Project limits that were fabricated more than 10 years prior to Contract execution. This shall apply to all signs on mainline and ramps except Motorist Information Signs (MIS). Signs fabricated and installed 10 years or less from Contract execution may remain in place or be relocated as necessary to accommodate new geometry, to provide more accurate sign placement, to correct spacing deficiencies, or to replace wood posts. The installation date shall be considered the date shown on the fabrication sticker on the back of the sign. If this sticker is missing or unreadable, the sign shall be deemed to be more than 10 years old and shall be replaced.

Signs on ***I-90 and SR 18*** within the Project limits that are damaged or that do not meet the Mandatory Standards shall be replaced or upgraded in accordance with the WSDOT *Sign Fabrication Manual* or the *FHWA Standard Highway Signs*. Within the Project limits on ***I-90 and SR 18*** where permanent changes are made to the roadway geometry or lane configuration, signs that are damaged or that do not meet the Mandatory Standards shall be replaced or upgraded in accordance with the WSDOT *Sign Fabrication Manual* or the *FHWA Standard Highway Signs*.

The Design-Builder shall be responsible for providing all new signing required for changes made to the roadway geometry or lane configuration. ***The Design-Builder shall be responsible for locating sign foundations to meet roadway geometry and lane configurations, and to not conflict with others features required on this Project.***

The Design-Builder shall be responsible for installing or relocating primary guide signs to overhead locations ***where shown in the *Conceptual Guide Sign Plan*

(Appendix M).*** All primary guide signs and Highway Advisory Radio Signs specified in the Conceptual Plans within the Project limits shall be overhead.

2.19.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. Standard Plans M 21-01 (Appendix D)
4. WSDOT *Traffic Manual* M 51-02 (Appendix D)
5. WSDOT *Design Manual* M 22-01 (Appendix D)
6. ***2020 Supplement to the WSDOT *Sign Fabrication Manual* (Appendix T)***
7. WSDOT *Sign Fabrication Manual* M 55-05 (Appendix D)
8. *Washington State Modifications to the Manual on Uniform Traffic Control Devices* (WAC 468-95) (Appendix D)
9. *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, 2009 Edition with Revisions 1 & 2 dated May 2012 (Appendix D)
10. *FHWA Standard Highway Signs*, 2004 with 2012 Supplement
11. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
12. WSDOT *Electronic Engineering Data Standards Manual* M 3028 (Appendix D)
13. WSDOT *Materials Manual* M 46-01 (Appendix D)
14. *AASHTO A Policy on Geometric Design of Highways and Streets*
15. *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, ***First Edition (2015)****
16. *AASHTO Roadside Design Guide*
17. *Transportation Research Board Highway Capacity Manual*
18. *ITE Traffic Control Devices Handbook*
19. *FHWA Traffic Control Systems Handbook*
20. *ITE Traffic Engineering Handbook*

2.19.3 *Design and Construction Requirements*

2.19.3.1 *Software*

The Design-Builder shall use software ***such as Transoft Solutions GuideSign or Bentley Systems SignCAD*** for producing engineering drawings of guide

signs that can either create or seamlessly convert files to MicroStation DGN file format.

The Design-Builder may use WSDOT's SignSpecs 2.0 Excel spreadsheet program to produce the sign specification sheets. The spreadsheet program can be accessed from the WSDOT sign specification website, https://www.wsdot.wa.gov/Design/ProjectDev/EngineeringApplications/SignSpecification.htm.

If the WSDOT SignSpecs 2.0 Excel spreadsheet is used, all sign notes shall be compiled on the INS # tab sheets. These sheets shall be edited to read "SIGN SPECIFICATIONS". This is done by removing the word "installation" from the top line of the sheet (must be done for each sheet). The password to make modifications is "dotsgsp".

2.19.3.2 *Signing Design Requirements*

2.19.3.2.1 *Existing Sign Inventory*

The Design-Builder shall complete an Existing Sign Inventory using the WSDOT *Signing Inventory Form* (Appendix T). This inventory shall include all signs within the Project limits and all signs outside the Project limits that will be affected by the Project. All dimensions on the WSDOT *Signing Inventory Form* (Appendix T) shall be field measured. The Existing Sign Inventory shall include the following:

- Location of sign by station or roadway feature where stationing does not exist
- Horizontal distance (W) as shown in Standard Plan G-20.10
- Vertical clearance (V) as shown in Standard Plan G-20.10
- Size of sign panel
- Sign fabrication date, month and year (sticker on back of sign)
- General condition of sign, noting any apparent damage
- Post type and material, size, length, and condition (if wood post, only type is required)
- Digital photograph of front and back of all signs included in the inventory, including station and direction of travel. The photographs shall be submitted and the pictures shall be in JPEG format
- Strip map and legend showing all existing traffic signs, including cross and side road signs, with corresponding identifying labels

2.19.3.2.2 *Sign Spacing*

Minimum mainline sign spacing between all primary and supplemental guide signs shall be in accordance with the WSDOT *Traffic Manual*. Minimum sign spacing between all other signs except Milepost (MP) and object marker signs shall be 500 feet. ***This shall include spacing to primary and supplemental guide signs, and Variable Message Signs (VMSs).*** Minimum sign spacing on

ramps shall be 100 feet. ***Minimum spacing on SR 18 shall be 350 feet between all signs except MP and object marker signs.*** Lateral clearance requirements shall be in accordance with Standard Plan G-20.10 and the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*. Vertical clearance to ground mounted signs shall be in accordance with Standard Plan G-20.10 and the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*. Vertical clearance to overhead signs shall be 20 feet from bottom of sign to finished grade or roadway wearing surface.

2.19.3.2.3 *Sign Posts ***and Supports****

All wood sign posts on ***I-90 and SR 18, and WSDOT-maintained portions of Snoqualmie Parkway*** within the Project limits and within the ROW shall be replaced with steel sign posts regardless of age of sign. All other signs within the ROW that are replaced, relocated, or modified due to the Project shall have steel sign posts. ***This shall include all WSDOT-owned signs outside the Project limits.***

Steel sign posts ***and supports*** shall be:

- 2.5-inch Perforated Square Steel Tube (PSST) with Type ST-4
  - 2.5-inch ***PSST*** with a full length 2.25-inch PSST insert with ***Type SB-1, SB-2, or SB-3 slip base*** (SB) supports.
    - ***Where an SB support is needed, when behind guardrail a Type ST-4 support may be used.***
- ***2.5-inch PSST with*** Type ST-1 supports may be used with MP and object markers only when behind barrier or guardrail.
- 3-inch Solid Square Steel Tube (SSST) with Type SB ***-1, SB-2, or SB-3*** supports
- 4 or 5-inch outside diameter round steel posts with Type AP supports
- ASTM A36 or ASTM A992 ***wide flange*** "W" series posts ***with Type TP-B supports. Single post installations are not allowed.***

Sign posts for all signs outside the ROW that are replaced, relocated, or modified shall be in accordance with the affected Local Agency's specifications

Steel sign posts and supports shall include all anchor sleeves, concrete foundations, and all necessary hardware required for a complete sign installation.

Sign width on single-post installations shall not exceed 5 feet.

2.19.3.2.4 *Overhead Sign Illumination*

Sign illumination requirements shall be in accordance with the WSDOT *Design Manual*. When sign illumination is used, all signs on a structure shall have illumination.

2.19.3.2.5 *Overhead Signs on Structures*

The Design-Builder shall mount all primary guide signs and High-Occupancy Vehicle lane (HOV) (R3-14 Series) signs on overhead structures (sign bridge or sign cantilever) for urban freeways. The Design-Builder shall mount all "Exit Only" guide signs and HOV R3-14 Series signs on overhead structures (sign bridge or sign cantilever) for non-urban freeway and other highways.

The Design-Builder shall not mount signs for mainline ***SR 18*** traffic on bridges except for the following:

- Exit signs to loops at cloverleaf interchanges
- Street identification signs for roadways crossing ***SR 18***
- Replacement of existing signs on existing structures
- Vertical clearance signs
- Bridge-mounted signs as shown in the Conceptual Plans

Bridge-mounted signs for arterial roads crossing under ***I-90*** bridges shall be limited to regulatory and lane designation signs ***and signs shown in the *Conceptual Guide Sign Plan* (Appendix M).*** When it is necessary to mount signs on bridges, the Design-Builder shall design the signs so the bottom of sign does not extend below the bottom of the bridge and the top of the sign is not higher than bridge railing height.

2.19.3.2.6 *Signs on Light Standards*

The maximum allowed square footage for signs on light standards is ***20*** square feet. The ***distance from the base plate of light standard to the bottom of sign shall not exceed 7*** feet.

2.19.3.2.7 *Signs on Signal Poles and Mast Arms*

The maximum square footage of signs allowed on signal poles and mast arms shall be as indicated on the ***_Illumination and Signal Details_ (Appendix T)***.

2.19.3.2.8 *Ramp Meter Signing*

"RAMP METERED AHEAD WHEN FLASHING" signs (W3-501) shall be 36 by 36 inches on roadways with a posted speed limit of 40 mph or lower; and shall be 48 by 48 inches on roadways with a posted speed limit greater than 40 mph. When signing shoulder mounted Type 1 ramp meter signal poles, R10-601R/L shall be used; when signing overhead Type 2 ramp meters, R10-402 signs shall be used. These signs shall be placed in accordance with the Ramp Meter Signal Assembly detail and the Type II Mast Arm Signal Standard detail in the ***_Northwest Region ITS Details_ (Appendix T)***. At overhead ramp meter locations, a R10-601R/L shall be placed on the shoulder at the location of the stop bar.

2.19.3.2.9 *Speed Limit and Speed Reduction Signs*

Speed limit and speed reduction signs on ***SR 18*** shall be placed on both sides of the highway, at the same stations, and facing the direction of travel.

Signs on the left shall be mounted on the median barrier at 14 feet and shall be rotated up to 45 degrees to stay within the barrier footprint (see *Barrier Mounted Sign Post Details* in Appendix T).

2.19.3.2.10 *Motorist Information Signs*

Directional ramp signing that does not have related mainline signs will not be allowed. All mainline guide and MIS shall be represented on the ramps.

If the removal of any MIS is required for construction, the Design-Builder shall relocate and reinstall the existing MIS at a location acceptable to WSDOT in accordance with this Section. Existing MIS shall be relocated, replaced, or temporarily mounted within 24 hours of removal.

WSDOT will supply new sign back panels or business logo signs at its discretion to replace existing MIS being relocated. MIS damaged ***or lost*** by the Design-Builder shall be replaced at the Design-Builder's expense. The Design-Builder shall furnish new sign foundations and steel posts, and install the new sign panels or relocated existing sign panels.

2.19.3.2.11 ******Toll Rate Signs******

This Section is intentionally omitted.

2.19.3.2.12 ******Left Lane Restriction Signs******

This Section is intentionally omitted.

2.19.3.2.13 ******Left Lane Restriction Ends Signs******

This Section is intentionally omitted.

2.19.3.2.14 ******High Occupancy Toll Lane Signs******

This section is intentionally omitted.

2.19.3.2.15 *EXIT ONLY Panels*

"EXIT ONLY" panels shall be 36 inches in height. The arrow shall be placed between the words "EXIT" and "ONLY" and the sign shall be ***placed with the down arrow*** centered over the corresponding lane.

2.19.3.2.16 *Overhead Sign Placement*

"EXIT ONLY" and all other signs with a down arrow shall ***be placed with the down arrow*** centered over the corresponding lane. These signs may be shifted up to 2 feet left or right of center due to roadway geometry or existing sign structure constraints.

2.19.3.2.17 *Non-Standard Breakaway Features*

The Design-Builder shall be responsible for upgrading all existing non-standard breakaway features for sign posts impacted by this Project. See *Type 1 Breakaway Feature Description* (Appendix T).

2.19.3.2.18 *Conceptual Guide Sign Plan*

Two types of conceptual plans have been included in Appendix M (*Conceptual DDI Signing Plans and Conceptual Signing Plans*). Conceptual DDI Signing Plan show only proposed signs within the DDI. The Design-Builder shall be responsible for verifying the location of all existing signs. The Design-Builder shall also be responsible for incorporating all new signs into the Permanent Signing Plans. Overhead signing shall be installed over the lanes as shown in the Conceptual Plans. Final placement of all other signs shall be determined by the Design-Builder and shall be in accordance with the Mandatory Standards. Conceptual Proposed Signing Plan sheets do not include any removals of existing signs. The Design-Builder shall be responsible for including all removals shown on the Permanent Signing Plans.***

Two cantilevers shall not be substituted for a sign bridge.

2.19.3.2.19 ******Bicycle Restriction Signs******

This Section is intentionally omitted.

2.19.3.2.20 ******Freeway Ends with Flashers Sign******

A freeway ends (W6-401) sign shall be installed on a cantilever sign structure on SR 18 at approximate station 190+50 in the eastbound direction. Flashing beacons shall be installed at the upper left and upper right corner of the sign. See Section 2.16, *Illumination*, for flashing beacons requirements.

2.19.3.2.21 ******Active Warning Sign******

An Active Warning Sign "Turning Traffic Ahead" (see Appendix T) shall be installed on a Type FB Signal Standard at approximate station 600+10 in the east bound direction. A flashing beacon shall be installed in accordance with Section 2.18, *Intelligent Transportation Systems,* which provides specifications and installation requirements.

2.19.3.3 *Plan Requirements*

The Design-Builder shall prepare and submit a Permanent Signing Plan for the Project. This plan shall include all necessary guide, warning, regulatory, marker, and information signs; and ***VMS***. The Permanent Signing Plan shall also provide for modifications and updates to signs outside of the Project limits that are rendered inaccurate, ineffective, confusing, or unnecessary by WSDOT as a result of modifications by the Project. The modifications shall include the addition, removal, or replacement of signs and appurtenances. The Permanent Signing Plan shall include and provide for all Project signing within and outside of the Project limits.

The Permanent Signing Plan shall include, but is not limited to, the following:

- Sign locations, sign notes, and identifications. These shall include existing signs to remain, existing signs to be relocated, and new signs. Sign locations shall be shown using the correct sign symbol as shown in the WSDOT *Electronic Engineering Data Standards Manual*. Where signs are being

placed on light standards, signal or ramp meter poles, or mast arms; those symbols shall be shown as well as any corresponding sign symbols such as an overhead sign on a mast arm.

  - Sign notes shall be shown using either Sign Note, Sign Relocation or Sign Removal note flags as shown in the WSDOT *Electronic Engineering Data Standards Manual*.
  - New signs ***shall be identified with the sign fabrication code. Sign relocations shall be identified with the full sign message and not the sign fabrication code.***
  - ***New signs and signs to be relocated shall be*** identified with a small-scale detail ***that shall be next to the sign note or on the same sheet, with a leader line pointing from the note to the detail.***
  - Existing signs to remain shall be identified in note form ***only, which shall be the full sign message, and shall be noted to protect in place.
  - Existing signs to be removed shall be identified with a sign removal note and the full sign message. No detail is required. The sign fabrication code shall not be used. See the *Signing Plan* example (Appendix T).***

- Sign details shall be drawn to scale and shall include sign size, sign legend, text and symbol height, letter stroke width, background, legend and border colors, and vertical and horizontal spacing. ***A sign design program such as Transoft Solutions GuideSign or Bentley SignCad shall be used. Sign details shall meet the following requirements:
  - The 2020 Supplement to the WSDOT *Sign Fabrication Manual* (Appendix D) shall be followed for all "D" and "E" Series signs.
  - Sign lettering for all primary and supplemental guide sign destinations shall be E Modified (EM).
  - Street name signs shall have upper/lower text and shall have series D or C series lettering. Series B will not be allowed.
  - Arrow sizes and fraction box heights shall be called out on the detail. Fraction box height shall be 1½ times the action message text height.***
  - All mainline primary guide signs shall be of the E Series classification and Size Code E.
  - All mainline supplemental guide signs shall be of the E Series classification and Size Code C.
- Ramp metering devices, cameras, and light and signal standards
- Types of proposed sign structures
- Permanent signing proposed on bridge structures

Sign specifications sheets shall be compiled on a single style sheet titled "SIGN SPECIFICATIONS" and shall have all removal, installation, and relocation notes

in numerical order as shown in ***Appendix T***. Separate sheets for installation, removal, and relocation notes will not be allowed.

2.19.3.4 *Material Requirements*

2.19.3.4.1 *Sign Sheeting Material*

All permanent signs shall be fabricated with background, legend, and border sheeting in accordance with ***WSDOT Sign Sheeting Policy (Appendix T)*** and shall be constructed in accordance with Section 9-28 of the Standard Specifications.

2.19.3.4.2 *Sign Supports*

At Physical Completion, all ground-mounted permanent signs within the Project limits and within the ROW shall have steel sign posts ***with Type ST-4, SB-1, SB-2, SB-3, AP, or TP-B supports in accordance with this Section.*** All other posts within the Project limits shall conform to the applicable Local Agency standards.

All new cantilever and sign bridge structures shall be behind barrier or guardrail regardless of clear zone.

All new cantilever and sign bridge structures shall be monotube. Relocation of existing sign bridge and cantilever structures will not be allowed.

2.19.3.5 ***Future Active Traffic Management Signs***

This Section is intentionally omitted.

2.19.3.6 *Permanent Signing Construction Requirements*

2.19.3.6.1 *General*

All existing signs, new permanent signs installed as part of this Contract, and construction signs that are inappropriate for the traffic configuration at any given time shall be removed or completely covered in accordance with Section 8-21 of the Standard Specifications during periods when they are not needed.

Existing sign panels and sign structures shall remain in place or shall be temporarily mounted until new or replacement signs are installed. New or replacement signs shall not be installed in a location that obscures the visibility of an existing sign.

***The Design-Builder shall coordinate the design of the signing with the design of other disciplines as necessary, such that the design performance and assumptions are not compromised, impacted, or degraded due to the final design of other disciplines. The coordination of signing design and the other civil design features shall include but are not limited to the following: channelization and pavement markings, structures, illumination, traffic signals, Intelligent Transportation Systems (ITSs), traffic control, roadway, drainage, and utilities. The design of the permanent signing shall be coordinated with and not limited to the following Technical Requirements (TRs): Section 2.10, *Utilities and Relocation*

Agreements; Section 2.11, *Roadway*; Section 2.13, *Bridges and Structures*; Section 2.14, *Hydraulics*; Section 2.15, *Roadside Restoration*; Section 2.16, *Illumination*; Section 2.17, *Traffic Signals*; Section 2.18, *Intelligent Transportation Systems*; Section 2.20, *Pavement Markings*; Section 2.21, *Traffic Operations*; and Section 2.22, *Maintenance of Traffic*.

The Design-Builder shall coordinate the locations of major sign structure foundations with work of other disciplines. The Design-Builder shall locate major foundations so they do not interfere with any earthwork, drainage, structures, poles, cabinets, conduits, or utility features.***

2.19.3.6.2 *Material Requirements*

The Design-Builder shall supply new materials for all signs, sign posts, structures, mounting hardware, and foundations.

2.19.3.6.3 *Salvage*

The Design-Builder shall notify the affected Local Agency a minimum of 7 Calendar Days in advance of removal of any Local Agency signs or sign structures. If the Local Agency requests that the items be salvaged, the Design-Builder shall make arrangements to deliver the items to the location specified by the Local Agency.

MIS and business logo signs shall be salvaged as designated by the WSDOT Engineer and Region Traffic Office. All other WSDOT signs removed by the Design-Builder shall become the property of the Design-Builder.

2.19.4 *Submittals*

All Submittals shall be in accordance with the Quality Management Plan.

The Design-Builder shall submit preliminary DDI signing plans to WSDOT for review prior to submitting preliminary signing plans.

2.19.4.1 *Preliminary Design Submittal*

The Design-Builder shall submit the Permanent Signing Plan and the Existing Sign Inventory with the Preliminary Design Submittal. Plan sheets shall be prepared in accordance with this Section, Section 2.28, *Quality Management Plan*, the WSDOT *Electronic Engineering Data Standards Manual*, and the WSDOT *Plans Preparation Manual*.

The Preliminary Design Submittal shall include, but is not limited to:

- Sign specification sheets containing sign number, sign code ***taken from the 2020 Supplement to the*** WSDOT *Sign Fabrication Manual* ***(Appendix D)***, sign description, station location, sign size ***(X and Y)***, letter size or sign ***size*** code (this can include “see detail”), and ***vertical and horizontal*** offsets for each sign.
- Signing plan sheets showing the location of all new signs; and existing signs to remain, to be relocated, and to be removed.
  - Include sign number referenced from the sign specification sheet.

  - Include small-scale layout of all signs including guide, regulatory, warning, and object markers for new signs, signs to remain, and signs to be relocated. Signs to be removed shall be depicted in note form only.
  - Include existing and proposed utilities within a 20-foot radius of new overhead sign structure foundations.
- Show final pavement markings.
- Sign Detail Plans ***with*** sign numbers ***, sign codes and size code*** corresponding to the ***signing plan and*** specification sheets. ***Sign details shall be drawn to scale in accordance with this Section and as shown in *Sign Detail Example* (Appendix T). Details shall be of a size that are clearly readable in 11-inch x 17-inch printed form.***
- Sign drawings (other than Standard Plans) showing details of sign mounting, foundations, base connections, and frames.
- For each sign bridge and cantilever sign structure, the Design-Builder shall provide drawings of cross-sections showing footing details, locations of utilities within 20 feet of foundations, offsets, sign placement including relations to travel lanes, mounting heights, and vertical clearance. Sign details of signs being installed on these structures shall be provided to the WSDOT Engineer for Review and Comment prior to these cross-section drawings Submittals.

2.19.4.2 *Permanent Signing Plans (Final Design Submittal)*

The Design-Builder shall prepare plan sheets in accordance with this Section; Section 2.28, *Quality Management Plan*; the WSDOT *Electronic Engineering Data Standards Manual*; and the WSDOT *Plans Preparation Manual*.

The Permanent Signing Plans shall include, at a minimum, all items from the Preliminary Design Submittal and the following items:

- Sign specification sheets containing all necessary information to fabricate, install, remove, and relocate all signs for the Project. This shall include all information required in the Preliminary Design Submittal, as well as post type, size and lengths, and horizontal (W) and vertical (V) offsets.

The Permanent Signing Plans shall be submitted to the WSDOT Engineer for Review and Comment as part of the Final Design Submittal.

2.19.4.3 *As Built Sign Inventory*

The Design-Builder shall deliver an As Built Sign Inventory within 30 Calendar Days of punch list Work completion ***using the *Sign Reporting Form* (Appendix T) and TSMS *Sign Inventory Codes* (Appendix T)***. These records shall include the following:

- Sign fabrication number
- State Route
- Mainline MP

- Location (mainline, ramp, LX)
- Special MP
- Direction of travel
- Direction sign is facing
- Side of road
- Sign message
- Sign height
- Sign width
- Background and letter colors
- Letter type (stroke width - B, C, D, E, Em)
- Letter height
- Installation date
- Support type
- Support size
- Number of supports
- Sheeting type
- Sign sort number (top to bottom or left to right)
- Action taken (install, relocate, remove)
- Reason for action
- Picture of front and back of sign, including posts and foundations in .JPEG format. Pictures shall be clearly labeled linking them to the corresponding sign on the Sign Reporting Form (Appendix T).

The Design-Builder shall be responsible for converting station locations to MP. The Design-Builder shall also provide the WSDOT Engineer with the above information submitted in a Microsoft Excel spreadsheet including all signs within the Project limits.

2.19.4.4 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.20 Pavement Marking

2.20.1 *General*

The Design-Builder shall perform all Work necessary to meet the requirements for permanent pavement markings for the Project.

2.20.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2 *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Design Manual* M 22-01 (Appendix D)
4. Standard Plans M 21-01 (Appendix D)
5. WSDOT *Traffic Manual* M 51-02 (Appendix D)
6. *Washington State Modifications to the Manual on Uniform Traffic Control Devices* (WAC 468-95) (Appendix D)
7. WSDOT *Materials Manual* M 46-01 (Appendix D)
8. WSDOT *Construction Manual* M 41-01 (Appendix D)
9. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
10. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
11. ***WSDOT *HOV Design Guide for the Northwest Region* (Appendix T)***
12. *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, 2009 Edition with Revisions 1 & 2 dated May 2012 (Appendix D)
13. *AASHTO A Policy on Geometric Design of Highways and Streets*
14. *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*
15. *AASHTO Roadside Design Guide*
16. *Transportation Research Board Highway Capacity Manual*
17. *ITE Traffic Control Devices Handbook*
18. *FHWA Traffic Monitoring Guide*

19. *ITE Traffic Engineering Handbook*
20. *ITE Manual of Transportation Engineering Studies*
21. *Qualified Products List* (QPL) *(http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm)*

2.20.3 *Design and Construction Requirements*

2.20.3.1 *Software*

The Design-Builder shall refer to Section 2.21, *Traffic Operations*, for traffic operations software requirements.

2.20.3.2 *Pavement Markings Performance Requirements*

The Design-Builder shall ensure that all pavement markings on the Project meet the requirements of Section 8-22 of the Standard Specifications.

The Design-Builder shall test the retroreflective performance of newly applied pavement markings after ***12*** hours, but within 21 Calendar Days, of the marking application. ***The Design-Builder shall use either continuous mobile retro readings or hand-held readings. If hand-held readers are used,*** the Design-Builder shall take 10 retroreflective readings per color line, evenly spaced, over a 2,000-foot roadway segment per mile for every 1-mile section over the length of the Project.

The Design-Builder shall ensure that the retroreflective pavement marking test methods and retroreflective performance meet the requirements in accordance with Section 9-34 of the Standard Specifications.

The Design-Builder shall prepare a written report summarizing all of the retroreflective performance test results, and submit the report to the WSDOT Engineer within 7 Calendar Days of completing the field testing.

Any section of pavement marking that fails to satisfy the test criteria shall be replaced at no cost to WSDOT, and retested to ensure it meets retroreflectivity criteria. The results of the retested sections shall be included in the Design-Builder's Pavement Marking Test Results Report.

The Design-Builder shall ensure that the minimum retroreflectance values for the pavement markings as specified in the Standard Specifications and listed in these Technical Requirements are maintained until Physical Completion.

2.20.3.3 *Permanent Pavement Marking Design Requirements*

The Design-Builder shall prepare permanent Pavement Marking Plans that include, but are not limited to, all tapers, horizontal curve data, lane, shoulder, buffer widths, and the following marking elements:

- Center line striping
- Edge line striping
- Gore striping

- Lane line striping
- Wide lines
- Stop bars
- Arrows
- Legends
- Symbols
- Object markers and delineators
- Aerial surveillance markers
- Crosswalk lines
- Drainage markings
- Raised Pavement Markers (RPM)
- Any other markings consistent with the needs of the Project

The Pavement Marking Plans shall provide a basis for the pavement marking requirements for the Project. The Design-Builder shall be responsible for removing and replacing existing pavement marking in areas where temporary pavement marking will be used during construction.

Where new permanent pavement markings are required, all adjacent edge lines, center lines, lane lines, and wide lines shall also be replaced.

All striping and markings shall be in accordance with the Standard Plans and Standard Specifications.

*2.20.3.3.1 ***Additional Permanent Pavement Marking Requirements****

"Look Left" and "Look Right" symbols shall be installed in the locations shown in the *Concept Channelization Plan for Approval* (Appendix M). The material shall be Type-B pre-formed fused thermoplastic at 120 millimeters thickness.

2.20.3.3.2 Permanent Pavement Marking Material Requirements

The Design-Builder shall provide permanent pavement markings that meet the requirements of Section 9-34 of the Standard Specifications.

On arterial and local streets maintained by ***the City of Snoqualmie,*** the Design-Builder shall use pavement marking materials specified by the applicable city or county.

All permanent striping shall be in accordance with the *Pavement Marking Policy* (Appendix T) except as otherwise noted in this Section. In other locations, paint shall be required where the Standard Plans or other guidelines refer to paint as "desirable."

All Methyl Methacrylate markings shall be profiled in accordance with the Standard Plans except edge lines that are adjacent to shoulder rumble strips. Edge lines adjacent to shoulder rumble strips are not required to be profiled.

All dotted extension lines within the DDI crossovers shall be Type D grooved pavement markings and shall meet the requirements of Section 8-22.3(3)D of the Standard Specifications.

2.20.3.3.3 Pavement Marking Material Certification

The Design-Builder shall provide the WSDOT Engineer with a manufacturer's certification that the pavement marking material meets the requirements of Section 9-34 of the Standard Specifications. The Design-Builder shall ensure that the certification includes the manufacturer's address, telephone number, and contact person. The Design-Builder shall use materials from the QPL or provide a Submittal for the proposed materials demonstrating compliance with Section 9-34 of the Standard Specifications and shall contain all supporting documentation and technical literature including previous testing, analysis, and field performance evaluations by an independent third party.

The Design-Builder shall provide the WSDOT Engineer with a copy of the manufacturer's application instructions.

2.20.3.4 *Permanent Pavement Marking Construction Requirements*

The Design-Builder shall not grind or blemish pavement after the final lift of pavement is applied. All pavement markings placed on the final lift of pavement shall be placed in their final location.

2.20.3.4.1 Equipment

The Design-Builder shall use equipment as required by the manufacturer.

2.20.3.4.2 Surface Preparation

If required, the Design-Builder shall remove any permanent or temporary pavement markings in accordance with the requirements of Section 2.22, *Maintenance of Traffic,* and Sections 8-22 and 8-23 of the Standard Specifications.

The Design-Builder shall prepare the pavement surface for the application of all pavement markings as recommended by the material manufacturer and in accordance with the requirements of Section 8-22 of the Standard Specifications. Grinding shall not be allowed after the final paving lift is complete.

2.20.3.4.3 Replacement of Unsatisfactory Pavement Markings

The Design-Builder shall remove and replace pavement markings that meet any of the following criteria:

- Do not conform to the tolerances established under Section 8-22 of the Standard Specifications
- Fail to meet retroreflective performance as described in this Section
- Have visible drag marks, gashes, or gouges
- Contain foreign material covering the markings

- Have discolored areas
- Fail to solidify
- Do not adhere to the pavement
- Have areas with a ragged appearance, areas without sharply defined edges, or areas with abrupt unintended changes in alignment
- Have more than 10 percent of the substrate exposed in a running 2,000-foot section of longitudinal pavement marking line

2.20.4 *Submittals*

2.20.4.1 *Preliminary Design Submittal*

The Preliminary Pavement Marking Plans shall be submitted to the WSDOT Engineer for Review and Comment as part of the Preliminary Design Submittal.

The Pavement Marking Plans shall be prepared in accordance with the WSDOT *Plans Preparation Manual* and shall include the following:

- All existing pavement marking for a minimum of 300 feet past the limits of construction. Typical sections in lieu of Plans will not be accepted.
- All new pavement markings by material type, color, and line width. The Design-Builder shall dimension the pavement marking across the roadway completely, tying the pavement marking to a construction centerline or a monument line.
- Station and offset for all pavement arrows, symbols, and miscellaneous pavement markings.
- Station and offset for the beginning and ending of all pavement markings, and the beginning and ending of each taper and associated taper rates. The Design-Builder shall locate the beginning and ending points of all curves and the associated radii.
- Design drawings, other than the Standard Plans, that show details of pavement markings, tapers, and transitions.

The Pavement Marking Plans shall not be combined with the Paving Plans.

2.20.4.2 *Final Design Submittal*

The Final Pavement Marking Plans shall be submitted to the WSDOT Engineer for Review and Comment as part of the Final Design Submittal.

2.20.4.3 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section

2.21 Traffic Operations

2.21.1 *General*

The *I-90/ SR 18 Interchange Justification Report Addendum* has been prepared for this Project.

The Design-Builder shall perform a traffic analysis for Maintenance of Traffic that has traffic impacts outside of permitted closures. Refer to Section 2.22, *Maintenance of Traffic* for additional requirements. The Design-Builder shall also perform a capacity assessment of each detour route.

The Design-Builder shall use the following software versions:

- Synchro ***10***
- Vissim ***9.00-14***
- Sidra ***8.0***

2.21.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. WSDOT *Traffic Manual* M 51-02 (Appendix D)
2. ****I-90/ SR 18 Interchange Justification Report Addendum****
3. *Transportation Research Board Highway Capacity Manual*
4. *AASHTO Highway Safety Manual*
5. *Protocol for Vissim Simulation*
6. WSDOT *Sidra Policy Settings*
7. ***WSDOT Synchro & SimTraffic Protocol***
8. *Transportation Research Board Highway Capacity Manual*, (Chapter 17, "Unsignalized Intersections)
9. *FHWA Guidelines for Applying Traffic Microsimulation Modeling Software* (Appendix T)

2.21.3 *Performance Requirements*

The design configuration in the Conceptual Plans is based on the ****I-90/ SR 18 Interchange Justification Report Addendum****. If any configuration elements

such as the intersection control type, number of lanes, storage lengths, and lane configurations in the Design-Builder's design vary from the configuration analyzed in the ****I-90/ SR 18 Interchange Justification Report Addendum* and the Concept Channelization Plan for Approval*** the Design-Builder shall conduct additional traffic analysis. The operational performance shall be equal or better to the design presented in the ****I-90/ SR 18 Interchange Justification Report Addendum**** as defined by the Measures of Effectiveness agreed to by the WSDOT Engineer and the Design-Builder. Changes to the number of mainline lanes shall be in accordance with Section 1-04 of the *General Provisions*. With respect to the number of lanes and storage lengths at intersections and along ramps, the configurations provided in the Conceptual Plans shall be the minimum. The Design-Builder may propose reductions in these characteristics of the design. Such proposals shall be supported by a traffic operations analysis. The WSDOT's Engineer determination to accept or reject such Proposals will be at its sole discretion and such determinations shall not be subject to the disputes process otherwise provided under the Contract. If the Design-Builder's traffic analysis requires additional storage or lanes, these shall be provided at no additional cost to WSDOT.

2.21.3.1 *Performance Criteria*

The Design-Builder shall analyze the following traffic performance parameters:

- ***I-90 mainline, SR 18 mainline, ramp speeds, and travel times
- I-90 mainline, SR 18 mainline, and ramp throughput volumes
- Degree of saturation or volume to capacity (v/c) ratio
- Control delay and level of service (LOS) at affected intersections by approach
- 95th percentile queue and maximum queue
- Safety performance, including*** number of fatal and serious injury crashes

The traffic performance parameter values obtained from geometric changes being proposed shall be equal or better to those outlined in the ****I-90/ SR 18 Interchange Justification Report Addendum****.

2.21.3.1.1 Traffic Analysis and Performance

Build conditions presented in the ****I-90/ SR 18 Interchange Justification Report Addendum**** were established using the Basic Configuration: ***2025 year of opening and 2045*** horizon year.

Proposed changes by the Design-Builder to the design configuration assumed in the ****I-90/ SR 18 Interchange Justification Report Addendum**** that will affect traffic operations within the study area defined in the traffic analysis shall be analyzed and compared to the ****I-90/ SR 18 Interchange Justification Report Addendum**** by the Design-Builder. The Design-Builder shall use Synchro to evaluate the signal timings of the identified intersections and Sidra to evaluate

roundabouts. Vissim shall be used to evaluate the performance of the mainline lanes, any WSDOT identified intersections, and the local street network. Synchro or Sidra shall be used at other intersections identified by the WSDOT Engineer. Intersection analysis performance shall be evaluated based on delay by approach and queue length by approach. Queue length shall be based on the average queue values. All results from Vissim shall be based on an average of 11, at minimum, separate random seed runs (Refer to Section 6 of the *Protocol for Vissim Simulation* for required number of simulation runs). Vissim shall be used to analyze the mainline operations on ***I-90 and SR 18,*** including on-ramps and off-ramps and intersections at ramp terminals.*** The concept plans will provide the number, type, and approximate location of ramp meters. The length of storage for the metered ramps should meet the required LOS at the ramp terminal intersections.***

The analysis shall be conducted for design years described in the ****I-90/ SR 18 Interchange Justification Report Addendum**** and shall include the morning and evening peak periods.

The Design-Builder shall use traffic volume projections from ****I-90/ SR 18 Interchange Justification Report Addendum**** The Design-Builder shall submit an electronic copy of the alternate configuration design and analysis to the WSDOT Engineer, at the same time a request is submitted to WSDOT.

The WSDOT Engineer may reject modifications to the design configuration assumed for the ****I-90/ SR 18 Interchange Justification Report Addendum**** that result in poor traffic operations, as measured by delay, throughput volumes, ***queue,*** degree of saturation or v/c, crash reduction in terms of the frequency or severity or both, or conflicts with future plans.

2.21.4 *Safety Performance Analysis and Mitigations Proposed*

The Design-Builder shall review crash data in the Project area for the latest full calendar 5-year period available from WSDOT and identify characteristics, contributing factors, and types of crashes involving fatalities, serious injuries, pedestrians and bicyclists, and potential countermeasures for addressing and reducing crash potential.

The Design-Builder shall use the predictive method in the *AASHTO Highway Safety Manual* (Chapters 10-12, 18, 19) and WSDOT-specific safety predictive spreadsheets for these chapters to perform predictive safety analysis for the Project. The predictive analysis shall use the same traffic volumes used in the traffic analysis for the Project.

The proposed level of predictive analysis shall be subject to Review and Comment by the WSDOT Engineer. Concurrence is needed for the use of crash modification factors to quantify the impact of mitigation on safety performance.

The Design-Builder shall prepare a memorandum describing how the proposed design mitigates or reduces the crash potential, including the frequency and severity of fatal, serious injury, pedestrian-vehicle, and bicyclist-vehicle involved

crashes. The Design-Builder shall submit the memorandum to the WSDOT Engineer prior to Submittal of the Design-Builder's preliminary design.

2.21.5 *Traffic Operations During Construction*

Any reduction in the number of lanes within the Project area, outside of closure hours described in Section 2.22, *Maintenance of Traffic*, or ramp closures with overlapping detours shall require an operational and safety analysis of the impacts to the freeway, ramps, and streets.

Any reduction in intersection capacity shall require a traffic operations analysis. Synchro, Vissim, Sidra, *AASHTO Highway Safety Manual* or any combination shall be used for this analysis depending on the intersection location and whether or not the ***I-90 and SR 18*** mainline or ramps are affected. WSDOT will determine which facilities (i.e., intersections, ***I-90 and SR 18*** mainline, or both) require the type and form of the analysis based on the proposed changes. WSDOT will provide information regarding the traffic analysis software that shall be used for each intersection. Operations analysis shall be performed using models consistent with the ****I-90/ SR 18 Interchange Justification Report Addendum**** utilizing Synchro, Vissim, or Sidra traffic software or the *AASHTO Highway Safety Manual*. The proposed analysis model(s) and model(s) results shall be subject to Review and Comment by the WSDOT Engineer. Analysis of queue distances for ramps and average speeds for mainline operation will be based on Vissim output.

2.21.6 *Submittals*

The Design-Builder shall prepare and submit a traffic and safety performance analysis report for any proposed alternate interchange or intersection configuration, together with the Proposal for the alternate configurations.

The report, including all supporting documents, shall be submitted electronically on a USB flash drive. The WSDOT Engineer will Review and Comment within 14 Calendar Days.

2.21.6.1 *Supporting Documents*

The Design-Builder shall provide the following supporting documents:

- Design drawings showing the Design-Builder's proposed configuration
- Synchro and Vissim analysis input files (electronic)
- Sidra analysis input files (electronic)
- Synchro and Vissim analysis output files for all random seed runs (electronic)
- Synchro and Vissim analysis summary
- Sidra analysis summary
- Documentation of segmentation of the Project for predictive analysis using the *AASHTO Highway Safety Manual* and any assumptions made in the predictive analysis. This includes documentation of any crash modification

factors used to quantify the safety performance impacts of mitigation measures.

- *AASHTO Highway Safety Manual* safety predictive analysis summary
- *AASHTO Highway Safety Manual* spreadsheets used for the safety performance analysis (electronic)
- Crash Analysis Report (WSDOT template)

The Design-Builder shall provide the following calculations:

- Level of service for every turn movement
- Degree of saturation or v/c ratio throughput for every turn movement
- Total delay, which includes control delay and stop delay for the entire intersection
- 95 percent ***Queue lengths***

2.21.6.2 *Miscellaneous Submittals*

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.22 Maintenance of Traffic

2.22.1 *General*

The Design-Builder shall perform 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 adverse impacts to residents, commuters, and businesses.

The Design-Builder shall prepare a Transportation Management Plan (TMP), a Traffic Incident Management Plan (TIMP), and Temporary Traffic Control (TTC) Plans, and shall conduct all on-site activities relating to traffic maintenance in accordance with this Section.

The Design-Builder shall be responsible for coordinating with other projects within the vicinity of the Project, at a minimum, scheduling of lane closures, detours, ramp closures, temporary alignments, and staging of construction activity. Construction activities shall be scheduled to minimize the number of required closures and to maximize the opportunities available to perform Work during closures required by other projects. The Design-Builder shall coordinate and schedule activities to minimize impact on other projects.

Refer to Section 2.1, *General Information,* for projects anticipated to be under construction at the same time as the Project. The Design-Builder shall coordinate with Local Agencies and Utility companies to identify other projects scheduled for construction during the duration of the Project.

2.22.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Design Manual* M 22-01 (Appendix D)
4. Standard Plans M 21-01 (Appendix D)*
5. WSDOT *Traffic Manual* M 51-02 (Appendix D)
6. WAC 468-95 *Washington State Modifications to the Manual on Uniform Traffic Control Devices*, 2009 Edition with Revisions 1 and 2 dated May 2012 (Appendix D)

7. *U.S. Access Board Revised Draft Guidelines for Accessible Public Rights-of-Way*, *November 2005* (Appendix D)
8. WSDOT *Materials Manual* M 46-01 (Appendix D)
9. WSDOT *Construction Manual* M 41-01 (Appendix D)
10. WSDOT *Sign Fabrication Manual* M 55-05 (Appendix D)
11. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
12. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
13. WSDOT *Plan Sheet Library – Work Zone Traffic Control* (Appendix D)*
14. WSDOT *Secretary's Executive Order E 1060 Speed Limit Reduction in Work Zone* (Appendix T)
15. WSDOT *Secretary's Executive Order E 1001 Work Zone Safety and Mobility* (Appendix T)
16. *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways,* 2009 Edition with Revisions 1 and 2, dated May 2012 (Appendix D)
17. *AASHTO Manual for Assessing Safety Hardware (MASH 16), 2016*
18. *NCHRP Report 350: Devices in Work Zones,* February 2004, Revised April 2004
19. *AASHTO A Policy on Design Standards - Interstate System*
20. *AASHTO A Policy on Geometric Design of Highways and Streets*
21. *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals,* 1st Edition, 2015
22. *AASHTO Roadside Design Guide,* 2010
23. *Transportation Research Board Highway Capacity Manual*
24. *ITE Traffic Control Devices Handbook*
25. *FHWA Traffic Control Systems Handbook*
26. *FHWA Traffic Monitoring Guide*
27. *FHWA Developing and Implementing Transportation Management Plans for Work Zones*
28. *ITE Traffic Engineering Handbook, 6th Edition*
29. *ITE Manual of Transportation Engineering Studies*
30. *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*
31. *U.S. Access Board ADA Accessibility Guideline*
32. *FHWA Final Rule on Work Zone Safety and Mobility* (23 CFR Part 630 Subpart J)

*The plans contained in these Mandatory Standards shall be made Site-specific if used for TTC Plans. The Plan Sheet Library is located at this link: https://www.wsdot.wa.gov/Design/Standards/PlanSheet/Work-Zone-Typical-TCPs.htm

2.22.2.1 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 MUTCD and the 2005 edition of the *Public Rights-of-Way Accessibility Guidelines (PROWAG)*. Judgment of the condition of devices furnished will be based upon *ATSSA Quality Guidelines for Work Zone Traffic Control Devices.* The condition of signs and traffic control devices shall be new or "acceptable" as defined in the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*, and will be accepted based on a visual inspection by the Traffic Control Supervisor (TCS). WSDOT may also identify devices that are unacceptable based on the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*. The WSDOT Engineer's decision on the condition of a sign or traffic control device will be final. The Design-Builder shall remove and replace a sign or traffic control device determined to be unacceptable within 12 hours of notification.

In addition to the standards of the MUTCD described above, WSDOT enforces crashworthiness requirements for most work zone devices. The *MASH 16* has superseded the *NCHRP Report 350* as the established requirements for crash testing. Temporary traffic control devices manufactured after December 31, 2019, shall be compliant with the *MASH 16* crash test requirements, as determined by WSDOT, except as follows:

1. In situations where a *MASH 16* compliant traffic control device does not exist and there are no available traffic control devices that were manufactured on or before December 31, 2019, then a traffic control device manufactured after December 31, 2019, that is compliant with either *NCHRP 350* or the 2009 edition of the *AASHTO Manual for Assessing Safety Hardware (MASH 09)* is allowed for use with approval of the WSDOT Engineer.
2. Temporary traffic control devices that were manufactured on or before December 31, 2019, and were successfully tested to *NCHRP 350* or *MASH 09* may continue to be used on WSDOT projects throughout their normal service life.
3. Small and lightweight channelizing and delineating devices, including cones, tubular markers, flexible delineator posts, and plastic drums, shall meet the requirements of either *NCHRP 350*, *MASH 09*, or *MASH 16* as determined by the manufacturer of the device.
4. A determination of crashworthiness for acceptance of trailer-mounted devices such as arrow displays, temporary traffic signals, area lighting supports, and portable changeable message signs is currently not required.

2.22.3 *Performance Requirements*

2.22.3.1 General

The Design-Builder shall prepare a TMP and a TIMP to be approved by the WSDOT Engineer, and establish a MOT task force prior to any construction activity that may impact traffic. The WSDOT Engineer may permit shoulder closures for activities such as surveying or environmental and other design-related Work prior to approval of the TMP and the TIMP, provided the Design-Builder prepares TTC Plans in accordance with the requirements of this Section. The Design-Builder shall make changes to the TMP and TIMP any time the personnel or conditions of the original TMP or TIMP change. TTC Plans that are within the jurisdiction of the ***City of Snoqualmie and King County*** will require approval from the affected Local Agency.

2.22.3.2 Transportation Management Plan

The Design-Builder shall develop a TMP that includes the items from the *Transportation Management Plan Checklist* (Appendix T), and the following items:

- Descriptions of traffic staging, including:
  - Conceptual TTC Plans, to accommodate construction staging.
  - ***Frequency and durations of planned construction closures.***
- Descriptions of the requirements 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.
- Processes for developing and obtaining agreement among stakeholders for switching procedures.
- Procedures to identify and incorporate the needs of Local Agencies affected by the Work.
- Procedures to identify and incorporate the needs of Environmental Justice (EJ) and Limited English Proficiency (LEP) populations affected by the Work.
- Processes 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. The Design-Builder shall also include procedures to ensure all information required by these agencies to protect the public is made available.

- Procedures for providing job Site access point for emergency service provider and law enforcement entities.
- Provisions for incident and emergency response.
- Processes to identify, produce, and receive acceptance for designs of temporary traffic signals.
- Methods and frequency of inspection and maintenance of all traffic control throughout the Project limits, including response times to correct, modify, or implement changes to pavement marking, signing, temporary lane configurations, and changes in Temporary Concrete Barrier (TCB) configurations.
- Descriptions of contact methods, personnel available, and response times for any conditions requiring attention during off-hours. Include a Communications Plan to ***WSDOT Seattle Radio and Northwest Region Traffic Management Center*** and field offices.
- Identification of measurable limits for the repair and replacement of traffic control devices, including pavement markings.
- Processes 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.
- Procedures to modify existing access within Project limits.
- Provisions to provide continuous access to established truck routes, Hazardous Material 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. The Design-Builder shall identify special needs for emergency service providers, transit service, and truck routes.
- Procedures to communicate MOT information to the WSDOT's Communications Team, and to notify the public of MOT issues in accordance with Section 2.9, *Communications*.
- Procedures to accommodate adjacent projects' TTC Plans and strategies, if applicable.
- Procedures to modify the TTC Plans when the staging schedule of the Project or any adjacent project changes.
- Identify haul routes.

2.22.3.3 Traffic Incident Management Plan

During construction, MOT will become increasingly sensitive to incidents such as equipment malfunctions, traffic crashes, inclement weather, ***floods, landslides/mudslides, tree falls,*** and special events. The Design-Builder shall prepare and implement a formal TIMP to address how these incidents shall be managed.

2.22.3.3.1 *General*

The TIMP shall identify methods for immediate incident detection and verification, response, Site management, clearance, and motorist information. The TIMP shall include procedures for interaction with the ***Northwest Region Traffic Management Center***. In addition, if any Local Agencies along the Project 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 staging. The Design-Builder shall modify and implement the TIMP in conjunction with planned special events. 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 provide a mechanism to review and capture lessons learned from 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.

2.22.3.3.2 *Incident Response Team*

Immediately upon detection, the Design-Builder shall notify the Traffic Management Center of any vehicles blocking traffic lanes, disabled vehicles on shoulders, or debris on the roadway that may present a traffic hazard to the public or cause traffic to deviate from normal traffic pattern. The Design-Builder will not be required to provide additional Incident Response Team equipment or personnel; however, the Design-Builder shall make materials and equipment available that are on-site as requested by the WSDOT Engineer, WSDOT Incident Response Team, or the Washington State Patrol (WSP). Removal of animal carcasses on the roadway shall be in accordance with Section 2.29, *Maintenance During Construction*.

2.22.3.3.3 *Drop Sites*

The Design-Builder shall identify a minimum of two drop sites within the vicinity of the Project where disabled vehicles can be safely towed off the freeway and motorists can be assisted. A phone and shelter shall be available at the drop sites for motorists to use. The drop sites may be retail establishments, such as a hotel, airport, gas station, or repair shop, and shall be located within ***2 miles*** of the Project limits.

2.22.3.3.4 *Temporary Emergency Turn-Outs*

Temporary emergency turn-outs shall be provided on segments where shoulder widths are less than 8 feet for sections longer than 4,000 feet in length. The minimum emergency turn-out width shall be 14 feet from the edge line for a minimum of 150 feet in length, not including transitions. The approach transitions shall be made at 15:1 (Length:Width) or greater. The departure transitions shall be made at 25:1 or greater. The emergency turn-outs shall have a paved surface and shall not be subject to ponding or other weather-related conditions that could render them ineffective. Emergency turn-outs shall be located on the right side of the travel lanes. Advance signing shall be provided 0.25 mile in advance of the approach transition, and an R8-7 "Emergency Stopping Only" sign shall be installed adjacent to the emergency turn-out.

2.22.3.3.5 *Emergency Vehicle and Law Enforcement 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 and law enforcement access shall be maintained through all nighttime, weekend, and evening closures.

2.22.3.3.6 *Maintain Camera Surveillance*

Refer to Section 2.18, *Intelligent Transportation Systems*, for maintenance requirements of the Closed-Circuit Television system during construction.

2.22.3.3.7 *Variable Message Signs*

Refer to Section 2.18, *Intelligent Transportation Systems*, for maintenance requirements of the existing Variable Message Sign (VMS).

Existing VMS approaching the Project may be used, with the WSDOT Engineer's concurrence, to provide motorists with incident and construction-related information prior to entering the Work zone. VMS shall not be used in lieu of PCMS as the primary messaging tool. The Design-Builder shall coordinate with the ***Northwest Region Traffic Management Center*** to provide timely, accurate information regarding planned closures, and updated traffic and construction information.

The Design-Builder shall also provide PCMS to provide information to motorists, in accordance with this Section.

2.22.3.3.8 *Highway Advisory Radio*

A portable Highway Advisory Radio (HAR) may be provided and operated by the WSDOT Engineer. The Design-Builder shall provide and maintain signing for a portable HAR when requested by the WSDOT Engineer.

The Design-Builder shall coordinate with the ***Northwest Region Traffic Management Center*** to provide timely, accurate information regarding planned closures, and updated traffic and construction information.

2.22.3.3.9 *Design-Builder Response Time*

The TCS, with the Design-Builder, shall coordinate the resources and equipment necessary to respond to emergency situations. The resources shall be on-site within ***45 minutes*** of notification of an emergency situation. The TCS and Design-Builder shall ensure the support staff is of sufficient size and has the equipment and materials necessary to respond to issues affecting traffic flow, such as displaced pre-cast concrete traffic barrier, pothole repair, water on the roadway, closing lanes, ramps, setting up detours, and other issues that have the potential of affecting safety of the motoring public.

2.22.3.4 ***Vacant***

2.22.3.5 Maintenance of Traffic Task Force Meetings

The Design-Builder shall establish and chair a MOT task force, which shall include Design-Builder personnel, the WSDOT Engineer, and other WSDOT personnel; the ***City of Snoqualmie and King County***; and other agencies that are affected by the TTC 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.

The Design-Builder shall schedule and chair MOT task force meetings twice each month from Contract execution to Substantial Completion. The meeting schedule and frequency of meetings may be adjusted upon agreement by the MOT task force members.

The purpose of the meetings shall be to achieve the following:

- Further refine and develop the TTC 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
- Review the TCS log
- Identify the need for improvements based on traffic control implemented previously
- Discuss comments/complaints about traffic control from the WSDOT Engineer and the public, and determine how they will be addressed

- Discuss Work zone related crashes and identify appropriate revisions to traffic control to prevent future crashes
- Identify potential haul routes to the task force meeting attendees

The Design-Builder shall prepare the agenda, meeting minutes, exhibits, and Design Plans required for the meetings, and shall invite representatives from adjacent projects to the meetings.

2.22.4 *Design and Construction Requirements*

2.22.4.1 Work Zone Traffic Engineering Manager

The Work Zone Traffic Engineering Manager (WTEM) shall be responsible for ensuring that the design of all elements related to construction staging, Work zone safety, and Work zone traffic control are completed and all applicable design requirements are met. The WTEM shall be on-site once a week for the duration of the construction staging and TTC Plan development unless otherwise approved by the WSDOT Engineer. The WTEM shall also be available for approval of modifications to the staging or TTC Plans through Substantial Completion. The WTEM shall be a Licensed Professional Engineer.

The WTEM shall have at least 5 years of recent temporary traffic control design, traffic engineering experience, or both, on complex, urban interstate projects in design, construction, or both. The WTEM shall understand the concepts of traffic modeling and have experience designing construction staging, Work zone safety, and Work zone traffic control.

The WTEM shall be responsible for the following design elements including, at a minimum:

- Detours
- Staging and TTC Plans
- Temporary Plans for signals, Intelligent Transportation Systems (ITS), lighting, signing, and pavement markings

2.22.4.2 Temporary Traffic Control Plans

The Design-Builder shall use the procedures in the TMP to develop detailed Site-specific TTC Plans that provide for all construction stages and identify opportunities to expedite construction throughout the course of the Project. The TTC Plans shall be prepared under the direction of the Design-Builder's WTEM.

All construction signs, flaggers, and other traffic control devices shall be shown on the TTC Plans, except for emergency situations. The TTC Plans shall show locations of all required advance warning signs, and a safe, protected location for the flagging station. If flagging is to be performed during hours of darkness, the TTC Plans shall require flagging station illumination per this Section.

The TTC Plans shall show the necessary construction signs, flaggers, and other control devices required to support the Work. The Design-Builder shall be

responsible for submitting proposed TTC Plans to the WSDOT Engineer for Review and Comment; releasing the drawings for construction; and providing copies of the TTC Plans to the TCS.

TTC Plans shall include, at a minimum, the following items:

- Complete plan sheets and details for all stages of construction. This shall include construction sequencing plans that show the overall approach to Project staging.
- The appropriate details when temporary construction of traffic signals, detour routes, bridges, retaining structures, drainage, and other miscellaneous construction is required to maintain traffic.
- Roadway plan sheets showing all existing traffic control devices that will be retained, relocated, or removed; and all temporary traffic control devices that will 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 barriers and attenuators to satisfy clear zone requirements, and to protect the traveling public and the Design-Builder's personnel, including lateral displacement distance behind barrier.
- Temporary lighting, signalization, and ITS details, as required.
- 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 the WSDOT *Sign Fabrication Manual* showing dimensions, background color, and legend.
- Methods for covering, partially covering, or modifying signs when not applicable to the current phase of construction.
- Methods for covering, partially covering, or modifying signals when needed for the current phase of construction.
- Striping, crosswalks, intersection details, and traffic delineators.
- Type and location of all pavement markings to be installed, removed, or renewed for each stage of construction; and locations of the final pavement markings.

- Cross-sections covering each significant change in configuration including, at a minimum, reduction in lane or shoulder widths; reduction or increase in number of lanes; and changes of lateral barrier placement or type. Cross-sections shall show lane configuration (including direction of travel) and widths, shoulder widths, lateral buffer distance behind barrier, Work areas, and pavement marking type. Cross-sections shall identify locations of vertical drop-offs or fixed objects adjacent to the roadway and how they will be protected. Cross-sections shall include the station limits the section applies to. Cross-sections shall be provided covering the entire length of the segment included in the TTC Plans.
- Typical sections shall identify direction of travel, lane widths, lane type (general purpose, shoulder, HOV, turn lane, etc.), and number of lanes.
- Access and control of bicyclists through the traffic control zones.
- Detail modifications to the TTC Plans to address wintertime conditions or periods of suspended Work.
- A switching procedure for each traffic control stage change identified in the TTC Plans. The switching procedure shall include information jointly determined by the Design-Builder and the WSDOT Engineer, sufficient to facilitate discussion of each traffic control stage change in the MOT task force meetings.
- The TTC Plans shall be complete. Typical traffic control configurations such as those found in the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways* may be used to assist in developing the TTC Plans. Only Site-specific TTC Plans that have been Released for Construction (RFC) shall be used by the Design-Builder. Typical plans are not acceptable unless incorporated as details into the TTC Plans.
- Temporary drainage plan and profile sheets showing all existing drainage that will be retained, relocated, or removed; and all temporary drainage facilities that will be installed, retained, relocated, or removed.

The Design-Builder shall prepare documentation to justify all proposed road closures, detour routes, and reductions in lane storage at traffic signals or ramp meters. The documentation shall be submitted to the WSDOT Engineer for Review and Comment with the proposed TTC Plans.

The Design-Builder shall maintain an updated log for the approved TTC Plans in the document control system. The log shall be available for WSDOT to review at any time.

2.22.4.2.1 *Design Vehicle*

The design vehicle for the Project shall be a ***WB-67***. The Design-Builder shall evaluate traffic patterns and vehicle classifications to determine an appropriate design vehicle for each Traffic Control Plan. Provisions for oversized

vehicles shall be coordinated with the WSDOT Engineer when detours or limited vertical clearance are required by the TTC Plans.

2.22.4.3 Allowable Closures

This Section lists the allowable lane, ***roadway, ramp, and shoulder*** closure hours for the Project. Any restrictions for roadway segments not listed in this Section require the WSDOT Engineer approval. No lane closures shall occur outside of the hours specified within this Section, unless approved in advance and in writing by the WSDOT Engineer. The Design-Builder shall notify the public in advance of closures.

No temporary lane closures or restrictions, including set-up and removal of traffic control devices, will be allowed except during the hours permitted by this Section. In addition, no Work that restricts or interferes with traffic will be allowed from noon on the day preceding through noon on the day following a holiday or holiday weekend. Holidays that occur on Friday, Saturday, Sunday, or Monday are considered a holiday weekend. 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 shall be considered holidays. When any of these holidays fall on a Sunday, the following Monday shall be considered a holiday. When any of these holidays fall on a Saturday, the preceding Friday shall be considered a holiday.

The Design-Builder shall coordinate their Work activities with other local events in the area, so that the events will not be impacted. In addition, road, ramp, and lane closures will not be allowed during the following events:

- ***The 2-hour periods prior to and after a Snoqualmie Casino event with expected attendance over 2,000. Events can be found on-line at http://snocasino.com/calendar/
- Western Washington State Fair
- Annual Seafair Hydroplane Race Weekend
    - Noon Friday to 8:00pm Sunday
- Watershed Musical Festival
- Boeing Classic Golf Tournament
- Snoqualmie Railroad Days
- Issaquah Salmon Days
- Flying Wheels Century (Cascade Bicycle Club)
- University of Washington-Washington State University Apple Cup football game***

The Design-Builder shall also identify any major event ***(within a 30-mile radius of the I-90/SR 18 interchange)***, such as a sporting event or any combination of events, with an anticipated combined attendance over ***25,000*** and shall adjust closure times to minimize the impact to traffic in accordance with Section 2.9, *Communications*. No traffic restrictions shall be

implemented between 2 hours prior to and 2 hours after the end of events having a significant impact on traffic volumes. Adjustment of closure times requires traffic analysis in accordance with Section 2.21, *Traffic Operations*.

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 of lane configurations, city street closures, or extended ramp closures shall be made during the holiday period unless approved by the WSDOT Engineer.

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.

WSDOT reserves the right to not approve 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 times, in accordance with Section 1-08 of the *General Provisions*.

2.22.4.3.1 *Lane Closures*

The Design-Builder shall maintain the existing configuration at all times outside of the allowable closures described in this Section, unless otherwise permitted in this Section.

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Table 2.22-1. SR 18 (MP 25.41 to MP 27.91) Allowable Lane Closures

SR 18 – Four-lane section (Two lanes in each direction) **Eastbound SR 18** **One-lane closure** **Allowable Closure Times**	One lane closed Nightly closures Sunday to Thursday Saturday night to Sunday morning	 8:00 p.m. to 5:00 a.m. 8:00 p.m. to 6:00 a.m.
SR 18 – Four-lane section (2 lanes in each direction) **Westbound SR 18** **One-lane closure** **Allowable Closure Times**	One lane closed Nightly closures Sunday to Thursday Saturday night to Sunday morning	 8:00 p.m. to 5:00 a.m. 8:00 p.m to 6:00 a.m.
SR 18 – Two-lane section (One lane in each direction) **Allowable Closure Times**	One lane closed (flagging operation) Nightly closures Sunday to Thursday Saturday night to Sunday morning	 9:00 p.m. to 5:00 a.m. 9:00 p.m. to 6:00 a.m.

Friday night to Saturday morning closures on SR 18 shall not be allowed. Closing one lane in the two-lane section of SR 18 requires alternate flagging.

Table 2.22-2. I-90 WB (SE Highpoint Way to MP 25.97) Allowable Lane and Shoulder Closures

Existing Configuration Three General Purpose Lanes

Allowable Closure Times Maximum one general purpose lane closed, including adjacent shoulder	Sunday 9:00 p.m. to Monday 6:00 a.m. Monday 9:00 a.m. to Tuesday 6:00 a.m. Tuesday 9:00 a.m. to Wednesday 6:00 a.m. Wednesday 9:00 a.m. to Thursday 6:00 a.m. Thursday 9:00 a.m. to Friday 6:00 a.m. Saturday 6:00 a.m. to Sunday 12:00 noon

Table 2.22-3. I-90 EB (SE Highpoint Way to MP 25.97) Allowable Lane and Shoulder Closures

Existing Configuration Three General Purpose Lanes

Allowable Closure Times Maximum one general purpose lane closed, including adjacent shoulder	Sunday 8:00 p.m. to Monday 2:00 p.m. Monday 8:00 p.m. to Tuesday 2:00 p.m. Tuesday 8:00 p.m. to Wednesday 2:00 p.m. Wednesday 8:00 p.m. to Thursday 2:00 p.m. Thursday 8:00 p.m. to Friday 11:00 a.m. Saturday 8:00 p.m. to Sunday 11:00 a.m.

Friday night to Saturday morning closures on I-90 WB and EB shall not be allowed.

Table 2.22-4. Snoqualmie Parkway Allowable Lane Closures

SB Snoqualmie Parkway from SE 99th Street to the Westbound I-90 on-ramp

Allowable Closure Times	Sunday 9:00 p.m. to Monday 4:30 a.m. Monday 9:00 p.m. to Tuesday 4:30 a.m. Tuesday 9:00 p.m. to Wednesday 4:30 a.m. Wednesday 9:00 p.m. to Thursday 4:30 a.m. Thursday 9:00 p.m. to Friday 4:30 a.m. Saturday 9:00 p.m. to Sunday 6:00 a.m.

Lane closures on Snoqualmie Parkway shall be allowed, provided the Design-Builder shall maintain one lane of traffic in each direction during the closures during the above hours. The westbound I-90 on-ramp shall remain open.

Table 2.22-5. SE High Point Way/270th Ave SE Allowable Lane Closures

Allowable Closure Times One lane closed with flaggers	Monday 9:00 a.m. to 3:00 p.m. Tuesday 9:00 p.m. to 3:00 p.m. Wednesday 9:00 p.m. to 3:00 p.m. Thursday 9:00 p.m. to 3:00 p.m. Friday 9:00 p.m. to 3:00 p.m.

Table 2.22-6. Upper Preston Rd SE Allowable Lane Closures

Allowable Closure Times One lane closed with flaggers	Monday 8:00 a.m. to 4:00 p.m. Tuesday 8:00 a.m. to 4:00 p.m. Wednesday 8:00 a.m. to 4:00 p.m.

	Thursday 8:00 a.m. to 4:00 p.m. Friday 8:00 a.m. to 4:00 p.m.

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2.22.4.3.2 *Full Freeway, Highway, and Roadway Closures*

Full roadway closures will be allowed as described in Section 2.22.4.3.2.1.

The Design-Builder shall provide written notification to the WSDOT Engineer of the planned closure, including the date and time of the closure, the Work activities scheduled for Work preceding the full closure, and the applicable traffic control, at least 60 Calendar Days in advance of the full freeways, highways, and roadways closure.

Roadway closures, detours, and alternate routes will be analyzed by WSDOT for disproportionate impacts to Environmental Justice (EJ) and Limited English Proficient (LEP) communities. If an EJ or LEP community is identified along a proposed route and will be disproportionately impacted, appropriate mitigation shall be coordinated between WSDOT Communications and the Design-Builder. When additional changes are made to the route, it shall be evaluated to determine if the detour would add congestion, noise, or create safety issues for adjacent residences and businesses. The detour shall also be evaluated to determine if it would add considerable longer distance to access residences/businesses that may affect low-income and minority populations. WSDOT will work with local agencies and conduct public outreach as necessary to ensure that the proposed route will not have a disproportionately high and adverse effect on EJ or LEP.

The Communications Plan must include appropriate accommodations for identified populations and businesses.

A 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 a disapproved closure or a closure that will require coordination with other parties, including EJ and LEP communities, as a condition of approval.

The Design-Builder shall submit the scheduled closure to the WSDOT Engineer for Review and Comment at least 14 Calendar Days prior to the date on which the closure is scheduled; the closure will be approved by 4:00 p.m. the following business day. All freeways, highways, and roadways closures not confirmed as scheduled shall be canceled.

Detour routes shall be provided by the Design-Builder for all freeways, highways, and roadways closures. Detours shall be approved by impacted Local Agencies a minimum of 30 Calendar Days prior to implementing the closure. The Design-Builder shall coordinate the closure with nearby projects and WSDOT Maintenance activities to ensure no conflicting Work activities are planned, including ramp or roadway closures that would have conflicting or overlapping detours.

Detour routes proposed by the Design-Builder shall be evaluated to determine if the detour would add congestion, noise, or create safety issues for adjacent residences and businesses and/or add considerable distance to access residences/businesses that may affect low income and minority population, including EJ and LEP populations.

All detours shall be in place, including all advance-signing, prior to closure of the freeways, highways, and roadways.

Full closure of the freeways, highways, and roadway shall require WSP enforcement as part of the traffic control strategy and use of WSP be reflected on the MOT and TTC Plans.

The Design-Builder shall complete all Work within the specified closure times prior to opening the freeways, highways, and roadways to traffic.

Advance notification, public notification, and signing requirements shall be in accordance with this Section and Section 2.9, *Communications*.

The Design-Builder shall provide the WSDOT Engineer with a Contingency Plan for re-opening closed freeways, highways, and roadways to public traffic in the event of equipment breakdown, shortage of materials, lack of production of materials, or other production failure; or when it becomes necessary to re-open the closure for use by public traffic. The Design-Builder shall furnish an hour-by-hour schedule of all Work activities to be performed during the full freeways, highways, and roadways closure, including the Work activities scheduled for Work preceding the full closure. The Design-Builder shall also furnish a Contingency Plan for this closure, including re-opening lanes for general public traffic. The Contingency Plan and its acceptance by the WSDOT Engineer shall not relieve the Design-Builder from the liquidated damages as specified in this Section and Section 1-08.9 of Chapter 1, *General Provisions*.

2.22.4.3.2.1 *** SR 18 Allowable Full Weekend Roadway Closure at I-90/SR 18 Interchange***

Allowable SR 18 roadway closure hours between the I-90 eastbound and westbound ramp terminals are listed in Table 2.22-7. During the weekend closures, the Design-Builder shall not close any right-turn ramp movements at the I-90/SR 18 interchange. The Design-Builder shall include the detour plans for the closed traffic movements at this location. The Design-Builder shall not close any lanes or ramps other than those listed in Table 2.22-7 in this section.

Table 2.22-7. SR 18 Full Weekend Roadway Closures at I-90/SR 18 Interchange

Location	Weekend Closures Allowed	Allowable Closure Times
SR 18 – from the I-90 westbound ramp terminal to the I-90 eastbound ramp terminal	4	Friday 9:00 p.m. to Monday 5:00 a.m.

2.22.4.3.3 ****I-90/SR 18 Interchange*** Entrance and Exit Ramp Closures*

The Design-Builder will be allowed to close ramps during the hours listed in the table below. The Design-Builder shall maintain the existing ramp configurations at all times outside of the allowable closures described in this Section, unless otherwise permitted in this Section. Refer to Section 1-08 of the *General Provisions* for liquidated damages associated with failure to fully re-open ramps by the opening time given in the table below. If two or more ramps within the Project limits are planned to be closed concurrently, and the closed ramps have overlapping detours, the Design-Builder shall conduct an analysis of the detour routes in accordance with Section 2.21, *Traffic Operations*, and submit it to the WSDOT Engineer. If overlapping detours are determined to be unacceptable by the WSDOT Engineer, then only one ramp closure will be allowed. Closure durations shall be reduced based on the results of this analysis.

The Design-Builder will be allowed to close ramps upon written notification to WSDOT and upon prior approval by the WSDOT Engineer and all affected Local Agencies, provided that the requirements for ramp access are satisfied, and provided that the closure is shown on an RFC TTC Plan. Consecutive off-ramps or consecutive on-ramps shall not be closed concurrently unless approved by the WSDOT Engineer.

The Design-Builder shall provide a written ramp closure schedule to the WSDOT Engineer at least 14 Calendar Days in advance of a ramp closure. The schedule shall show the locations and times of all ramp closures and the allowable closure time limits specified in the Contract. A schedule that does not conform to the Contract Time limits, is incomplete, 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 14 Calendar Days in advance will not be approved.

The Design-Builder shall confirm all scheduled closures with the WSDOT Engineer at least 7 Calendar Days prior to the date on which the ramp closure is scheduled. All ramp closures not confirmed as scheduled shall be canceled. Confirmed ramp closures that are canceled for unsuitable weather may be rescheduled for the next allowable day.

The Design-Builder shall provide detour routes for ramp closures and all roadway closures. Detours shall be approved by impacted Local Agencies a minimum of 14 Calendar Days prior to implementing the closure. All detours shall be in place, including all signing, prior to closure of the ramp. If more than one ramp or roadway will be closed at the same time, all detour routes shall be shown on the same plan.

The Design-Builder shall coordinate ramp closures with nearby projects in accordance with Section 2.1, *General Information*, to ensure consecutive ramps or off-ramps are not closed simultaneously or result in conflicting or overlapping detours.

The Design-Builder shall complete all ramp Work within the specified allowable closure times prior to opening the ramps to traffic.

2.22.4.3.3.1 ***Weekend and Nightly Entrance and Exit Ramp Closures***

Table 2.22-8. I-90/SR 18 Interchange – Allowable Nightly Ramp Closures

Ramp	Allowable Closure Hours		Maximum Night Closures Allowed
Eastbound I-90 exit to SR 18	Sunday to Thursday Saturday night to Sunday morning	9:00 p.m. to 5:00 a.m. 9:00 .pm. to 6:00 a.m.	10
SR 18 on-ramp to eastbound I-90	Sunday to Thursday Saturday night to Sunday morning	9:00 p.m. to 5:00 a.m. 9:00 p.m. to 6:00 a.m.	10
Westbound I-90 exit to SR 18	Sunday to Thursday Saturday night to Sunday morning	9:00 p.m. to 5:00 a.m. 9:00 p.m. to 6:00 a.m.	10
SR 18 on-ramp to Westbound I-90	Sunday to Thursday Saturday night to Sunday morning	9:00 p.m. to 5:00 a.m. 9:00 p.m. to 6:00 a.m.	10

Friday night to Saturday morning closures shall not be allowed.

Table 2.22-9. I-90/SR 18 Interchange – Allowable Weekend Ramp Closures

Ramp	Allowable Closure Hours	Maximum Weekend Closures Allowed
Eastbound I-90 exit to SR 18	9:00 p.m. Friday to 5:00 a.m. Monday	1
SR 18 on-ramp to eastbound I-90	9:00 p.m. Friday to 5:00 a.m. Monday	3
WB I-90 exit to SR 18	9:00 p.m. Friday to 5:00 a.m. Monday	3
SR 18 on-ramp to westbound I-90	9:00 p.m. Friday to 5:00 a.m. Monday	1

***

2.22.4.3.4 *Allowable Shoulder Closures*

Shoulder closures will be permitted during the allowable lane closure hours. In addition, temporary shoulder closures will be permitted in accordance with the RFC TTC Plan as follows:

Shoulders that are adjacent to a closed lane shall be closed.

2.22.4.4 Traffic Operations During Construction

The Design-Builder shall notify ***WSDOT Seattle Radio at (206) 440-4490*** when setting up and removing all lane, shoulder, and roadway closures.

The Design-Builder shall use protective vehicles with warning beacons and transportable attenuators (TAs) for protection of Work zones on roadways with a posted speed limit equal to or greater than 45 mph.

2.22.4.4.1 *Mainline During Construction*

Existing shoulders can be used as traveled lane or Work zone truck access in accordance with Section 2.7, *Pavement*.

There may be existing facilities in the existing roadway shoulder which may not be adequate for traveled lane or Work zone truck access operations. These may include, at a minimum, drainage structures, junction boxes, cable and drainage vaults, manholes, pull boxes, and the lids for these facilities. Prior to using an existing shoulder as all or part of the traveled way, the Design-Builder shall inspect all existing facilities within the roadway shoulder which may be used as traveled lane or Work zone truck access and remediate any existing facilities within the roadway shoulder which are not adequate to support sustained traffic. All damaged facilities shall be replaced at the Design-Builder's expense.

Mainline and auxiliary lanes shall be a minimum of ***12 feet*** where adequate room is available.

When shoulders are less than 5 feet wide, construction signs shall be barrier-mounted or placed behind the barrier at an elevated height to ensure visibility from a height of 3 feet from the roadway surface.

Tripod-mounted signs are allowed when shoulders are greater than 5 feet wide.

The Design-Builder shall not clip construction signs. When placement of a sign edge is within 2 feet of the traveled way, the Design-Builder may implement one of the following strategies:

- Use a sign smaller than the typical 48 by 48-inch size (roughly 67 inches wide diagonally).
- Omit the sign and provide additional advance warning at other locations.
- Design special rectangular signs to convey the same message but with a reduced width.

When shoulders are greater than 10 feet wide, the Design-Builder shall place drums at 80-foot spacing, 10 feet from the edge line, supplemented by a minimum of two transverse devices at 500-foot spacing.

The Design-Builder shall provide an 8-foot right shoulder/distress lane, 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.

The Design-Builder shall design any temporary construction or widening to withstand the anticipated traffic volumes and loadings during the applicable stage of the Project.

Mainline general purpose lanes in the same direction of travel shall not be split or separated.

2.22.4.4.1.1 Design Criteria

The design speed for temporary conditions shall not be less than ***the posted speed; however, if the design speed of an existing element at a particular location is less than the posted speed, then the design speed for that element at that particular location may remain the same in the temporary condition, and shall not be less than the existing condition unless approved by the WSDOT Engineer.*** All mainline shifting tapers and lane closure tapers shall be in conformance with standards provided in the latest version of the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*. The design speed for temporary conditions shall not be less than the posted speed. All mainline shifting tapers and lane closure tapers shall use a minimum taper rate of ***posted speed limit to one***.

2.22.4.4.1.2 Temporary Lane Closures

The Design-Builder shall provide written notification to the WSDOT Engineer and all affected Local Agencies a minimum of 7 Calendar Days prior to each closure. Each lane closure shall have one sequential arrow board per closed lane, as part of the traffic control layout. No closures shall be scheduled until the TTC Plans are RFC.

For lane closures longer than 500 feet, the Design-Builder shall use a minimum of two transverse devices in the closed lane at 500-foot spacing.

2.22.4.4.1.3 Law Enforcement

Law enforcement shall be provided for rolling slowdowns, full freeway closures, and to control intersections when traffic signals are temporarily turned off. Law enforcement for the Work zone shall be included in the Proposal Price.

2.22.4.4.1.4 Sequential Arrow Displays

Each vehicle used to place, maintain, or remove components of a traffic control system on multi-lane highways shall be equipped with a sequential arrow display that shall be in operation when the vehicle is in use. Vehicles equipped with sequential arrow displays not involved in placing, maintaining, or removing components when operated within a stationary-type lane closure shall display only the four-corner flash caution mode. The operator of the vehicle shall control the arrow display 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".

2.22.4.4.1.5 Advance Signing

The Design-Builder shall furnish and install ***four*** G24-501 (modified) signs with the Project hotline phone number at the Project limits ***at the following locations:

- one sign in the eastbound direction of SR 18
- one sign in the westbound direction of SR 18
- one sign in the eastbound direction of I-90
- one sign in the westbound direction of I-90 ***.

The signs shall be installed within 30 Calendar Days of the date the Contract is executed, and prior to all other construction activity on the Project. The signs shall remain in place until Physical Completion. Coordination with nearby projects may be required for placement of the signs.

WSDOT will supply the Project identification sign. The Design-Builder shall be responsible for coordination, transportation, and installation of the sign, including supplying the posts for the sign and placards with the Project amount and Design-Builder's name. Refer to the *Project Identification Sign Detail* (Appendix W). These signs shall be located a minimum of 800 feet away from any guide sign and motorist information signs.

The Design-Builder shall pick up the sign at the address below, and shall coordinate the receipt of the Project identification signs by contacting:

***Scott Hammersmith
WSDOT Traffic Maintenance
6431 Corson Ave South
Seattle, WA 98105-3145
Phone: (206) 768-5883***

If it is necessary to relocate advance signing for any reason, the Design-Builder shall be responsible for relocation.

2.22.4.4.2 *Ramps During Construction*

2.22.4.4.2.1 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. 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.

The number of lanes and lane configurations shall equal or exceed the existing configuration. Adequate storage for queuing and throughput volumes at traffic signals and ramp meters shall be maintained. Ramp meters shall not operate with two vehicles per green indication. Lanes shall be a minimum of ***12*** feet wide on entrance and exit ramps. Paved shoulders shall be provided on both sides

of each ramp and shall be a minimum of ***2*** feet wide. Wider ramp widths than these minimums shall be required where necessary to satisfy AASHTO design widths for turning roadways and horizontal stopping sight distances, and to accommodate ***WB-67*** design vehicle tracking. Refer to the WSDOT *Design Manual*. All exit ramp tapers shall use a desirable taper rate of ***20:1***, and a minimum taper rate of ***15:1***.

Turning movements at the ramp terminals shall be designed to accommodate a ***WB-67*** design vehicle.

2.22.4.4.3 *Local Roads During Construction*

The Design-Builder shall maintain the existing local street configuration at all times outside the allowable closures from the Local Agencies, unless otherwise permitted in this Section.

All TTC Plans affecting local roads shall follow the requirements of each Local Agency impacted. The Design-Builder shall be responsible for submitting plans and obtaining approvals from the Local Agencies for each planned closure and detour route. Allowable closure hours for lane and roadway closures on local roads shall be approved by the corresponding Local Agency. The Design-Builder shall coordinate with ***City of Snoqualmie or King County*** regarding concurrent construction work along city cross-streets that may be affected by traffic control for the Project; see *Right of Way Use Permits* (Appendix R), if any.

The Design-Builder shall provide written notice to the WSDOT Engineer and the affected Local Agencies a minimum of 30 Calendar Days prior to restricting local traffic. The Design-Builder shall be responsible for obtaining approval for each planned lane closure from WSDOT and the Local Agencies affected by the Work. The Design-Builder shall be responsible for obtaining all necessary permits from Local Agencies associated with lane closures on local streets. The Design-Builder shall maintain access to all affected businesses and residences during the lane closures.

2.22.4.4.3.1 Design Criteria

The design speed of all local roads during construction shall be the existing posted speed limit. Any reduction from the existing posted speed limit shall be identified in the TMP and requires approval by the corresponding Local Agency.

The existing number of through lanes shall be maintained at all times except as approved by the WSDOT Engineer and the affected Local Agency. All lanes for local roads shall be a minimum of ***12*** feet wide, measured to the front of gutter, unless the existing lane width is less than ***12*** feet, in which case the lane shall not be less than the existing width.

2.22.4.4.3.2 Detours

All detours shall be in place, including all signing, prior to closure of any road. Detours using local roads shall follow traffic control permit requirements for each Local Agency impacted.

Detour signing for interstate/freeway, roadway, or entrance ramp closures shall include specific route shield, cardinal direction, and arrow of appropriate orientation comprised on one sign of either 48” x 48” (posted speeds of 45 mph or greater) or 36” x 36” (below 45 mph) in size.

The Design-Builder shall identify all bus routes, including school bus routes, which may be affected by the detour; and shall coordinate with the bus agency regarding impacts to the schedule and location of the bus stops.

2.22.4.4.4 *Temporary Guardrail, Barrier Attenuators, and Glare Screen*

2.22.4.4.4.1 Vehicle Protection

The Design-Builder shall be responsible for using temporary guardrail, barrier, and attenuators to protect the traveling public from the following:

- Fixed objects within the clear zone
- Drop-offs as required by this Section
- Slopes steeper than 4H:1V (Horizontal:Vertical)

2.22.4.4.4.2 Barrier and Glare Screen

TCB placed along the edge of a bridge structure shall be anchored.

The end of TCB shall not be placed within the clear zone of approaching traffic unless an appropriate attenuator is used. Refer to the WSDOT *Design Manual* for minimum taper rates and additional details.

The Design-Builder shall provide a lateral displacement distance behind all barriers (including TCB) equal to or greater than the longitudinal barrier deflection shown in Exhibit 1610-3 of the WSDOT *Design Manual.* The lateral displacement area shall be kept clear of fixed objects and shall not be used as a Work area.

2.22.4.4.5 *Pedestrian and Bicycle Access During Construction*

The Design-Builder shall maintain existing pedestrian and bicycle access on all sidewalks, transit facilities, and intersections. The Design-Builder shall also maintain safe pedestrian and bicycle access and passage for all pedestrian and bicycle facilities. Pedestrian sidewalks and bike paths shall be maintained and continue to conform to ADA 2005 PROWAG requirements. Occupational safety regulations that apply to the Project limits shall also be considered the minimum standard for personal safety to pedestrians. If Work will be performed over any pedestrian and bicycle routes, temporary lighted covered walkways shall be provided to protect pedestrians and bicyclists from overhead hazards.

When the Design-Builder allows Work areas to encroach upon a sidewalk or crosswalk area and a minimum clear width of 48 inches cannot be maintained for pedestrian use, an alternative accessible pedestrian route shall be provided. Separation of pedestrians from the Work area and vehicular traffic is required.

Protective barricades, fencing, and bridges, together with warning and guidance devices and signs, shall be used so that the passageway for pedestrians is safe, well defined, and accessible. Whenever pedestrian walkways are provided across excavations, they shall be provided with handrails in accordance with ADA requirements. Footbridges shall be designed in accordance with AASHTO LRFD specifications; have a slip-resistant coating; and be free of cracks, holes, and irregularities that could cause tripping. Ramps with and a maximum slope of 8.3 percent shall be provided at the entrance and exit of all raised footbridges. The maximum cross slope shall be 2 percent. When the existing facility is illuminated or MOT and TTC Plans require illumination, illumination shall be provided during the hours of darkness. Retro-reflective delineation, with or without illumination, shall be provided during hours of darkness.

Where accessible pedestrian routes are allowed to be closed by the Design-Builder during construction, an alternate accessible pedestrian route shall be provided that complies with the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, the ADA2005 PROWAG requirements, and this Section. The alternate accessible pedestrian route shall not have abrupt changes in grade or terrain. Barriers and Pedestrian channelizing devices shall be detectable to pedestrians who have visual disabilities and have a handrail meeting 2005 PROWAG requirements. Where it is necessary to divert pedestrians into the roadway, barricading or channelizing devices shall be provided to separate the pedestrian route from the adjacent vehicular traffic lane. Barricading or channelizing devices used to separate pedestrian and vehicular traffic shall be crashworthy and,

when struck by vehicles, present a minimum threat to pedestrians, workers, and occupants of impacting vehicles. At no time shall pedestrians be diverted into a portion of the street used concurrently by moving vehicular traffic.

The Design-Builder shall not park motor vehicles or construction equipment on a pedestrian sidewalk or bike path, or use a pedestrian sidewalk or bike path for loading operations, stockpiling of materials, or allowing demolished or spoil materials to be deposited on the surface of a pedestrian sidewalk or bike path. Any surface of a pedestrian sidewalk or bike path affected by the Work shall be restored to meet ADA requirements prior to re-opening to pedestrian traffic. The trail surface shall be swept or washed free of debris including, at a minimum, mud, gravel, grease, and excavated, spoiled, or stockpiled materials.

Pedestrian and bicycle routes shall not be closed except during full closures of the adjacent roadways. During full closures of the adjacent roadways, a Pedestrian and Bicycle Access Plan shall be implemented with a minimum of 14 Calendar Days advance notice provided to all pedestrians and bicyclists. The Design-Builder shall notify the ***Cascade Bicycle Club and affected Local Agencies*** prior to the close of any bicycle trails. A Pedestrian and Bicycle Access Plan shall not require pedestrians or bicyclists to travel more than 0.25 mile longer than the preconstruction distance. Advance notice shall consist of signs located at the construction limits and all accesses serving the affected area; and public notification in accordance with Section 2.9, *Communications*. All access closures

and Pedestrian and Bicycle Access Plans shall be shown in the MOT and TTC Plans. All detours and Work Sites shall be signed in accordance with the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, the ADA requirements, and this Section. Refer to Chapters 1510 and 1520 of the WSDOT *Design Manual*.

2.22.4.5 Public Convenience and Safety

2.22.4.5.1 *Construction Under Traffic*

The Design-Builder shall conduct all operations with the least possible obstruction and inconvenience to the public. The Design-Builder shall not have under construction a greater length or amount of Work than can be prosecuted properly with due regard to the rights of the public. To the extent possible, the Design-Builder shall finish each section of Work before commencing Work on the next section. The Design-Builder shall enter interstate highways only through legal movements from existing roads, streets, and other access points specifically permitted by the Contract.

In order to minimize public traffic disruption, the Design-Builder shall permit traffic to pass through the Work zone with the least possible inconvenience or delay. The Design-Builder shall maintain existing roads and streets within the Project limits, keeping them open, and in a good, clean, safe condition at all times. Deficiencies caused by the Design-Builder's operations shall be repaired at the Design-Builder's expense. Except where noted in this Section and Section 2.29, *Maintenance During Construction,* deficiencies not caused by the Design-Builder's operations shall be repaired by the Design-Builder, when directed by the WSDOT Engineer, at WSDOT's expense. Pothole damage shall be repaired by the Design-Builder at the Design-Builder's expense. The Design-Builder shall also maintain roads and streets adjacent to the Project limits when affected by the Design-Builder's operations. Snow and ice control will be performed in accordance with Section 2.29, *Maintenance During Construction*. The Design-Builder shall perform the following:

- Remove or repair any condition resulting from the Work that might impede traffic or create a hazard.
- Maintain operation of traffic signals and highway lighting systems as the Work proceeds.
- Maintain the striping on the roadway.
- Maintain existing permanent signing. Sign repairs will be at WSDOT's expense, except those damaged due to the Design-Builder's operations.
- Keep drainage structures clean to allow for free flow of water.

To protect the rights of abutting property owners, the Design-Builder shall perform the following:

- Conduct the construction so that abutting property owners are inconvenienced as little as possible.
- Maintain access to driveways, houses, and buildings within the Project limits.
- Provide temporary approaches to crossing or intersecting roads, and keep these approaches in good condition.
- Provide another access before closing an existing access whenever the Contract calls for removing and replacing an abutting owner's access.

When traffic must pass through grading areas to access private property, the Design-Builder shall perform the following:

- Make cuts and fills that provide a reasonably smooth, even roadbed.
- In advance of other grading Work, place enough fill at all culverts and bridges to permit traffic to cross.
- After rough grading or placement of any subsequent layers, prepare the final roadbed to a smooth, even surface free of humps and dips, suitable for use by public traffic.
- Settle dust with water or other dust palliative.

If grading Work is on or next to a roadway in use, the Design-Builder shall finish the grade immediately after rough grading and place surfacing materials as the Work progresses.

Where planing is performed, live traffic will be allowed to drive on the ground surface for a maximum of 5 Calendar Days before an overlay is required in the planed section.

The Design-Builder shall conduct all operations to minimize any drop-offs (abrupt changes in roadway elevation) left exposed to traffic during non-working hours. Grinding shall not be allowed after the final paving lift is completed. Drop-offs left exposed to traffic during nonworking hours shall be protected as follows:

1. Drop-offs up to 0.20 feet may remain exposed with appropriate warning signs alerting motorists of the condition. The drop-offs shall not remain open for more than 3 Calendar Days.
2. Drop-offs more than 0.20 feet that are in the traveled way or auxiliary lane will not be allowed unless protected with appropriate warning signs and further protected as indicated in 3b or 3c below.
3. Drop-offs more than 0.20 feet, but no more than 0.50 feet, that are not within the traveled way or auxiliary lanes shall be protected with appropriate warning signs and further protected by using one of the following:
    a. A wedge of compacted stable material placed at a slope of 4H:1V or flatter.

b. Channelizing devices (Type I barricades, plastic safety drums, or other devices 36 inches or more in height) placed along the traffic side of the drop-off and a new edge of pavement stripes placed a minimum of 3 feet from the drop-off. The maximum spacing between the devices in feet shall be the posted speed in mph. Pavement drop-off warning signs shall be placed in advance and throughout the drop-off treatment.

c. TCB or other approved barrier installed on the traffic side of the drop-off with 2 feet between the drop-off and the back of the barrier, and a new edge of pavement stripes a minimum of 2 feet from the face of the barrier. An approved terminal, flare, or impact attenuator shall be required at the beginning of the section. For night use, the barrier shall have standard delineation such as paint, reflective tape, lane markers, or warning lights.

4. Drop-offs more than 0.50 feet not within the traveled way or auxiliary lane shall be protected with appropriate warning signs and further protected as indicated in 3a, 3b, or 3c above, if all of the following conditions are met:

   a. The drop-off is less than 2 feet.

   b. The total length throughout the Project is less than 1 mile.

   c. The drop-off does not remain for more than 3 Calendar Days.

   d. The drop-off is not present on any holiday or holiday weekend described in this Section.

   e. The drop-off is only on one side of the roadway.

5. Drop-offs more than 0.50 feet that are not within the traveled way or auxiliary lane and are not otherwise accounted for by No. 4 above, shall be protected with appropriate warning signs, and further protected as indicated in 3a or 3c above.

6. No saw cuts or open trenches across mainline or ramps will be allowed, unless approved by the WSDOT Engineer.

2.22.4.5.2 *Work Zone Clear Zone*

The Work Zone Clear Zone (WZCZ) applies during working and non-working hours. Equipment or materials shall not be within the WZCZ unless it is protected by permanent guardrail or TCB.

During actual hours of active construction Work, unless protected as described above, only materials absolutely necessary for construction shall be allowed within the WZCZ; and only construction vehicles absolutely necessary for construction shall be allowed within the WZCZ or allowed to stop or park on the shoulder of the roadway. No equipment shall be stored within the WZCZ between shifts of active construction Work.

The Design-Builder's nonessential vehicles and employee's private vehicles shall not be permitted to park within the WZCZ at any time, unless protected as described above.

The WZCZ applies only to roadside objects introduced by the Design-Builder's operations, and is not intended to resolve preexisting deficiencies in the Design Clear Zone or clear zone values established at the Completion of the Project. Work operations or objects that are actively in progress and delineated by approved traffic control measures are not subject to the WZCZ requirements.

Minimum WZCZ distances are measured from the edge of the traveled way, and shall be determined as follows:

Table 2-22.10 Minimum Work Zone Clear Zone Distance

Posted Speed	Distance From Traveled Way (Feet)
35 mph or less	10
40 mph	15
45 to 50 mph	20
55 to 60 mph	30
65 mph or greater	35

Construction vehicles using a closed traffic lane shall travel only in the normal direction of traffic flow, unless expressly allowed in the RFC TTC Plans. Construction vehicles shall be equipped with flashing or rotating amber lights.

Work over an open lane of traffic shall not be allowed, unless a plan for the protection of the traveling public from debris falling onto the traveled way is approved by the Engineer of Record. This protection shall remain in place during construction, and shall meet minimum vertical clearance for the highway.

2.22.4.5.2.1 Controlled Access

The Design-Builder shall not be allowed any special access, egress, including leaving the roadway shoulder to enter the Work area, or breaks in limited access, other than normal legal movements or movements as approved by the WSDOT Engineer. The Design-Builder shall be allowed short-duration shoulder stops in the Work area, using light vehicles properly equipped with amber warning lights.

All ingress and egress to the Work area shall be shown on Site-specific TTC Plans. The Design-Builder shall provide appropriate warning signs and traffic control devices when vehicles will be departing or entering highway and city streets. Ingress and egress to the Work area shall not be located at a gore.

The Design-Builder shall close a lane of traffic in locations where the length and width of the shoulder is not adequate for construction vehicles to decelerate from departing the mainline traffic to enter the Work area or to accelerate from exiting

the Work area to merge with the mainline traffic. The design speed for departing and merging into a mainline shall not be less than 10 mph below the design speed of the mainline. Access for large construction vehicles to and from an open lane, meeting the criteria above, shall only be between the hours of 9:00 a.m. and 3:00 p.m. daily, and during the lane closure hours described in this Section. Light vehicles properly equipped with amber warning lights shall be allowed access to the Work area to and from an open lane, meeting the criteria above, at all times.

Lane closures and ingress and egress to the Work area shall be restricted to the hours described in this Section, unless otherwise approved by the WSDOT Engineer.

Access to the Work area from adjacent properties outside of the Right of Way shall be in accordance with Section 1-07.16(1) of the *General Provisions*.

For an approved break in limited access, the Design-Builder shall prohibit unauthorized use of the access from adjacent property. Access from outside the limited access lines shall be closed by use of a locked gate when the access point is not being used.

The access location shall not adversely affect wetlands or other sensitive areas. Airborne particulates created as a result of using the access shall be effectively controlled. The continuity of the existing drainage system shall be maintained throughout the access Site.

At the Completion of the Project, the Design-Builder shall restore the area of the access Site to its original, pre-Contract, condition. Any damage to the traveled way, shoulders, auxiliary lanes, side slopes or other areas caused by the access shall be repaired. All Work to comply with this provision or to build, maintain, provide erosion control, control airborne particulates, ensure that drainage continues throughout the access Site, provide traffic control when necessary, remove the temporary access, and restore the surrounding area when no longer required for use is the responsibility of the Design-Builder. The Design-Builder shall include all related costs in the Proposal Price of the Contract.

2.22.4.5.2.2 Work During Hours of Darkness

Work during hours of darkness 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 station illumination shall meet the requirements of the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways* and these Technical Requirements. The Design-Builder shall provide portable lighting equipment capable of sufficiently illuminating a flagger and their station without creating glare for oncoming motorists, yet will meet the mobility requirements of the operation. The lighting stations shall be located on the same side of the roadway as the flagger and aimed either parallel or perpendicular to the traveled lanes to minimize glare. The lighting devices shall be located 5 to 10 feet from the edge of

the travel lane with a mounting height of 15 to 25 feet above the ground. The flagger shall be visible and discernable as a flagger from a distance of 1,000 feet.

Lighting for construction activity shall be directed away from maintained traffic to minimize glare to motorists.

Refer to this Section and Section 1-07 of the *General Provisions* for additional requirements.

2.22.4.5.2.3 Signs and Traffic Control Devices

All signs and traffic control devices for lane and roadway closures shall be installed only during the hours specified in this Section. If placed earlier than the specified hours of closure, the construction signs shall be turned or covered so as not to be visible to motorists.

2.22.4.5.2.4 Advance Notification

The Design-Builder shall submit TTC Plans for lane and shoulder closure requests in writing to the WSDOT Engineer 14 Calendar Days in advance of the proposed closure.

2.22.4.5.2.5 Hour Adjustment

If the permitted closure hours adversely affect traffic, causing queues that extend beyond ***1*** mile or delay traffic for longer than ***15*** minutes for any lane or total roadway closure, the Design-Builder shall evaluate the Contract hours and recommend new hours to the WSDOT Engineer for Review and Comment.

2.22.4.5.2.6 Public Notification

The Design-Builder shall furnish and install information signs that provide advance notification of ramp and roadway closures a minimum of 7 Calendar Days prior to the scheduled 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 TTC Plans. For ramp and local road closures, PCMS shall be used to supplement the required signs. The Design-Builder shall notify the WSP, local fire departments, police departments, city engineering departments, public transit agencies, and the affected school districts in writing a minimum of 7 Calendar Days prior to scheduled closures. The Design-Builder shall provide these notifications to WSDOT.

2.22.4.5.2.7 Mast Arm Erection and Traffic Block Allowance

During erection of mast arm assemblies, the Design-Builder may, with the prior authorization from the WSDOT Engineer, block all traffic for intervals of a maximum of 5 minutes between midnight and 4:00 a.m. These 5-minute blockages shall be separated by an interval long enough to allow the delayed vehicles to clear.

2.22.4.5.3 *Construction and Maintenance of Detours*

Unless otherwise approved, the Design-Builder shall maintain two-way traffic during construction. The Design-Builder shall build, maintain in a safe condition, keep open to traffic, and remove when no longer needed, the following:

- Detours and detour bridges that will accommodate traffic diverted from the roadway or bridge during construction
- Detour crossings of intersecting highways
- Temporary approaches

The Design-Builder shall pay all costs to build, maintain, and remove any other detours, whether built for the Design-Builder's convenience or to facilitate construction operations. Any detour proposed by the Design-Builder shall conform to the requirements of the Contract. Surfacing and paving shall be consistent with traffic requirements.

Upon failure of the Design-Builder to immediately provide, maintain, or remove detours or detour bridges, the WSDOT Engineer may, without further notice to the Design-Builder or the Surety, perform any of the above and deduct all of the costs from any payments due or coming due to the Design-Builder.

2.22.4.6 Construction Requirements

2.22.4.6.1 *General*

The Design-Builder shall plan, manage, supervise, and perform all temporary traffic control activities required to support the Work using labor, equipment, and materials provided by the Design-Builder (except when such labor, equipment, or materials are to be provided by WSDOT specifically identified herein).

The Design-Builder shall be responsible for all MOT starting at 12:01 a.m. on the day following Notice to Proceed (NTP). The temporary traffic control devices, including temporary signal systems, shall 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 Completion of the Project. The WSDOT Engineer may, in writing, temporarily suspend such responsibility in conjunction with an official suspension for weather or other reasons.

2.22.4.6.2 *Materials*

All materials shall meet the requirements of Section 9-35 of the Standard Specifications. Additionally, all materials shall conform to the requirements of the Special Provisions.

2.22.4.6.3 *Traffic Control During Construction*

The Design-Builder shall provide flaggers and all other personnel required for traffic control activities, unless specified in the Contract as being provided by WSDOT.

The Design-Builder shall perform all procedures necessary to support the Work.

The Design-Builder shall provide signs and other traffic control devices not otherwise specified in the Contract as being provided 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, the Design-Builder's employees, and WSDOT 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 the RFC TTC Plans.

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 requested to do so by the WSDOT Engineer, the WSDOT Engineer may, without further notice to the Design-Builder or the Surety, perform any of the above and deduct all of the costs from any payments due or coming due to the Design-Builder.

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 the WSDOT Engineer, provided by the WSDOT Engineer, or paid for by WSDOT.

When performing 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 backing up through the Work area. When located behind barrier or at other locations shown on RFC TTC Plans, equipment may operate in a direction opposite to adjacent traffic.

Under the Contract, the Design-Builder is responsible for all traffic control, and any such participation by law enforcement personnel in traffic control activities shall be preceded by an agreement. Nothing in the Contract is intended to create an entitlement, on the part of the Design-Builder, to the services or participation of the law enforcement organization.

2.22.4.6.4 *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 signs. Every detour route shall be driven hourly 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 ensure there are no conflicting or misleading signs due to adjacent projects. The Design-Builder shall coordinate with adjacent projects and relocate signs as required to avoid conflicting information. Temporary pavement markings shall be installed in accordance with Sections 8-23 and 9-34 of the Standard Specifications.

The Design-Builder shall ensure temporary pavement markings do not conflict with existing pavement markings including recessed and raised markings. If a conflict occurs with existing recessed pavement markings the Design-Builder shall remove the recessed pavement markings by filling the recess with hot mix asphalt for prelevel in accordance with Section 5-04 of the Standard Specifications.

The Design-Builder shall use temporary removable tape for temporary pavement marking configurations in areas that will not be ground or overlaid. Refer to Section 2.20, *Pavement Marking,* for tape specification. Temporary pavement markings shall be identified on the TTC Plans and the TMP. If paint or temporary removable tape is used for temporary markings that will remain in place for 48 hours or longer, the markings shall be supplemented with Type 2 Raised Pavement Marker (RPM) installed at 40-foot spacing and in accordance with Standard Plan M-20.30. In areas where Type 2 RPM are used to supplement temporary removable tape, the adhesive for the Type 2 RPM shall be butyl rubber. The Design-Builder shall follow all manufacturers' preparation and application procedures for this product. In areas that will be ground or overlaid, Standard Plan M-20.50 shall be used for striping configurations lasting more than 30 Calendar Days.

The Design-Builder shall not use a grinder to remove painted markings. For removal of plastic markings, grinding will be allowed down to the pavement surface.

Sand or other material deposited on the pavement surface as a result of removing pavement markings shall be removed as the Work progresses to avoid hazardous conditions. Accumulation of sand or other material which might interfere with drainage will not be permitted. Temporary paint on the final pavement surface shall be placed only in the final pavement marking configuration.

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 time frames 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 markings within 24 hours.

The Design-Builder shall clean or replace all pavement markings when they become damaged or lose reflectivity.

The Design-Builder shall replace or clean temporary pavement markings whenever the reflectance of the markings has deteriorated to less than 100 mcd/m^2/lux. The Design-Builder shall perform the required tests monthly, at 1-mile intervals or at specific locations requested by the WSDOT Engineer.

As each construction phase is completed, the Design-Builder shall install the final signing and pavement markings required to safely open the road to traffic. This Work shall be completed on or before the date of opening. Overhead signs except exit only signs may be temporarily ground-mounted at the Design-Builder's expense.

The Design-Builder shall have adequate spare sections of temporary barrier and the necessary equipment on-site to replace and repair temporary barrier within 4 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 vehicle safety.

2.22.4.6.5 *Temporary Signalization*

This Section applies to new temporary signals necessary for detour routes or other construction staging, if any. Any modifications to existing traffic signals must be shown in the TTC Plans and approved by the operating agency. Modifications proposed for signal timing or staging shall be coordinated with and approved by the operating agency. A traffic signal warrant analysis may be required for approval.

2.22.4.6.5.1 Temporary Signal 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 induction loops or video image detection for temporary signal installations.

2.22.4.6.5.2 WSDOT Inspection

The Design-Builder shall provide a minimum of 7 Calendar Days' notice to the WSDOT Engineer prior to implementing temporary signalization. The WSDOT Engineer will perform the final electrical inspection and acceptance of temporary signal systems in accordance with WAC 296-46B. When signals are owned and operated by other Local Agencies, the Design-Builder shall follow that jurisdiction's requirements.

2.22.4.6.5.3 Signal Turn-On

The Design-Builder shall secure and pay for the services of a law enforcement agency to perform traffic control while the traffic signal is being placed into service. Appropriate signing shall be installed by the Design-Builder in advance of signal turn-on. The Design-Builder shall request a timeframe for signal turn-on from the WSDOT Engineer. The request for the signal turn-on shall be submitted 14 days in advance for the desired date, and approval by the WSDOT Engineer shall be obtained at least seven days prior to actual turn-on date. ***See the WSDOT *Traffic Signal Turn-on Checklist* (Appendix T) for additional requirements.***

2.22.4.6.5.4 Operation and Maintenance

The Design-Builder shall develop Timing Plans and staging for the temporary signal operation. WSDOT or the operating agency 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 the approval of the WSDOT Engineer or the operating agency.

WSDOT or the operating agency will operate and maintain the temporary signal systems once the signal is turned on and operational. The Design-Builder shall remove all temporary signal systems upon completion and operation of the new permanent signal systems.

2.22.4.6.6 *Temporary Illumination*

The Design-Builder shall evaluate the lighting values of the existing illumination in relation to the temporary configuration to determine if the existing illumination provides the required illumination values. If the required illumination values are not satisfied, the Design-Builder shall provide temporary illumination satisfying the “construction lanes and detours” light level and uniformity ratios in accordance with the WSDOT *Design Manual*.

Where temporary illumination is required, the existing illumination system shall not be removed until the temporary system is operational. Only lighting equipment no longer needed for illumination of the roadway shall be removed.

The Design-Builder shall provide temporary lighting satisfying the “construction lanes and detours” light level and uniformity ratios when existing lighting must be removed or disconnected, and new lighting is not in operation.

The Design-Builder shall provide temporary lighting for all intersections where traffic control devices are in place. The temporary lighting shall satisfy the greater of the “construction lanes and detours” or the specific intersection light level and uniformity ratios.

Temporary lighting is required when an obstruction (such as a new bridge) is placed over an area requiring illumination, and shall be installed prior to placing the obstruction.

The Design-Builder shall provide temporary lighting satisfying the "construction lanes and detours" light level.

In addition to the requirements of the WSDOT *Design Manual*, the Design-Builder shall provide temporary lighting satisfying the "construction lanes and detours" light level and uniformity ratios for temporary channelization or traffic control.

Portable light stands shall not be used for temporary roadway lighting.

The Design-Builder shall provide temporary illumination satisfying the "required illumination" described in the WSDOT *Design Manual*. Temporary illumination shall be in place and in operation prior to implementing the TTC Plans which require the temporary illumination.

See Section 2.16, *Illumination*, for additional requirements.

2.22.4.6.6.1 General

At a minimum, the Design-Builder shall perform the following:

- Design Temporary Lighting Plans.
- Maintain current levels of roadway illumination for all roadway segments and intersections 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. Any damage to the existing illumination system shall be repaired prior to hours of darkness on the following day.

Temporary illumination shall be provided in accordance with the requirements for construction lanes and detours in the WSDOT *Design Manual*.

2.22.4.6.6.2 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.

2.22.4.7 Traffic Control Personnel

The Design-Builder shall plan, conduct, and safely perform the Work. The Design-Builder shall manage temporary traffic control.

The Design-Builder shall provide all personnel for flagging; spotting; execution of all procedures related to temporary traffic control; and setup, maintenance, and removal of all temporary traffic control devices and construction signs necessary to control traffic during construction operations.

2.22.4.7.1 *Traffic Control Management*

One or more of the Design-Builder's supervisors, who are actively involved in the planning and management of field contract activities, shall assume the responsibilities for traffic control management. The Design-Builder shall provide the WSDOT Engineer with a copy of the formal assignment. The duties of traffic control management shall not be Subcontracted.

The Design-Builder's traffic control management personnel shall be responsible for the following:

- Overseeing and approving the actions of the TCS to ensure that proper safety and traffic control measures are implemented and consistent with the specific requirements of the Project. An alternate form of oversight shall be in place and effective when the traffic control management personnel are not present at the Work area.
- Providing the Design-Builder's designated TCS with RFC TTC Plans which are compatible with the Work and traffic control for which they will be implemented.
- Having the latest adopted edition of the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*, the *Washington State Modifications to the Manual on Uniform Traffic Control Devices*, and applicable standards and specifications available at all times on the Project.
- Discussing proposed traffic control measures and coordinating implementation of the TTC Plans with the WSDOT Engineer.
- 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.
- Coordination, review, and retention of video log and storage.

Failure to carry out any of the above-referenced responsibilities shall be considered a failure to comply with the Contract and may result in a suspension of Work as described in Section 1-08 of the *General Provisions*.

2.22.4.7.2 *Traffic Control Supervisor*

The Design-Builder shall designate one or more people to perform the duties of the primary TCS, and 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 the RFC TTC Plans.

TCS shall have at least 5 years of practical TTC experience with design, implementation of traffic control on freeway construction projects, or both.

The TCS shall be certified as a Work Site Traffic Control Supervisor by one of the following agencies:

The Northwest Laborers-Employers Training Trust
27055 Ohio Avenue
Kingston, WA 98346
360-297-3035

Evergreen Safety Council
12545 135th Avenue NE
Kirkland, WA 98034
(800) 521-0778 or 425-814-3868

American Traffic Safety Services Association
15 Riverside Parkway
Suite 100
Fredericksburg, VA 22406
(800) 272-8772 or 540-368-1701

Possession of a current flagging card by the TCS is mandatory.

A TCS shall be present on the Project whenever flagging, spotting, or other traffic control is occurring; or less frequently, as authorized by the WSDOT Engineer.

During nonworking hours, the TCS shall be on-site within 45 minutes after notification by the WSDOT Engineer.

The TCS shall perform all of the duties listed below:

- Possess a current set of RFC TTC Plans; applicable Contract Provisions as provided by the Design-Builder; the *Washington State Modifications to the Manual on Uniform Traffic Control Devices;* the *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways*; the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*; and applicable standards and specifications.
- Inspect 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 may be inspected only twice a week. Traffic control devices left in place for 24 hours or more shall also be inspected once during 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.

- Prepare a daily traffic control diary on each day that traffic control is performed using WSDOT Form 421-040A EF, *Contractor's Daily Report of Traffic Control - Summary* and WSDOT Form 421-040B EF *Contactor's Daily Report of Traffic Control – Traffic Control Log*. The Design-Builder shall maintain all copies of the daily traffic control diaries and shall make them available to the WSDOT Engineer no later than the end of the next business day. The Design-Builder may use alternate forms if approved by the WSDOT Engineer. Diary entries shall include, at a minimum, the following:
    - 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 TTC Plans
    - Lighting used at night
    - Observations of traffic conditions
    - Identify TTC Plans in use and provide location on the Project where TTC Plans are used
- Make minor revisions to the TTC Plans to accommodate Site conditions and minimize obstructions, provided that the original intent of the TTC Plans is maintained. The revisions shall only shift devices laterally without adding or deleting devices and shall be documented in the daily traffic control diary. The TTC Plans shall be revised and re-released when determined necessary by the WTEM.
- Attend traffic control coordination meetings or coordination activities, including meetings and activities for adjacent projects, as necessary, for a complete understanding of the Project and effective performance.
- Ensure that all required traffic control devices and equipment are available and in good working condition prior to the need to install or use them.
- Ensuring that all pedestrian routes or access points, existing or temporary, are kept clear and free of obstructions and that all temporary pedestrian routes or access points are detectable and accessible to persons with disabilities as provided for in the approved plans.

Provided that the duties of the TCS are accomplished, the TCS may perform other duties described in this Section.

The TCS shall be considered a critical component of the Design-Builder's management team, and shall have prior experience managing TTC operations on similarly complex projects. Registration as a Licensed Professional Engineer is not required; however, the Design-Builder may elect to use the WTEM in this

position. The TCS shall attend all MOT task force meetings. The TCS shall also coordinate activities with the Communications Specialist.

The TCS or a designee shall be available on a 24-hour basis with a single contact phone number throughout the duration of the Project; supervise and verify all changes in the TTC setup; and perform daily Project Reviews to verify that TTC devices are correctly placed and traffic is safely and efficiently moving through the Project. The TCS or an alternate TCS shall be on-site within ***45 minutes*** of notification of an emergency situation, and shall be prepared to positively respond to the need to repair the traffic control system 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 de-mobilize any construction operation that is resulting in excessive delays to traffic or creating an unsafe condition.

The TCS shall maintain a 30 Calendar 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 Communications Specialist to ensure the information is disseminated to WSDOT, Local Agencies, and the public.

The TCS shall perform drive-through inspections as indicated above and immediately after any shift in TTC setup, while crews are still on-site to make modifications. If the Project has signalized intersections, the review shall be done prior to each morning peak traffic period, and each signal cycle shall be reviewed. At least two of the daily inspections each week shall be performed at night so that the arrangement and condition of the lights can be reviewed. The inspections shall also include assurances that bicyclists have a safe travel path around or through the Project area, and that existing ***forest road and gate locations***have adequate access during ***construction***, 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's personnel who have been directed to provide the maintenance or corrective action. The daily report shall state that the TTC setup and all traffic control devices substantially conform to the Contract requirements, except as noted, and shall be signed by the TCS.

2.22.4.7.3 *Flaggers*

Workers engaged as flaggers shall wear reflective vests and hard hats. High-visibility apparel shall be in accordance with Section 1-07 of the *General Provisions*.

Flaggers shall be posted where shown on the RFC TTC Plans. All flaggers shall possess a current flagging card issued by the states of Washington, Oregon, Montana, or Idaho. The flagging card shall be immediately available and shown to the WSDOT Engineer upon request.

Flagging stations shall be shown on TTC 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 ensures that flaggers can be seen easily, but that does not cause glare to the traveling public. Flagger Station illumination shall meet the requirements of *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways* and this Section. 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 (e.g., foremen and superintendents).

The Design-Builder shall provide portable lighting equipment capable of sufficiently illuminating a flagger and their station without creating glare for oncoming motorists, yet will meet the mobility requirements of the operation. The lighting stations shall be located on the same side of the roadway as the flagger and aimed either parallel or perpendicular to the traveled lanes to minimize glare. The lighting devices shall be located 5 to 10 feet from the edge of the travel lane with a mounting height of 15 to 25 feet above the ground. The flagger shall be visible and discernable as a flagger from a distance of 1,000 feet.

The Design-Builder shall provide the standard stop/slow paddles for all flagging operations. Stop/slow paddles shall conform to the Standard Specifications.

No flaggers shall be used on freeways.

2.22.4.7.4 *WSDOT Electrical Inspector*

The Washington State Department of Labor and Industries has authority over all electrical installations within the State. WSDOT has been granted authority over all electrical installations within the Right of Way of State highways, provided WSDOT maintains and enforces an equal, higher, or better standard of construction, materials, devices, appliances, and equipment than is required by Applicable Laws. It is the role of the WSDOT Electrical Inspector to ensure that all electrical installations, including Illumination, Traffic Signal, and ITS installations, meet the requirements of the National Electrical Code and Applicable Laws and provisions.

The WSDOT Electrical Inspector will perform the following:

- Act as a resource for the electrical design team
- Assist with electrical system plan reviews (as applicable)
- Perform periodic electrical inspections during construction
- Witness required field tests (as desired)
- Perform inspections required before energizing any new equipment or circuits

- Inspect and approve all electrical installations in accordance with this Contract

2.22.4.7.5 *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 personnel to install, maintain, and remove any traffic control devices shown on the TTC Plans.

2.22.4.8 Video Record

A drive-through video of all TTC devices shall be made each week; immediately after each accident causing injuries and after each shift in TTC setup. The video recordings shall be saved digitally and maintained in a remote, fireproof location, and a log of the video recordings with dates and times shall be provided to the WSDOT Engineer on a monthly basis. The WSDOT Engineer shall have the right to review the video recordings at any time with 24 hours' notice to the Design-Builder.

2.22.4.9 Traffic Control Procedures

2.22.4.9.1 *One-Way Traffic Control*

The Work may require that traffic be maintained on a portion of the roadway using one-way traffic control. If this is the case, the Design-Builder's operation shall be confined to one-half of the roadway, permitting traffic on the other half. If shown on the RFC TTC Plans or as directed by WSDOT one-way traffic control 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.

At the end of each Calendar Day the Design-Builder shall 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 the WSDOT Engineer, one-way traffic control cannot be dispensed with after working hours, then the operation shall be continued throughout the nonworking hours.

2.22.4.9.2 *Rolling Slowdown*

When a short-term roadway closure of 15 minutes or less is needed for an infrequent, nonrepetitive Work operation such as traffic signal erection or utility

wire crossing, the Design-Builder may implement a rolling slowdown on a multi-lane roadway, as part of an RFC TTC Plan. Rolling slowdown traffic control operations shall not be used for routine Work that can be addressed by standard lane or shoulder closure traffic control. ***Rolling slowdowns on I-90 will be permitted between 12:00 a.m. and 4:00 a.m. on Monday through Friday***. Rolling slowdowns will not be permitted to set girders.

Where included in the RFC TTC Plans, 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 Design-Builder shall provide and pay for a minimum of two WSP officers per direction, for mainline rolling slowdowns. 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 complete stoppage of traffic.

A PCMS 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 begin the slowdown and the speed at which the moving blockade is allowed to travel shall be calculated by the Design- Builder to accommodate the estimated time needed for closure. The chase control vehicle shall follow the slowest vehicle ahead of the blockade. The Design-Builder shall not begin the Work operation until the chase vehicle passes the Work area. In the event that the Work operation is not completed when the moving blockade reaches the site, all Work, except the Work necessary to clear the roadway, shall cease immediately, and the roadway shall be cleared and re-opened as soon as possible.

All ramps and entrances to the roadway between the moving blockade and the Work operation shall be temporarily closed using construction vehicles. 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.

If more than one rolling slowdown occurs during the same period, the Design-Builder shall ensure that any queues originating from previous rolling slowdowns have fully dissipated.

2.22.4.9.3 *Lane Closure Setup/Takedown*

Where allowed by the Contract and where shown on the RFC TTC Plans or as directed by WSDOT, the Design-Builder shall establish traffic control measures to close one or more lanes of a multi-lane facility. When this is scheduled to occur, the Design-Builder shall adhere to the following sequence:

- Set up advance warning signs on the shoulder of the roadway opposite the lane to be closed.

- Set up advance warning signs on the same shoulder as the lane to be closed.
- Move a TA with arrow board into place at the beginning of the closure taper.
- Place channelization devices to mark the taper and the length of the closure as shown on the TTC Plans.
- Once the lane is closed, the TA/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 TA 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.

2.22.4.9.4 *Patrol and Maintain Traffic Control Measures*

When temporary traffic control measures are in place, the Design-Builder shall patrol and maintain these measures, at all times. The Work shall consist of resetting displaced 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 quantity and 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 TCS. 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 Calendar Day.

2.22.4.10 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 an increased potential for accidents.

All traffic control devices shall be removed from the Work Zone Clear Zone or placed behind barrier or guardrail away from traffic when not in use. Traffic safety drums, traffic cones, tubular markers or tall channelizing devices may remain in the Work Zone Clear Zone if they can be placed off the paved shoulder.

The Design-Builder shall locate traffic control devices so as not to block the existing sidewalk to pedestrians, and to provide adequate space for wheelchairs.

2.22.4.10.1 *Construction Signs*

All construction signs required by the RFC TTC Plans, as well as any other appropriate signs directed by the WSDOT Engineer, shall be provided 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 they are no longer required. Post-mounted signs shall be installed as shown in the Standard Plans. Sign attachment to posts shall conform to the applicable detail shown in the Standard Plans. When the construction signs are no longer required, the Design-Builder 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 where striping is anticipated to be destroyed by construction operations shall be replaced by “Do Not Pass” and “Pass With Care” signs. The Design-Builder shall furnish and install the signs and posts. The signs shall be maintained by the Design-Builder until they are removed, or upon Physical Completion. 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 re-established by striping. The signs and posts shall become the property of the Design-Builder.

All existing signs, new permanent signs installed as part of the Work, and construction signs installed as part of the Work that are inappropriate for the traffic configuration at a given time, shall be removed or covered in accordance with Section 8-21.3(3) of the Standard Specification. 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 RFC TTC Plans. “Do Not Pass” and “Pass With Care” signs are Class A construction signs. Sign and support installation for Class A signs shall be in accordance with the Contract 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 1 to 3 Calendar Days. They are mounted on portable or temporary mountings.

Class A construction signs mounted behind traffic barrels shall be mounted a minimum of 5 feet above the ground (ground to bottom of sign).

Where it is necessary to add weight to signs for stability, the Design-Builder shall follow the manufacturer’s recommendations for sign ballasting.

Signs, posts, or supports that are lost, stolen, damaged, destroyed, or which the WSDOT Engineer deems to be unacceptable while used on the Project, shall be replaced by the Design-Builder.

2.22.4.10.2 *Sequential Arrow Signs*

Sequential arrow signs shall be shown on the TTC Plans either as a stand-alone unit without a TA or as a unit with a TA. When required, and as shown on the TTC Plans, the Design-Builder shall provide, operate and maintain sequential arrow signs.

2.22.4.10.3 *Portable Changeable Message Signs*

Where shown on the RFC TTC Plans or when requested by the WSDOT Engineer, the Design-Builder shall provide, operate, and maintain PCMS. The Design-Builder shall provide a minimum of four PCMS available for use throughout the duration of the Project, and shall provide additional PCMS as required.

2.22.4.10.4 *Barricades*

Where shown on the RFC TTC Plans or when requested by the WSDOT Engineer, the Design-Builder shall furnish, install, and maintain barricades. Barricades shall be kept in acceptable condition, as defined in the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*.

Where it is necessary to add weight to barricades for stability, the Design-Builder shall follow the manufacturer's recommendations for sign ballasting.

2.22.4.10.5 *Traffic Safety Drums*

Where shown on the RFC TTC Plans, or when requested by the WSDOT Engineer, the Design-Builder shall furnish, install, and maintain traffic safety drums.

The Design-Builder shall use wide angle prismatic retroreflective sheeting as specified in this Section or Type C steady-burning warning lights and Type III or Type IV reflective sheeting as described in Section 9-28.12 of the Standard Specifications. All traffic safety drums shall be the same type and shall be in accordance with Section 9-35.7 of the Standard Specifications with the exception that retroreflective bands fabricated from prismatic retroreflective sheeting is also permitted as noted below.

Used traffic safety drums may be utilized, provided all drums used on the Project are of essentially the same configuration and in acceptable condition, as defined in the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*. Used traffic safety drums shall meet the requirements of this Section.

Traffic safety drums shall be designed to resist overturning by means of a weighted lower unit that shall separate from the drum when impacted by a vehicle.

Traffic safety drums shall be regularly maintained to ensure that they are clean and that the drum and reflective material are in good condition. When a drum has been damaged beyond usefulness, or provides inadequate reflectivity, a replacement drum shall be provided by the Design-Builder at no cost to WSDOT.

When the traffic safety drums are no longer required, they shall be removed from the Project and shall remain the property of the Design-Builder.

2.22.4.10.6 *Traffic Cones*

Where shown on the RFC TTC Plan, or when requested by the WSDOT Engineer, the Design-Builder shall furnish, install, and maintain traffic cones. The Design-Builder shall not use traffic cones on State highways nor interstates. Traffic cones shall be kept in good repair, and shall be removed immediately when directed by the WSDOT Engineer. Where wind or moving traffic frequently displaces cones, an effective method of stabilizing cones, such as stacking two together at each location, shall be employed.

2.22.4.10.7 *Tubular Markers and Tall Channelizing Devices*

The Design-Builder shall not use tubular markers or tall channelizing devices on State highways nor interstates for temporary lane closures or temporary channelization, unless specifically requested in writing by the Design-Builder and approved by the WSDOT Engineer.

***The Design-Builder may use tubular markers or tall channelization devices on SR 18 at the I-90/SR 18 interchange for temporary channelization through the ramp intersections.

Tubular markers and tall channelizing devices shall be kept in good repair and shall be removed immediately when directed by the WSDOT Engineer. Tubular markers, which are secondary devices, are not to be used as substitutes for cones or other delineation devices without an approved Traffic Control Plan.

Where the Traffic Control 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 the WSDOT Engineer. 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.***

2.22.4.10.8 *Warning Lights and Flashers*

The Design-Builder shall provide and maintain Type C steady-burning lights attached to all traffic safety drums used for lane closures or shifting tapers during hours of darkness in accordance with Sections 9-35.7 and 9-35.11 of the Standard Specifications.

2.22.4.10.9 *Wide Angle Prismatic Retroreflective Sheeting*

The Design-builder shall provide and maintain orange traffic safety drums with two white and two fluorescent orange 6-inch wide bands of wide angle prismatic retroreflective sheeting as specified below.

The wide angle prismatic retroreflective sheeting is sheeting with optimized performance at traditional observation angles and with extended entrance angle performance. The fluorescent orange sheeting shall be a visible activated

fluorescent retroreflector providing higher daytime brightness than ordinary colored sheeting's of similar chromaticity. The white sheeting shall be a high brightness retroreflector providing higher brightness than non-prismatic sheeting's of similar chromaticity.

The retroreflector sheeting shall have a smooth surface with a distinctive interlocking diamond seal pattern visible from the face. The sheeting shall be precoated with a pressure sensitive adhesive backing protected by a removable liner.

2.22.4.10.9.1 Test Methods

Test Conditions: Unless otherwise specified herein, all applied and unapplied test samples and specimens shall be conditioned at the standard condition of 73°F (plus or minus 3°F) and 50 percent relative humidity (plus or minus 5 percent) for 24 hours prior to testing.

Test Panels: Unless otherwise specified herein, when tests are to be performed using test panels, the specimens of retroreflective material shall be applied on smooth aluminum cut from ASTM B-209 Alloy 5052-H36.

2.22.4.10.9.2 Physical Requirements

The wide angle prismatic retroreflective sheeting shall meet the following physical requirements:

Color

The color shall be in conformance to color requirements of Table ***2.22-11***.

Table ***2.22-11* - Color specification limits for new sheeting (daytime)**

Color	Chromaticity Coordinate 1		Chromaticity Coordinate 2		Chromaticity Coordinate 3		Chromaticity Coordinate 4		Total Luminance Factor Limit, YT	
	x	y	x	y	x	y	x	y	min.	max.
White	.305	.305	.355	.355	.335	.375	.285	.325	40	--
Fluorescent Orange	.506	.404	.562	.350	.645	.355	.507	.429	30	-

Fluorescence

The fluorescence shall be in conformance to fluorescence luminance factor requirements of Table ***2.22-12***.

Table ***2.22-12*

Sheeting Type	Fluorescence Luminance Factor Limit, YF Min.
Fluorescent Orange	15

Conformance to color and fluorescence requirements of Tables ***2.22-11 and 2.22-12*** shall be determined instrumentally on sheeting applied to aluminum test panels, using a 2-monochromator spectrophotometer employing annular 45/0

(or equivalent 0/45) illuminating and viewing geometry. The total chromaticity coordinates and total luminance factor shall be calculated from the total spectral radiance factors computed for International Commission on Illumination (CIE) Illuminant D65 in accordance with ASTM E-308, *Practice for computing the colors of objects by using the CIE system* for the CIE 1931 (2 degrees) standard colorimetric observer. The measurement shall be made on a labsphere BFC-450 bispectral fluorescence colorimeter or equivalent.

Coefficient of Retroreflection, R_A

The coefficients of retroreflection shall not be less than the minimum values specified in Table ***2.22-13*** according to the sheeting type. Testing shall be in accordance with ASTM E-810. The coefficients of retroreflection shall be specified in candelas per lux per square meter.

Table ***2.22-13* – Minimum Coefficient of Retroreflection R_A (Candelas per lux per square meter)**

Observation Angles (degrees)	Entrance Angles (degrees)		
	-4	**30**	**45**
White			
0.10	1000	600	180
0.20	550	300	130
0.50	200	100	50
1.00	12	15	15
Fluorescent Orange			
0.10	375	200	50
0.20	200	120	40
0.50	80	50	30
1.00	10	10	10

Gloss

The retroreflective sheeting shall have an 85-degree specular gloss of not less than 50 when tested in accordance with ASTM D-523.

Flexibility

The retroreflective sheeting with the liner removed and conditioned as in the test method described below shall be sufficiently flexible to show no cracking when slowly bent, in one second's time, around a 3.2-millimeter mandrel, with the adhesive contacting the mandrel, at test conditions. Talcum powder shall be spread on the adhesive to prevent sticking to the mandrel.

Adhesive

Protective liner attached to the adhesive shall be removable by peeling without soaking in water or other solutions and without breaking, tearing, or removing any adhesive from the backing. Protective liner shall be easily removed following accelerated storage for 4 hours at 158°F under a weight of 2.5 pounds per square inch. The adhesive backing of the retroreflective sheeting shall produce a bond to support at 1.75-pound weight for 5 minutes without the bond peeling for a

distance of more than 2 inches when applied to a test panel prepared in accordance with this Section. Apply 4 inches of a 1 by 6-inch specimen to a test panel. Condition and then position the panel face-down horizontally, suspend the weight from the free end of the sample, and allow it to hang free an angle of 90 degrees to the panel surface for 5 minutes.

Impact Resistance

The retroreflective sheeting applied according to the sheeting manufacturer's recommendations to a test panel of alloy 6061-T6, 0.04 by 3 by 5 inches, and conditioned in accordance with this Section shall show no cracking outside the impact area when the face of the panel is subjected to an impact of 100 inch-pounds using a weight with a $^{5}/_{8}$-inch diameter rounded tip dropped from a height necessary to generate an impact of 100 inch-pounds, at test temperatures of both 32 and 72°F.

Resistance to Accelerated Outdoor Weathering

The retroreflective surface of the sheeting shall be weather resistant and show no appreciable cracking, blistering, crazing, or dimensional change after 1 year of unprotected outdoor exposure, facing the equator, and inclined 45 degrees from the vertical. Following weather exposure, panels shall be washed in a 5 percent HCL solution for 45 seconds, rinsed thoroughly with clean water, blotted with a soft clean cloth, and brought to equilibrium at standard conditions. After cleaning, the coefficient of retroflection shall not be less than 50 percent of the values in Table ***2.22-13*** when measured according to ASTM E 810. The color shall conform to the chromaticity coordinates of Table ***2.22-11***, and the minimum fluorescence luminance factor Y_F shall not be less than 10. The sample shall:

- Show no appreciable evidence of cracking, scaling, pitting, blistering, edge lifting or curling, or more than $^{1}/_{32}$-inch shrinkage or expansion.
- When more than one panel of a color is measured, the coefficient of retroreflection shall be the average of all determinations.

Optical Stability

Three pieces of new retroreflective sheeting applied test panels and conditioned in accordance with this Section shall each first have their photometric properties characterized by measuring the coefficients of retroreflection according to the provisions in this Section at all test geometries shown in Table ***2.22-13***. These panels shall then be exposed in an air-circulating oven at 160°F (plus or minus 5°F) for a period of 24 hours. After exposure, the panels shall be allowed to condition according to the provisions in this Section. These panels will again be characterized for photometric properties by measuring the coefficients of retroreflection according to the provisions of this Section at all test geometries measured before exposure. The coefficients of retroreflection measured after exposure shall be between 80 percent and 120 percent of the values shown in Table ***2.22-13***.

Resistance to Corrosion

The retroreflective sheeting applied to a test panel and conditioned in accordance with this Section shall show no loss of adhesion, appreciable discoloration or corrosion, and after cleaning shall retain a minimum of 80 percent of the specification minimum when measured at 0.2 degrees' observation, -4 degrees' entrance angle after 1,000 hours' exposure to a 5 percent concentration salt spray at 35 degrees when tested in accordance with ASTM B 117.

General Characteristics

The retroreflective sheeting applied to traffic control devices shall be free from ragged edges, cracks, and extraneous materials.

2.22.4.10.10 *Transportable Attenuator*

Where shown on the RFC TTC Plans, or when requested by the WSDOT Engineer, the Design-Builder shall provide, operate, and maintain Transportable Attenuators (TAs). These TAs shall be available, on-site, for the entire duration of their anticipated use.

The TA shall be placed on each closed lane 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.

A TA may be used in lieu of a temporary impact attenuator as part of a stage traffic control shift to protect an object such as a blunt barrier end or a bridge pier column that is located within the WZCZ. This use of a TA is restricted to a maximum of 24 hours unless the WSDOT Engineer approves an extension.

2.22.4.10.11 *Temporary Concrete Barrier*

Impact attenuators shall be used to protect the ends of barrier within the clear zone. Refer to Sections 6-10 and 8-17 of the Standard Specifications and Chapters 1610, 1620, 1010, and 1030 of the WSDOT *Design Manual* for material and construction details regarding the barrier, glare screen, attenuators, and barrier delineators. Glare screen on TCB shall conform to the requirements of this Section and the Special Provisions.

2.22.5 *Submittals*

TMP and TIMP require a draft and final submittal prior to commencement of any construction activity that has the potential to impact traffic.

TTC Plans for individual construction phases require a Preliminary Design Submittal and a Final Design Submittal prior to approval for each phase of construction.

2.22.5.1 Transportation Management Plan

The Design-Builder shall submit six copies of the draft TMP to WSDOT. The WSDOT Engineer will respond to the submittal within 14 Calendar Days of receipt.

The Design-Builder shall prepare a final TMP for the WSDOT Engineer's review. The final TMP shall carry the WTEM's Professional Engineering stamp and signature. The Design-Builder shall submit six copies and an electronic copy of the final TMP to the WSDOT Engineer. The WSDOT Engineer will respond to the final TMP within 14 Calendar Days of receipt. Comments to the TMP shall be resolved prior to commencement of any construction activity that has the potential to impact traffic. Changes to the TMP shall be prepared and submitted to the WSDOT Engineer for Review and Comment 14 Calendar Days after the need to change is recognized by the WSDOT Engineer or the Design-Builder.

2.22.5.2 Traffic Incident Management Plan

The Design-Builder shall submit six copies of the draft TIMP to the WSDOT Engineer within 30 Calendar Days of NTP. The WSDOT Engineer will provide comments on the draft TIMP within 14 Calendar Days of receipt.

The Design-Builder shall prepare a final TIMP for the WSDOT Engineer's review. The final TIMP shall carry the WTEM's Professional Engineering stamp and signature. The Design-Builder shall submit six copies and an electronic copy of the final TIMP to the WSDOT Engineer. The WSDOT Engineer will respond to the final TIMP within 14 Calendar Days of receipt. Comments to the TIMP shall be resolved prior to commencement of any construction activity that has the potential to impact traffic. Changes to the TIMP shall be prepared and submitted to the WSDOT Engineer for Review and Comment 14 Calendar Days after the need to change is recognized by the WSDOT Engineer or the Design-Builder.

2.22.5.3 Temporary Traffic Control Plans

The Design-Builder shall submit TTC Plans to the WSDOT Engineer for Review and Comment prior to the Preliminary and Final Design Submittals. The Design-Builder may submit TTC Plans separately for each phase of construction. The plans must be distributed and RFC prior to implementation. All traffic control implemented in the field shall be in accordance with RFC TTC Plans. The Design-Builder shall consider the review times when planning for implementation of construction phases. Reviews will only be waived or expedited if the Design-Builder obtains approval from the WSDOT Engineer. The WSDOT Engineer may, at its discretion, waive a review.

The Design-Builder shall prepare plan sheets in MicroStation format and in accordance with the Mandatory Standards and the WSDOT *Plans Preparation Manual*.

The Preliminary Design Submittal shall show lane configurations including typical cross-sections, signing, and Work zones. General notes to show the intent of the construction phase shall also be included. Stations and offsets of barriers,

lane lines, edge lines, and tapers shall be included in the Preliminary Design Submittal. Stations and offsets of PCMS and signs are not required for the Preliminary Design Submittal. The Design-Builder shall submit six copies and one electronic copy of the TTC Plans to the WSDOT Engineer for Review and Comment. The WSDOT Engineer will provide comments on the Preliminary Design Submittal TTC Plans within 14 Calendar Days of receipt.

The Final Design Submittal shall include, but is not limited to, all required details including station and offset for all elements, cross-sections, temporary drainage, pavement marking details, signing, traffic control devices, temporary or modified traffic signals, and temporary lighting. The Design-Builder shall submit six copies and one electronic copy of the TTC Plans to the WSDOT Engineer for Review and Comment. The WSDOT Engineer will provide comments on the Final Design Submittal TTC Plans within 14 Calendar Days of receipt.

When all comments from the Final Design Submittal TTC Plans have been incorporated, the Design-Builder shall prepare RFC TTC Plans, carrying the stamp and signature of a Licensed Professional Engineer. For roadways outside of limited access, the Design-Builder shall submit TTC Plans for review and approval to the Local Agencies responsible for the roadway. The Design-Builder shall provide an informational copy of the submittal to the WSDOT Engineer. The Design-Builder shall allow a minimum of 14 Calendar Days for the Local Agencies to review the plans. If the plans are not approved, they shall be corrected and resubmitted until they are approved. Once approval is received and all requirements of the Quality Management Plan are satisfied, the plans may be RFC. The Design-Builder shall provide four sets of the approved RFC TTC Plans to the WSDOT Engineer prior to implementation.

The RFC TTC Plans shall be distributed to all stakeholders a minimum of 14 Calendar Days prior to implementation of any lane, ramp, sidewalk, or roadway closures or detours, in order to allow for public notification.

2.22.5.4 Temporary Signal Plans

Temporary Signal Plans shall be submitted to the WSDOT Engineer or the operating agency for approval prior to commencement of construction for temporary signals. Temporary Signal Plans shall be submitted as part of the TTC Plans packages for the phase in which they will be required.

2.22.5.5 Temporary Illumination Plans

Lighting level calculations, including electronic files, shall be submitted to the WSDOT Engineer for Review and Comment prior to planning any pavement marking changes. When the analysis shows temporary illumination is required, the Design-Builder shall submit Temporary Illumination Plans as part of the TTC Plans package for the stage in which the illumination will be required.

2.22.5.6 Temporary Drainage Calculations

Calculations for the design of temporary drainage facilities shall be submitted to the WSDOT Engineer for Review and Comment with the TTC Plans Preliminary and Final Design Submittals. When the drainage analysis shows temporary drainage is required, the Design-Builder shall submit temporary drainage plans as part of the TTC Plans package for the stage in which the drainage will be required. Temporary drainage calculations shall meet the requirements in Section 2.14, *Stormwater,* that apply to permanent drainage facilities.

2.22.5.7 Other Submittal Requirements

The Design-Builder shall deliver to the WSDOT Engineer a list of all parties invited to take part in the MOT task force, and the responses to all of the invitations. The Design-Builder shall take meeting minutes and distribute them to all task force members.

A copy of the MOT diary shall be submitted to the WSDOT Engineer on a monthly basis. Upon Completion of the Project, the MOT diaries shall be delivered to and become the property of the WSDOT Engineer.

A Closure Plan shall be submitted for each full highway closure. The Design-Builder shall submit the Closure Plan to the WSDOT Engineer for Review and Comment at least 30 Calendar Days prior to the scheduled closure.

2.22.5.8 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.23 ***Vacant***

2.24 Right of Way

2.24.1 *General*

2.24.1.1 Available Right of Way

WSDOT will acquire the property for this Project as shown in the *Conceptual Plans* (Appendix M) or the *Right of Way Plans*/Exhibit Maps (Appendix R), as noted below. The Design-Builder shall have access to the Right of Way (ROW) as stated in this section. If the ROW is not available, WSDOT will consider an extension of time in accordance with Section 1-08 of the General Provisions.

The following locations will be certified by the end of October 2022:

- Parcel 1-24926
- Parcel 1-24927
- Parcel 1-23501
- Parcel 1-24923

Prior to entering or using any areas located outside of the existing ROW, the Design-Builder shall verify and confirm the location and accuracy of the ROW boundaries, including boundaries for temporary rights acquired as part of the Project.

WSDOT has prepared mapping, monumentation and survey control for the Project as described in Section 2.5, *Survey and Mapping*, and as shown in the *Record of Survey* (Appendix R).

2.24.1.2 Right of Way Use Permit

The Design-Builder shall acquire any additional permits and approvals as may be required by the Local Agencies to perform the Work. The Design-Builder shall pay all associated fees required to obtain permits including inspection fees that apply.

2.24.1.3 Laydown and Staging Areas

WSDOT did not identify any staging areas within the Project limits. If the Design-Builder identifies staging and laydown areas within the ROW, the Design-Builder shall submit a staging site request package to the WSDOT Engineer for Review and Comment. The submittal shall include site layout and grading, drainage analysis, description of use, Traffic Control Plans, Temporary Erosion

and Sediment Control Plans, and Site Prep and Restoration Plans. The Design-Builder shall be responsible for obtaining the necessary permits and WSDOT approval for the use of these sites. The Design-Builder shall be responsible for developing a plan and securing appropriate approvals for site access.

If the Site is approved by the WSDOT Engineer, waste material shall be placed at the identified location.

2.24.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all ROW activities related to design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, as amended
2. 49 Code of Federal Regulations (CFR) Part 24
3. 23 Code of Federal Regulations (CFR) Part 710
4. RCW 8.26 *Relocation Assistance – Real Property Acquisition Policy*
5. WAC 468-100 *Uniform Relocation Assistance and Real Property Acquisition*
6. WSDOT *Right of Way Manual* M 26-01 (Appendix D)
7. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)

2.24.3 *Additional Right of Way Acquisition*

2.24.3.1 Additional Right of Way

If the Design-Builder's proposed design requires the acquisition of property outside of the ROW, the Design-Builder shall identify the type and location of the ROW and submit a request for additional ROW to the WSDOT Engineer for Review and Comment, in accordance with this Section and Section 1-04 of the *General Provisions*.

The time required to acquire ROW varies. In the event that the Design-Builder determines additional ROW will be required, the Design-Builder may contact the WSDOT Engineer to obtain an approximate amount of time that would be required for acquisition.

Design changes proposed by the Design-Builder that result in a reduced need for WSDOT acquired ROW/property shall not be considered for any kind of monetary "credit" or "offset" against any new ROW needs proposed by the Design-Builder.

2.24.3.2 Right of Way Requirements Determination

Additional ROW necessary to construct the Project will be acquired either by WSDOT or by a qualified ROW consultant pursuant to this Section.

If the Design-Builder requests additional ROW, the Design-Builder shall reimburse WSDOT for the costs of such review. The costs of the review shall be paid regardless of whether or not the request is approved. In addition, all acquisition costs such as property surveys; title reports; appraisals; condemnation and relocation assistance; schedule delays and cost of schedule delays, regardless of the outcome, shall be paid by the Design-Builder.

WSDOT will provide an estimate of costs to the Design-Builder following receipt of the request for additional ROW. The cost estimate will serve as the basis for a price adjustment as described in Section 1-04 of the *General Provisions*.

The Design-Builder's request for additional ROW shall include the following:

- A notice indicating the Design-Builder's name, the Project name, the Project location, the Contract number, the submittal date, and the submittal type.
- A plan of sufficient scale and detail to show the existing and proposed roadway ROW, and the proposed easements, in accordance with the WSDOT *Plans Preparation Manual*.
- An outline of what will be required for WSDOT to acquire the ROW will include, at a minimum, additional land (fee) ownership, airspace, Utility corridors, access rights, permanent or temporary easements, and any relocation assistance.
- A discussion of the impacts to the Project schedule and a proposed plan to recover the Project schedule.
- If applicable, a Demolition Plan of all buildings, structures, and other improvements located in the ROW. The plan shall also include the inspection, sampling and testing of any lead-based paint, asbestos or other Hazardous Materials, in accordance with applicable Washington regulations. The Design-Builder shall provide the WSDOT Engineer with a Hazardous Materials Abatement Plan for Review and Comment. All Utilities installed on or connected to buildings, structures or other improvements in the ROW shall be abandoned or removed in accordance with the requirements of the applicable Utility Owner as part of the demolition, unless otherwise specified. All costs associated with the demolition shall be paid by the Design-Builder.

Any acquisition of ROW either by WSDOT or a ROW consultant shall be performed in accordance with all applicable laws and this Section.

2.24.3.3 Right of Way Acquisition

Upon approval of the request for additional ROW, WSDOT will establish a ROW work order funded by the Design-Builder and initiate the ROW acquisition process. Any offer that exceeds the mutually agreed-upon estimated cost for properties that will be acquired must be approved by the Design-Builder prior to the settlement offer.

In order to minimize the impacts of acquisition on the property owners, and to acquire the necessary property expeditiously, all additional ROW, whether permanent or temporary, from a property owner who owns multiple properties in the ROW, shall be acquired in a single offer, unless otherwise determined by WSDOT at its sole discretion. All property rights acquired must be inspected and inventoried as directed in Chapter 11 of the WSDOT *Right of Way Manual*.

2.24.3.4 Other Property Rights

The Design-Builder may acquire any temporary rights or interests in real property that, in the Design-Builder's discretion, are deemed necessary or advisable to acquire. Such real property may be required for workspace, 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; and will not take any responsibility for the acquisition, maintenance, or disposition of additional properties or of any temporary rights of interest therein.

The costs to acquire any such property rights in this Section is the sole responsibility of the Design-Builder.

The Design-Builder shall submit to the WSDOT Engineer a signed copy of all other property rights that the Design-Builder has acquired for the Project.

2.24.3.5 Use of Right of Way Consultants

In accordance with Chapter 16 of the WSDOT *Right of Way Manual*, the Design-Builder may hire qualified ROW consultants to handle the acquisition of ROW for the Project. ROW consultants must be selected from the WSDOT Approved Consultant List for Right of Way Services. Details can be found at http://www.wsdot.wa.gov/realestate/. Close coordination with WSDOT Real Estate Services will be required throughout the Project, as provided for in Chapter 16.

2.24.4 *Property Management*

The Design-Builder shall be responsible for the maintenance of improvements, compliance with all applicable permits, and providing reasonable safety and security measures relative to the preservation of the ROW parcels for the Project.

The Design-Builder shall assume responsibility for the ROW parcels indicated above beginning on the 30th calendar day after certification, and ending on the 30th calendar day following Physical Completion. The Design-Builder shall establish a Property Management Plan and shall submit the plan to the WSDOT Engineer for Review and Comment within 7 calendar days after NTP. The plan shall assure that all acquired ROW is maintained in a manner that will prevent, minimize, or correct problems such as vandalism, trespassing, weed control, rodent infestation, and illegal dumping or disposal of rubble and debris within the ROW.

2.24.5 *Demolition*

The Design-Builder's Work shall include demolition of all buildings, structures, and other improvements located in the ROW and to be removed by the Project. This may include decommissioning of water wells and resource protection wells in conformance with WAC 173-160 or abandonment of on-site sewage systems in accordance with WAC 246-272A, as applicable. The Design-Builder's Work shall also include the inspection, sampling, and testing of any lead-based paint, asbestos, or other Hazardous Materials, in accordance with applicable Washington State regulations. The Design-Builder shall provide the WSDOT Engineer with a Hazardous Materials Abatement Plan for Review and Comment. All Utilities installed or connected to buildings, structures, or other improvements in the ROW shall be abandoned or removed in accordance with the requirements of the applicable Utility Owner as part of the demolition, unless otherwise specified. Prior to demolition of buildings, structures, or other improvements located in the ROW which were acquired as an early acquisition, the Design-Builder shall consult with the WSDOT Engineer and receive approval for demolition. An early acquisition is defined in Federal Regulation 23 CFR 710.105 as acquisition of real property by state or local governments prior to completion of the environmental review process for a proposed transportation project.

2.24.6 *Right of Entry*

This section is intentionally omitted.

2.24.6.1 Notice of Entry

If the Design-Builder determines that there is a need to enter property not owned by WSDOT, it shall be the Design-Builder's responsibility to obtain permission to enter that property from the legal property owner.

The Design-Builder shall submit a *Notice of Entry* (Appendix R) to the legal property owner with a minimum of 21 Calendar Days' notice, from the date of said notice, prior to entering said property. A *Notice of Entry* shall be required for the following activities that do not include invasive (ground disturbance) purposes:

- Surveying – location, boundaries, topography, channel features and monumentation.
- Environmental examinations – soil, water, hazardous and biological material.
- Archaeological examinations – historical and cultural

If the *Notice of Entry* includes any ground disturbance or invasive action, it will require a temporary easement or permit, payment of just compensation, and shall be processed as specified in this Section.

The *Notice of Entry* (see Appendix R for sample) shall include the following:

- An explanation of the type of work that will take place and the type of equipment that will be used
- Date, time, and duration the Design-Builder will be on the property
- Contact information for the Design-Builder if the property owner needs to make arrangements for entry

The Design-Builder shall submit a copy of the signed *Notice of Entry* to the WSDOT Engineer prior to entering the private property.

2.24.7 *Right of Way Easements*

2.24.7.1 Permanent Easement

WSDOT acquired the permanent easements identified on the *Right of Way Plans* (Appendix R).

2.24.7.2 Temporary Easements

Temporary easements obtained by WSDOT for use during construction are included in the *Temporary Easements* (Appendix R).

If the Design-Builder requires a time extension of any temporary easement, the Design-Builder shall submit a request to the WSDOT Engineer to obtain a time extension. The time extension will be acquired as set forth in this Section. All costs associated with obtaining any time extension shall be paid by the Design-Builder. The duration of the Contract shall not be extended if any temporary easements cannot be extended.

2.24.8 *Acquisition Subject to Existing Easements*

Several property parcels were acquired subject to existing public Utility easements. The Design-Builder shall protect the Utilities so their function is not impaired during construction. This requirement shall remain until the Utility is relocated and becomes serviceable, if applicable. If the Utility will not be relocated, then it shall remain serviceable after construction.

2.24.9 *Construction Interdisciplinary Commitments*

This Section is intentionally omitted.

2.24.10 *Notification*

The Design-Builder shall notify the WSDOT Engineer as work is completed on the individual parcels.

The Design-Builder shall notify certain property owners in accordance with the *Temporary Easements* (Appendix R). The Design-Builder's notification shall include, but is not limited to, the following:

- When Utilities are relocated
- When individual sewer service lines are connected and become operational
- When individual stormwater service lines are connected and become operational

2.24.11 *Submittals*

Project submittals may include, at a minimum, the following:

- Request for additional ROW
- Property Management Plan
- Relocation Plan, if applicable
- *Notice of Entry* together with all supporting documentation for entry
- Requests for extensions or additional temporary easements

2.24.11.1 Hazardous Material Abatement

Prior to any demolition, the Design-Builder shall submit a Hazardous Material Abatement Plan to the WSDOT Engineer for Review and Comment. At a minimum, the plan shall address the following:

- The name and location of the disposal site of the Hazardous Material
- How the Hazardous Material will be abated to prevent release into the atmosphere, onto the earth, and into underground and surface water

2.24.11.2 Right of Way Certification

Prior to the commencement of construction in any Project phase or segment, ROW must be certified in accordance with Chapter 17 of the WSDOT *Right of Way Manual*. If additional ROW acquisitions occur after certification, an updated certification must be submitted to the WSDOT Engineer for approval prior to commencement of construction.

2.24.11.3 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section

2.25 Control of Materials

2.25.1 *General*

The Design-Builder shall be responsible for the quality of materials, methods of construction, and testing incorporated into the Project, and shall comply with Federal Highway Administration (FHWA) and WSDOT requirements for approval of materials, sampling, and testing used in the Project. The Design-Builder's Quality Assurance (QA) procedures shall ensure that operational techniques and activities comply with the Contract, and that all materials used in the Work are of acceptable quality.

The Design-Builder shall be responsible for all materials acceptance testing on this Project except for the State Inspected and Tested Items listed in this Section. All references to performing materials acceptance testing in the Standard Specifications, WSDOT *Construction Manual*, or any other Contract Document shall be the responsibility of the Design-Builder's QA organization.

2.25.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Construction Manual* M 41-01 (Appendix D)
4. WSDOT *Materials Manual* M 46-01 (Appendix D)
5. *Qualified Products List* (QPL)

   (http://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm)
6. *AASHTO Guide Specifications for LRFD Seismic Bridge Design*
7. *AASHTO LRFD Bridge Design Specifications*
8. *AASHTO LRFD Bridge Construction Specifications*

The Design-Builder may be required to use the materials forms listed in WSDOT *Construction Manual* Section 9-1.2B or additional existing WSDOT forms to meet the materials documentation requirements. The Design-Builder may develop substitute forms that shall include all information and fields from the applicable WSDOT materials forms being substituted. The Design-Builder shall modify the wording from the original WSDOT form to conform to the Design-Builder's terminology.

2.25.3 *Buy America*

In accordance with the FHWA Buy America requirements located at 23 CFR 635.410, all steel and iron materials that are permanently incorporated into the Project shall consist of American-made materials only. Temporary steel items that are not permanently

incorporated, e.g. temporary sheet piling, steel scaffolding and false work, temporary bridges, are not subject to Buy America requirements. However, all steel used for temporary purposes that is permanently incorporated into the Work shall meet Buy America requirements.

Minor quantities of foreign steel and iron may be utilized in this Project provided the cost of the foreign material used does not exceed 0.1 percent of the total Contract cost or $2,500, whichever is greater.

American-made material is defined as material having all manufacturing processes occurring domestically. To further define the coverage, a domestic product is a manufactured steel material that was produced in one of the 50 States, the District of Columbia, Puerto Rico, or in the territories and possessions of the United States.

If domestically produced steel billets or iron ingots are exported outside of the area of coverage, as defined above, for any manufacturing process then the resulting product does not conform to the Buy America requirements. Additionally, products manufactured domestically from foreign source steel billets or iron ingots do not conform to the Buy America requirements because the initial melting and mixing of alloys to create the material occurred in a foreign country.

Manufacturing begins with the initial melting and mixing, and continues through the coating stage. Any process which modifies the chemical content, the physical size or shape, or the final finish is considered a manufacturing process. The processes include rolling, extruding, machining, bending, grinding, drilling, welding, and coating. The action of applying a coating to steel or iron is deemed a manufacturing process. Coating includes epoxy coating, galvanizing, aluminizing, painting, and any other coating that protects or enhances the value of steel or iron. Any process from the original reduction from ore to the finished product constitutes a manufacturing process for iron.

Due to a nationwide waiver, Buy America requirements do not apply to raw materials (iron ore and alloys), scrap (recycled steel or iron), and pig iron or processed, pelletized, and reduced iron ore.

The following are considered to be steel manufacturing processes:

1. Production of steel by any of the following processes:
    a. Open hearth furnace
    b. Basic oxygen
    c. Electric furnace
    d. Direct reduction
2. Rolling, heat treating, and any other similar processing
3. Fabrication of the products
    a. Spinning wire into cable or strand
    b. Corrugating and rolling into culverts
    c. Shop fabrication

A certification of materials origin will be required for any items comprised of, or containing, steel or iron construction materials prior to such items being incorporated into the permanent Work. The certification shall be on WSDOT Form 350-109, *Certification of Materials Origin*; or such other form the Design-Builder chooses, provided it contains the same information as WSDOT Form 350-109, *Certification of Materials Origin*.

2.25.4 *Materials Approval*

Prior to use by the Design-Builder, all materials shall be reviewed and approved by the Materials Approval Engineer. Materials submittals shall be in the form of a QPL or a Request for Approval of Materials (RAM). Proprietary items may be listed in the plans and specifications that have been stamped by the Engineer of Record (EOR). The Construction Quality Assurance Manager (CQAM) shall establish the materials acceptance requirements in accordance with the Standard Specifications, WSDOT *Construction Manual* and this Section for the material approved by the Materials Approval Engineer on the Record of Materials (ROM). If the Design-Builder uses the RAM process, then the Design-Builder shall use WSDOT Form 350-071, *Request for Approval of Material*.

All permanent equipment, materials, and articles incorporated into the Project, and any temporary equipment, materials, and articles that have a specification shown in Division 9 of the Standard Specifications, such as erosion control devices and temporary traffic control devices, shall adhere to the following standards:

- Shall be new, unless specified otherwise in this Section
- Shall meet the requirements of the Contract and shall be approved by the Materials Approval Engineer
- Shall be inspected or tested in accordance with this Section, WSDOT standards, and WSDOT manuals
- Shall not be used in the Work if they become unfit after being previously approved

The Design-Builder shall be responsible for approval and acceptance of all materials by means of testing, inspection, and documentation. A Materials Certification Package, as described in this Section and approved by the Design-Builder's CQAM, shall be submitted to the WSDOT Engineer prior to Completion of the Project.

Qualified Products List – The Design-Builder may use products listed on the most recent edition of WSDOT's QPL, without submitting a RAM. It is possible ***that the QPL may include products from a manufacturer, but not cover all products that the manufacturer provides. The QPL must cover the actual product that the Design Builder intends to use***. Proper use of the QPL is defined in Section 9-1.3A (2) of the WSDOT *Construction Manual*. The Design-Builder shall follow the acceptance requirements listed in the QPL for the product/material used.

Request for Approval of Materials – The RAM shall be used if the Design-Builder elects not to use the QPL; or if the material is not listed in the QPL; or not shown in the plans and specifications stamped by the EOR. The RAM shall be prepared by the Design-Builder and submitted to the Materials Approval Engineer for approval before the material is incorporated into the Work. Proper use of the RAM process is defined in the Section 9-1.3B of the WSDOT *Construction Manual*. Approval of the material does not constitute acceptance of the material for incorporation into the Work.

Proprietary Items – Proprietary items are those items that the EOR has identified in the plans and specifications as a single source by manufacturer's make and model number. These items are considered approved if they are shown in the plans and specifications stamped by the EOR. Acceptance shall follow the requirements in this Section.

WSDOT Aggregate Source Approval Database – The Design-Builder may use any approved aggregate that is included in the WSDOT Aggregate Source Approval (ASA) database. If the Design-Builder wishes to use an aggregate source that is not in the WSDOT ASA database, preliminary samples shall be obtained and evaluated for quality by WSDOT for preliminary approval of the source. Testing performed for acceptance shall be performed by the Design-Builder's QA. Regardless of status of the source, whether listed or not listed in the WSDOT ASA database, the source owner may be asked to provide testing results for toxicity in accordance with Section 9-03.21(1) of the Standard Specifications. The WSDOT ASA database can be accessed online at the WSDOT website under Business tab then Materials Laboratory.

Optional Approval – The Design-Builder's CQAM may elect to request to accept materials listed in Table 9-1 of the WSDOT *Construction Manual* by invoking Section 9-1.1D – Optional Approval/Acceptance for Materials of the WSDOT *Construction Manual*. The request shall be approved by the Materials Approval Engineer with concurrence of the WSDOT Engineer and submitted to the QA Team for final approval.

WSDOT Oversight – The Design-Builder shall distribute copies of all documents that list materials which have been approved to the WSDOT Engineer for review within 3 Calendar Days of receipt of approval. WSDOT will use these documents to verify the materials being used.

2.25.5 *Acceptance of Materials*

2.25.5.1 General

All materials that the Design-Builder intends to use shall be approved by the Materials Approval Engineer prior to use; shall be listed on the ROM with the established materials acceptance requirements; and shall be tested and inspected as required by this Section, field-verified, and documented. The Design-Builder shall also track and maintain a daily listing of material quantities. The materials acceptance program shall be in accordance with the WSDOT *Construction Manual*, WSDOT *Materials Manual*, Standard Specifications, or other provisions of the Contract.

For most materials, the method of acceptance is in Chapter 9 of the WSDOT *Construction Manual*.

Record of Materials – The Design-Builder shall develop and use a tracking system for the ROM that is used to maintain the materials documentation information for the Contract.

The ROM is a program that is an electronic filing cabinet to assist the Design-Builder in managing and tracking required documentation. The ROM shall number and list all permanently incorporated materials used on the Project. Materials documentation such as approval, acceptance, field verification, Certificate of Materials Origin, estimated/placed/paid quantities, testing frequencies/number or tests, deficiencies, status (approved or rejected) and other documentation for each item of material placed shall be included. Examples of some Acceptance Criteria items may be testing, Fabrications Inspection, Manufacturer's Certificate of Compliance, Miscellaneous Certificates of Compliance, Shop Drawings, Catalog Cuts, Proprietary items, and Field Acceptance. The Design-Builder is expected to keep up-to-date entries for accurate tracking of materials

placed on the Site and update the ROM to reflect the actual materials and quantities placed.

The ROM shall, at a minimum have the same information and general level of detail as shown in the *ROM Sample* (Appendix F). In regard to materials that are not evaluated statistically and used, i.e. walls and bridge structures, a key feature of the tracking system shall be to track material specific to each individual wall or bridge separately. The ROM shall be updated daily, kept at the Project office, and available for WSDOT Review and Comment.

Upon award of the Contract, WSDOT will provide the Design-Builder's CQAM with an electronic file containing the most recent listing of the method of acceptance for materials, to assist the Design-Builder in developing the ROM.

Visual Acceptance – If a visual acceptance is required as part of the acceptance method for materials, or is the acceptance criteria, the materials shall be inspected by the Construction QA Inspector to ensure the materials meet the specifications. The Construction QA Inspector shall document the results of the inspection.

Manufacturer's Certificate of Compliance – If a Manufacturer's Certificate of Compliance is required as part of the acceptance criteria for materials, the CQAM shall review the certificate for compliance with the required specification, prior to incorporating the materials into the Project. The Manufacturer's Certificate of Compliance shall meet the requirements of this Section.

Field Verification – The Construction QA Inspector shall field verify all materials permanently incorporated into the Project. The field verification shall occur prior to or during placement of materials and shall validate actual quantities incorporated into the Work. The QA Inspector shall inspect the product, material, and construction processes for conformity to the Contract requirements. The QA Inspector shall also inspect the product or material for shipment and handling damage. When the Design-Builder gives authorization of payment of the materials placed, they are affirming that items requiring field verification have been checked and found to be acceptable. The field verification information is the link between what is specified by the EOR or approved on the RAM or QPL, and what is placed.

Proprietary Items – Proprietary items that have been approved in the plan sheets shall require acceptance by testing, inspection, or other forms of acceptance as required by the Contract, and shall also require field verification.

Tested Materials – The Design-Builder's QA staff shall test materials that require testing for acceptance. Materials listed in Table 6 of this Section, or any other materials where three or more tests are required, shall be statistically accepted. In order to use the Design-Builder's QA test results for acceptance, the QA test results shall be validated per Table 6 of this Section by comparing them with WSDOT's independent Quality Verification (QV) test results.

Materials that only require one or two QA tests for acceptance or that have less than three sublots shall require validation using the QA test results and WSDOT's QV test results in accordance with this Section.

All field and laboratory materials testing by the Design-Builder shall follow the methods described in the WSDOT *Materials Manual* and the Contract.

Optional Acceptance – The Design-Builder's CQAM may elect to request to accept materials listed in Table 9-1 of the WSDOT *Construction Manual* by invoking Section 9-1.1D – Optional Approval/Acceptance for Materials of the WSDOT *Construction Manual*. These materials would be accepted by visual acceptance. The request is required to be approved by the Materials Approval Engineer with concurrence of the WSDOT Engineer and submitted to the QA Team for final approval.

2.25.5.2 Validation of Quality Assurance Test Results

The CQAM shall be responsible for evaluating all of the QA test results against WSDOT's QV test results to determine the acceptability of the QA test results by one of the following methods:

- When there are less than three QA and QV tests, the validation process shall be to compare the differences between the QA and QV test results to the limits in Table 3 of this Section or to the precision and bias statement in the test procedure.
- When there are three or more QA and QV tests, unless stated otherwise in Table 6, the validation process shall be performed by using the F and t Test analysis as described in Section 2.28, *Quality Management Plan*.
- When there are three or more QA and QV tests, and Table 6 does not require F and t Test analysis the validation process shall be to compare the differences between the QA and QV test results to the limits in Table 3 of this Section or to the precision and bias statement in the test procedure.

If the test results are validated, then the QA test results shall be used for acceptance. If the test results are not validated, then an investigation shall be conducted by the QA Team, as described in Section 2.28, *Quality Management Plan,* to resolve the discrepancy. If a resolution cannot be reached, then WSDOT's QV test results shall be used for acceptance.

2.25.5.3 Statistical Acceptance of Materials

Where specified, QA sampling and testing shall be performed by the Design-Builder's QA organization. Materials shall be statistically evaluated when defined in Table 6 of this Section.

The CQAM shall be responsible for statistically evaluating the validated QA test results as described in Section 2.28, *Quality Management Plan*. The CQAM shall use the Statistical Analysis of Materials (SAM) software to determine the acceptability of the test data, the total percent of the lot that is within specification limits, and an appropriate Composite Pay Factor (CPF). Refer to this Section for the statistical acceptance requirements.

2.25.5.4 Non-Statistical Acceptance of Materials

Materials that are not required by Table 6 to be statistically evaluated shall meet the minimum and maximum specifications. The CQAM shall be responsible for validating the QA and QV test results and comparing the validated QA test results to the specification limits.

For structural concrete, when validated concrete cylinder tests for compressive strengths fail to meet the minimum acceptance requirements, the concrete shall be evaluated for structural adequacy by the EOR. If the material is found to be structurally adequate by the

EOR and the WSDOT Engineer concurs, the concrete may be left in place. If the material is found to be structurally deficient, the concrete shall be removed and replaced, or may be left in place with other remedial action as determined by the EOR with WSDOT concurrence. Payment for concrete that is left in place without meeting minimum acceptance requirements shall be adjusted in accordance with Section 6-02.3(5)L of the Standard Specification under the item "Material Compliance Price Adjustment".

2.25.5.5 Sample and Testing Frequency

Sample and testing frequencies shall comply with the testing frequencies defined in the Standard Specifications and the WSDOT *Construction Manual,* Section 9-3.7 and Table 6 of this Section. Additional testing requirements are included in the Standard Specifications and this Section.

If the tables do not define a material test or material sample rate, the QA Team shall establish the testing attributes and frequency. The QV sampling and testing shall occur at a frequency of one test or sample per five QA tests or samples.

During operational startup or unprecedented Project testing, the QV sampling and testing shall be required at the same frequency as the Design-Builder's QA frequency for the first five samples, to be able to establish a statistical base for verification and acceptance and on a more frequent basis as needed until the process is established to be under good control. Additional testing may be performed for validation of statistical modeling if the CQAM and the WSDOT Engineer deem it necessary. If the Design-Builder elects to take extra QA samples and tests to ensure quality, the QV sampling frequency shall continue to be based on the required frequency of one QV test for every five required QA tests.

2.25.5.6 Manufacturer's Certificate of Compliance

When authorized by this Section and prior to use, the CQAM may accept certain materials on the basis of a Manufacturer's Certificate of Compliance as an alternative to material inspection and testing.

The Manufacturer's Certificate of Compliance shall 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 Project, and the lot shall be clearly identified in the certificate.

Upon receipt of the Manufacturer's Certificate of Compliance, the CQAM shall review it for compliance with the specifications using WSDOT Form 350-572, *Manufacturer's Certificate of Compliance Checklist*, or the Design-Builder's own checklist with the same information.

All materials used on the basis of a Manufacturer's Certificate of Compliance may be sampled and tested at any time by the CQAM or by the WSDOT Engineer. Any material not conforming to the requirements shall be subject to rejection whether or not it has been used. The CQAM has the authority to refuse to accept materials on the basis of a Manufacturer's Certificate of Compliance.

The Design-Builder may request that the CQAM sample and test materials in lieu of a Manufacturer's Certificate of Compliance. Sampling and testing must be completed

prior to incorporating them into the Project. Any material not conforming to the requirements shall be subject to rejection whether or not it has been used.

2.25.5.7 Recycled Materials

The Design-Builder shall make their best effort to utilize recycled materials in the construction of the Project; the use of recycled concrete aggregate as specified in this Section is a requirement of the Contract.

The Design-Builder shall submit a Recycled Material Utilization Plan on WSDOT Form 350-075A, *Recycled Concrete Aggregate Reporting* within 30 Calendar Days after the Contract is executed. The plan shall provide the Design-Builder's anticipated usage of recycled concrete aggregates for meeting the requirements of this Contract. The quantity of recycled concrete aggregates shall be provided in tons and as a percentage of the plan quantity for eligible material listed in Section 9-03.21(1) E of the Standard Specifications, Table on Maximum Allowable Percent (By Weight) of Recycled Material. If the Contract does not include Work that requires the use of a material that is included in the requirements for using materials, the Design-Builder may state in their plan that no recycled materials are proposed for use.

Within 30 Calendar Days after Physical Completion, the Design-Builder shall report the quantity of recycled concrete aggregates that were utilized in the construction of the Project for each eligible items listed in Section 9-03.21(1)E of the Standard Specifications. The Design-Builder's report shall be provided on WSDOT Form 350-075A, *Recycled Concrete Aggregate Reporting*.

2.25.5.7.1 *Recycling of Aggregate and Concrete Materials*

The minimum quantity of recycled concrete aggregate shall be 25 percent of the total quantity of aggregate that is incorporated into the Contract for those items listed in Section 9-03.21(1)E of the Standard Specifications, Table on Maximum Allowable Percent (By Weight) of Recycled Material that allow the use of recycled concrete aggregate. The percentage of recycled material incorporated into the Project for meeting the required percentage shall be calculated in tons based on the quantity of recycled concrete used on the entire Contract and not as individual items.

If the Design-Builder's total cost for Work with recycled concrete aggregate is greater than without, the Design-Builder may choose to not use recycled concrete aggregate. When the Design-Builder does not meet the minimum requirement of 25 percent recycled concrete aggregate for the Contract due to costs or any other reason, the following shall be submitted:

A cost estimate for each material listed in Section 9-03.21(1) E of the Standard Specifications that is utilized on the Contract. The cost estimate shall include the following:

a. The estimated costs for the Work for each material with 25 percent recycled concrete aggregate. The cost estimate shall include for each material a documented price quote from the supplier with the lowest total cost for the Work.

b. The estimated costs for the Work for each material without recycled concrete aggregate.

The Design-Builder's cost estimates shall be submitted as an attachment to WSDOT Form 350-075A, *Recycled Concrete Aggregate Reporting*.

2.25.5.8 Acceptance of Small Quantities of Materials

Upon the request of the Design-Builder, the CQAM may elect to accept small quantities of materials without normal sampling and testing frequencies. The request is required to be approved by the Materials Approval Engineer with concurrence of the WSDOT Engineer and submitted to the QA Team for final approval.

A material can be accepted as a small quantity if the proposed total quantity for the specific material is less than one testing frequency for the entire Project.

Questions that the Design-Builder shall 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 inspection, certification, or other methods. Acceptance of small quantities of materials by these methods shall be fully documented. Documentation of materials shall be provided by the Design-Builder's QA Inspector accepting the material. For visual acceptance, the CQAM shall have written documentation, such as an entry in the Construction QA Inspector's Daily Report (IDR) or a note 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 quantity of the following:

- Curbs and sidewalks
- Driveways
- Paved ditches and slopes

2.25.5.9 Fabrication Inspection

The WSDOT Fabrication Inspection Office will be responsible for in-plant inspection and approval of items fabricated specifically for the Project as detailed in the WSDOT *Construction Manual* and as determined by the WSDOT Engineer.

In the event the Design-Builder elects to have items fabricated beyond 300 miles from Seattle, Washington, the WSDOT Engineer will deduct from monies due or that may become due to the Design-Builder all costs to perform plant approval and fabrication acceptance inspection for the items listed in Fabrication Table 1 and costs for initial plant approval for items listed in Fabrication Table 2. Plants currently listed on the QPL for the items shown in Fabrication Table 1 and Fabrication Table 2 in this Section do not require plant approval.

Fabrication Table 1

The following are items that require Plant Approval and Fabrication Acceptance Inspection:

Anchor Bolts (ASTM A449 & F1554 Grade 105)
Bridge Bearings (Cylindrical, Disc, Fabric Pad, Low Rise, Pin, Pendulum, and Spherical)
Cattle Guards
Coated Piling and Casing
Epoxy-Coated Reinforcing Steel
Fabricated/Welded Miscellaneous Metal Drainage Items: Grate Inlets, and Drop Inlets
Longitudinal Seismic Restrainers
Metal Bridge Railing and Handrail
Metal Castings for Concrete Drainage, electrical, and Utility Items
Modular Expansion Joints
Paint & Powder Coating Facilities for Table 1 items
Precast Concrete Bridge Deck Panels
Precast Concrete Catch Basins, Manholes, Inlets, Drywells, Adjustment Sections (Greater than 12 inches) and Risers (Greater than 4 inches)
Precast Concrete Drain, Perforated Underdrain, Culvert, Storm Sewer, and Sanitary Sewer Pipe (Greater than 30 inches in Diameter or larger)
Precast Concrete Floor Panels
Precast Concrete Junction Boxes, Pull Boxes, Cable Vaults
Precast Concrete Marine Pier Deck Panels
Precast Concrete Pier Caps
Precast Concrete Retaining Walls, including Lagging Panels
Precast Concrete Roof Panels
Precast Concrete Structural Earth Walls, Noise Barrier Walls, Wall Panels, and Wall Stem Panels
Precast Concrete Traffic Barrier
Precast Concrete Vaults (Electrical, Utility, Drainage, etc.)
Precast Concrete Girders and Precast Bridge Components
Prestressed Concrete Girders
Prestressed Concrete Panels
Precast Reinforced Concrete Box Culverts
Precast Reinforced Concrete Split Box Culverts

Precast Reinforced Concrete Three-Sided Structures
Prestressed Concrete Piles
Retrofit Guardrail Posts with Welded Base Plates
Signal Standards (Only Type II – V, ITS, and High Mast Light Poles require fabrication inspection)
Sign Structures – Cantilever, Sign Bridge, and Bridge Mounted, (Roadside Type PLT/PLU do not require Fabrication Inspection)
Soldier Piles
Steel Bridges and Steel Bridge Components
Steel Column Jackets
Steel Light Standards and High Mast Light Poles
Strip Seal Expansion Joints
Structural Steel for Ferry Terminal Berthing, Pedestrian and Vehicle Loading Structures
Timber Bridges
Treated Timber and Lumber 6 by 6 inches or larger
Welded Structural Steel (Miscellaneous)

Fabrication Table 2

The following are items that require Initial Plant Approval Only:

Epoxy Coating of Dowels and Tie bars for Concrete Pavement
Guardrail Posts and Blocks
Precast Concrete Blocks for Structural Earth Walls
Steel Pipe Piling

The deductions for fabrication inspection costs will be calculated as indicated in the following Payment Table:

Payment Table

Zone	Place of Fabrication or Inspection Site	Reduction in Payment
1	Within 300 airline miles from Seattle	None*
2	Between 300 and 3,000 airline miles from Seattle	$700 per inspection day**
3	Over 3,000 airline miles from Seattle	$1,000 per inspection day,** but not less than $2,500 per trip

*Fabrication inspection expense does not apply for initial acceptance inspection in Zone 1. Re-inspection of items due to unacceptable workmanship or scheduling errors made by the Contractor, fabricator, or facility applying protective coatings will be assessed at $60 per hour but not less than $120 per inspection.

**An inspection day includes any Calendar Day or portion of a Calendar Day spent by one inspector inspecting, on standby, or traveling to and from, a place of fabrication. An additional cost per inspection day will be assessed for each additional inspector. Reimbursement will be assessed at $280 per inspection day for weekends and holidays for each on-site inspector in travel status, but not engaged in inspection or travel activities when fabrication activities are not taking place.

Where fabrication of an item takes place in more than one zone, the reduction in payment will be computed on the basis of the entire item being fabricated in the farthest of zones where any fabrication takes place on that item.

The rates for Zones 2 and 3 shall be applied for the full duration of time for all fabrication inspection activities, to include, but not be limited to: plant approvals, Prefabrication Meetings, fabrication, coatings, and final inspection. When an inspection is for more than one Contract the fabrication inspection costs shall be prorated as determined by the WSDOT Engineer.

The Design-Builder shall notify the WSDOT Engineer at least 60 Calendar Days prior to fabrication to allow for fabrication plant approval. If deficiencies are found during the plant approval process, additional time will be required to obtain fabrication plant approval.

The Design-Builder shall include the fabrication schedule in a detailed report submitted to the WSDOT Engineer as part of the Monthly Contract Schedule Update. Any change to the current published fabrication schedule shall be communicated in writing to the WSDOT Engineer at least 3 Calendar Days before the proposed effective date.

The Design-Builder shall notify the WSDOT Engineer 14 Calendar Days prior to commencing fabrication of any item, and provide two copies of plans, specifications, and approved Working Drawings for items being fabricated. No fabrication inspection will be performed until the fabrication facility has been approved by the WSDOT Engineer, and the approved Working Drawings have been received.

A Prefabrication Meeting shall be held prior to fabrication of any major item requiring WSDOT fabrication inspection and approval. Major items include, at a minimum, the following:

- Precast concrete wall panels
- Prestressed concrete products
- Precast three-sided structures
- Steel pedestrian and highway bridges

- Wood bridges
- Bridge bearings
- Modular expansion joints
- Sign bridges, gantries, and cantilever sign bridges

The Design-Builder shall be responsible for scheduling the Prefabrication Meeting which shall be held at the facility where the fabrication will take place. The Prefabrication Meeting may be waived upon mutual agreement between the WSDOT Engineer and the Design-Builder. At a minimum, the fabricator's Production Manager and QA Manager, the CQAM, and the WSDOT Fabrication Inspection Office representative shall attend the Prefabrication Meeting.

WSDOT's Fabrication Inspector will be responsible for the following:

- Collecting and reviewing all material certification documents for acceptance
- Collecting and reviewing all of the fabricator's inspection reports for acceptance
- Visually inspecting the fabricated items for acceptance
- Maintaining the IDR

Items requiring fabrication inspection shall be stamped or tagged for approval as specified in Section 9-2 of the WSDOT *Construction Manual* prior to the item being shipped to the Site. Exceptions to in-plant inspections are described in Section 9-4 of the WSDOT *Construction Manual*.

WSDOT will perform random dimensional inspections. The Design-Builder or the fabricator shall be responsible for ensuring compliance with the Contract, performing the Quality Control (QC) inspections, and maintaining all QC records. These records shall be available for review by the WSDOT Engineer.

All items requiring WSDOT fabrication inspection shall be inspected and approved prior to being incorporated into the Project. All documentation collected as part of the WSDOT fabrication inspection shall be retained in the WSDOT Fabrication Inspection Office.

The fabricator or the Design-Builder shall be responsible for all materials QC sampling and testing. WSDOT's Fabrication Inspector shall be responsible for sampling and testing moisture-cured polyurethane, prestressing strand, and high strength bolts that are being used by the fabricator and the shop coating facilities prior to their use.

In the event of noncompliance that will prevent approval of a fabricated item, WSDOT's Fabrication Inspector will notify the fabricator, the CQAM, and the WSDOT Engineer for resolution. All risk for schedule delay due to nonapproval of a fabricated item shall be borne by the Design-Builder.

2.25.5.10 Sign Inspection by the Design–Builder

The Design-Builder shall be responsible for inspection of permanent signs detailed in the Released for Construction Plans except for traffic signs in accordance with this Section. The Design-Builder shall verify that signs meet the requirements of the Contract.

The Design-Builder shall attach a "PEO Approved" decal (see Figure 9-9 in the WSDOT *Construction Manual*) to all approved signs. "PEO Approved" decals will be provided to the Design-Builder by WSDOT Materials and Fabrication Inspection Office. Sign mounting hardware provided by the sign fabricator shall be inspected and approved by the Design-Builder at the Site.

2.25.6 *Handling and Storing Materials*

In storage and handling, the Design-Builder shall protect materials against damage from careless handling, exposure to weather, mixture with foreign matter, and all other causes. The CQAM shall 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.

2.25.7 *Cement Concrete Pavement Mix Design and Batch Plant*

The Design-Builder, or its designee, shall develop the Cement Concrete Pavement (CCP) mix design in accordance with the Standard Specifications. The CQAM shall verify that the concrete mix design conforms to the Contract provisions and to the Standard Specifications.

The concrete batch plant that the Design-Builder uses for the production of cement concrete shall have a current National Ready Mix Concrete Association plant certification. The certification shall be maintained for the duration of the Contract.

2.25.8 *Hot Mix Asphalt Mix Design and Asphalt Concrete Plant*

Hot Mix Asphalt Mix Design – The Design–Builder shall comply with the HMA mix design requirements of Section 5-04 of the Standard Specifications and Section 2.7, *Pavement* for HMA mix submittal criteria.

Hot Mix Asphalt Mixing Plant - The plants used by the Design-Builder for the production of HMA shall conform to all of the requirements of the Standard Specifications. The CQAM shall inspect the HMA plants and document that they meet all requirements.

2.25.9 *State Inspected and Tested Items*

Certain items have been identified by the WSDOT Engineer as critical to the everyday operations of the Project. These items will be inspected and tested by WSDOT to ensure that they meet State and Federal requirements. These items include the following:

Traffic Signs – All traffic signs will be inspected at the point of fabrication by WSDOT. All inspected traffic signs will be tagged by WSDOT's Fabrication Inspector prior to shipment.

Traffic Signal Controllers – Traffic signal controllers provided by the Design-Builder will be tested by WSDOT in accordance with WSDOT Standard Operating Procedure 429 at the State Materials Laboratory in Tumwater, Washington. The Design-Builder is advised that the time necessary to test a traffic signal 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 20 Calendar Days for testing if everything is correct. Only traffic signal controllers tested by WSDOT shall be installed. The Design-Builder shall be responsible for delivery and pick up of traffic signal controllers.

Intelligent Transportation Systems – Refer to Section 2.18, *Intelligent Transportation Systems*, for the division of responsibility between WSDOT and the Design-Builder for testing of the Intelligent Transportation Systems equipment and system.

Hot Mix Asphalt – Unless otherwise explicitly stated elsewhere in this Section, the anti-strip requirements for the HMA mix designs will be performed by the State Materials Laboratory in Tumwater, Washington. The Design-Builder shall be responsible for all acceptance testing for HMA aggregate, mixture, in-place density, cyclic density, and coring as required. The Design-Builder shall be responsible for performing all QA street inspection duties.

Fabrication Inspected Items – WSDOT will be performing fabrication inspections on this Project in accordance with this Section.

Aggregate Source Approval and Qualified Products List– WSDOT will perform all preliminary ASA testing. The Design-Builder's QA shall perform all aggregate acceptance testing. WSDOT will determine materials approval requirements for the QPL.

Miscellaneous Materials Testing – The materials listed below are not statistically accepted and are not included in Table 6 of this Section, but may still require testing. These materials shall generally require a single sample for each lot of material to be tested for acceptance. The Design-Builder shall be responsible for sampling the materials; providing the proper paperwork as described in Chapter 9 of the WSDOT *Construction Manual*; and delivering the samples to the State Materials Laboratory in Tumwater, Washington. The Design-Builder shall provide notice to WSDOT 14 Calendar Days prior to sampling, and coordinate these activities with the WSDOT Engineer. The sampling requirements and the testing procedures shall be in accordance with the WSDOT *Construction Manual*:

- Materials that will be tested by WSDOT:
  - Bagged cement (when quantities exceed 40,000 pounds)
  - Mineral filler
  - Mechanical rebar splices
  - Epoxy systems and epoxy resin
  - Crack injection resin
  - Construction geosynthetic (Geotextiles and Geogrids)
- Materials tested by WSDOT if they are not on the QPL (submitted on a RAM):
  - Rebar chairs and spacers
  - Chain link fabric
  - Wire mesh
  - Fencing tension and barbed wire
  - Grade 1 fence posts
  - Wire fence line posts
- Materials tested by WSDOT if the "material lot" has not been previously tested and listed in the QPL:
  - Hot melt traffic button adhesive
  - Elastomeric expansion joint seals
  - Two-component poured rubber joint sealer
  - Hot-poured joint sealant and crack sealing – rubberized asphalt
  - Pigmented sealer

  - Paint for structures
    - Cured polyurethane
    - Intermediate and stripe coat single component moisture-cured polyurethane
  - Top coat single component moisture-cured polyurethane
  - Curing compound
- Materials Tested by WSDOT for items listed in Section 2.25.5.8 as part of the fabrication inspection program:
  - Reinforcing bars (random sampling for verification program)
  - Prestressing/Post-tensioning reinforcement – strands
  - Prestressing/Post-tensioning reinforcement – bars
  - Moisture-cured polyurethane

2.25.10 *Submittals*

2.25.10.1 Owner's Manuals, Operating Instructions, and Product Data

For equipment and materials that are permanently incorporated in the Work, the Design-Builder shall provide the WSDOT Engineer with all owner manuals and operating instructions furnished by the equipment or material manufacturer. The Design-Builder shall also submit an electronic copy of all manufacturer's warranties, guarantees, instruction sheets, parts lists, and other product data to the WSDOT Engineer for acceptance within 20 Calendar Days of installation of the items to which they relate. The WSDOT Engineer will advise the Design-Builder of the status of this product data within 7 Calendar Days of receipt.

The Design-Builder shall submit an electronic copy of all inspection reports to the WSDOT Engineer, and copies of testing reports within 24 hours of test completion. The Design-Builder shall ensure that the product data cited in this Section is organized and indexed in a manner to allow easy retrieval of information.

2.25.10.2 Materials Certification Package

The Design-Builder shall submit a final Materials Certification Package to the WSDOT Engineer. The Materials Certification shall be signed by the EOR, and the CQAM. The Design-Builder may use WSDOT Form 350-115, *Contract Materials Checklist* or develop its own checklist with the same information. The Materials Certification Package shall include all necessary supporting documentation. This documentation shall consist of all documentation practices used for material acceptance, and an explanation of any deficiencies noted in the checklist. The summary of this documentation shall be organized in an order similar to Division 9 of the Standard Specifications.

2.25.10.3 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

2.25.11 *Statistical Evaluation of Materials for Acceptance*

2.25.11.1 General

Acceptance of materials shall be based on statistical evaluation for the applicable elements as defined in Table 6 of this Section. The Design-Builder shall use WSDOT's SAM software. The material shall be sampled at the point of acceptance in accordance with the applicable test procedure and specifications.

Since these specifications designate the payment of the material by other than a unit bid price basis, the unit price for calculating a price adjustment as stated in Table 5 of this Section will be used. The payment for the price adjustment shall be made under the item "Material Compliance Price Adjustment" and "HMA Compaction Price Adjustment."

Statistical acceptance for aggregate, HMA, and CCP concrete shall be in accordance with this Section. This Section replaces all references to statistical acceptance in the Standard Specifications.

For the purpose of statistical acceptance sampling and testing, a lot is defined as a minimum of three sublots and a maximum of 15 sublots, except that the final lot may be increased to a maximum of 25 sublots. All of the test results obtained for a material type, such as gravel backfill for walls, Crushed Surfacing Base Course (CSBC) or gravel borrow shall be evaluated collectively, except for the following:

- **Hot Mix Asphalt** – Each Job Mix Formula (JMF) and all changes to that JMF shall be evaluated collectively. A compaction lot for HMA shall be in accordance with Section 5-04.3(10) C1 of the Standard Specifications.
- **Cement Concrete Pavement** – Each class of mix shall be evaluated collectively. The total volume of concrete for each lot shall be based on the calculated volume as defined in Section 5-05.4 of the Standard Specifications. All tests performed for QA purposes shall be recorded and incorporated into the lot.

The quantity represented by each sample will constitute a sublot. Sampling and testing for statistical acceptance shall be performed on a random basis at the frequency of one sample per sublot. A lot shall be not less than three uniform sized sublots with a maximum sublot size as stated in Table 6 of this Section for the material being sampled and tested.

After the first three sublots have been tested the CQAM shall compute and maintain the Composite Pay Factor (CPF) of the completed sublots. The CQAM shall furnish the WSDOT Engineer with a copy of the results of all QA testing and the CPF calculations within 24 hours of completing the testing or the next day of business.

A lot containing non-specification material will be accepted provided the CPF reaches the minimum value specified elsewhere. A lot containing non-specification material which fails to obtain at least the specified minimum CPF shall be rejected by the CQAM. The CQAM shall take one or more of the following actions when rejected material has been incorporated into the Work:

1. Require complete removal and replacement with specification material at no additional cost to WSDOT.
2. At the Design-Builder's written request, and with the WSDOT Engineer concurrence, allow corrective Work at no additional cost to WSDOT and then an appropriate price

reduction that may range from no reduction to no payment based on the unit prices in Table 5 of this Section.

Any lot for which at least three samples have been obtained, and all of the test results meet one of the appropriate criteria listed below, will receive at least a 1.00 CPF:

1. All test results are within the allowable limits specified for the item.
2. All test results that only have a Lower Specification Limit (LSL) are greater than or equal to that limit.
3. All test results that only have an Upper Specification Limit (USL) are less than or equal to that limit.

Lots represented by less than three samples or unsampled lots will be exempt from statistical based acceptance.

2.25.11.2 Vacant

2.25.11.3 Rejected Material

The following actions shall be taken regarding defective materials and compaction:

1. **Rejected by the Design-Builder** - The Design-Builder may, prior to sampling, elect to remove any defective material and replace it with new material at no expense to WSDOT. Any such new material shall be sampled, tested and evaluated for acceptance as a part of the sublot in accordance with this statistical sampling and testing procedure.
2. The CQAM may also reject a sublot which tests show to be defective. Such rejected material shall not be used in the Work, and the results of tests run on the rejected material will not be included in the original lot acceptance tests.
3. **Partial sublot** - In addition to the preceding random acceptance sampling and testing, the WSDOT Engineer or the QA tester may also isolate from a normal sublot any material that is suspected of being defective. Such isolated material shall not include any original sample locations. A minimum of three random samples of the suspect material shall be obtained and tested. The material shall then be statistically evaluated as an independent lot in accordance with this Section.
4. **An Entire sublot** - An entire sublot that is suspected of being defective may be rejected by the WSDOT Engineer or the QA tester. When a sublot is rejected, a minimum of two additional random samples from this sublot shall be obtained. These additional samples and the original sublot shall be evaluated as an independent lot.
5. **A Lot in Progress** - The Design-Builder shall shut down operations and shall not resume placement until such time as the CQAM and the WSDOT Engineer are satisfied that specification material can be produced:
   a. When the CPF of a lot in progress drops below 1.00 and the Design-Builder is taking no appropriate corrective action; or
   b. When the PF_i for any test property of a lot in progress drops below 0.95 and the Design-Builder is taking no appropriate corrective action; or
   c. When either the PF_i for any test property or the CPF of a lot in progress is less than 0.75.
6. **An Entire Lot** - An entire lot with a CPF of less than 0.75 will be rejected.

2.25.11.4 Quality Level Analysis

2.25.11.4.1 *General*

Quality level analysis is a statistical procedure for determining the percent compliance of the material with the Contract. Quality level is the computed percent of material meeting these specifications and is determined from the arithmetic mean, (X_m), and the sample standard deviation (S), for each test property of the lot.

The quality level calculations for HMA and other materials are completed using the formulas in this Section. For HMA the definition of the "x" value used in the calculations and the definition of the USL and LSL are in this Section. For other materials, the definition of the "x" value used in the calculations and the definition of the USL and LSL are included in this Section. All other terms and variables are the same for all calculations.

Any necessary rounding of test results or calculations will be accomplished according to the individual testing procedure, or, if not defined in the procedure then according to the following rule:

1. The final significant digit will not be changed when the succeeding digit is less than 5.
2. The final significant digit will be increased by one when the succeeding digit is 5 or greater.

2.25.11.4.2 *Hot Mix Asphalt*

For gradation and percent binder, x = difference between an individual test value and the JMF.

For Air Voids (Va) and Voids in Mineral Aggregate (VMA), x = individual test value.

USL = maximum allowable limit in Section 9-03.8(7) of the Standard Specifications.

LSL = minimum allowable limit in Section 9-03.8(7) of the Standard Specifications.

2.25.11.4.3 *Other Materials*

x = individual test value

USL = upper specification limit

LSL = lower specification limit

2.25.11.4.4 *Quality Level Calculation*

Procedures for determining the quality level and PFs for a material, other than HMA compaction, are as follows:

1. Determine the arithmetic mean, (X_m), for each specified material test property:

$$X_m = \frac{\sum x}{n}$$

Where:

$\sum x$	=	summation of individual test values
n	=	total number test values

2. Compute the sample standard deviation, "*S*", for each test property:

$$S = \left[\frac{n\sum x^2 - (\sum x)^2}{n(n-1)}\right]^{1/2}$$

Where: $\sum x^2$ = summation of the squares of individual test values

$(\sum x)^2$ = summation of the individual test values squared

3. Compute the upper quality index, (Q_U), for each test property:

$$Q_U = \frac{USL - X_m}{S}$$

4. Compute the lower quality index, (Q_L), for each test property:

$$Q_L = \frac{X_m - LSL}{S}$$

5. For each test property determine P_U (the percent within the USL which corresponds to a given Q_U) from Table 1 of this Section. If the USL is 100.00 percent or is not specified, P_U will be 100.

   For negative values of Q_U, P_U is equal to 100 minus the table P_U (e.g. n = 15 and Q_U = - 0.5 will result in P_U = 30). If the value of Q_U does not correspond exactly to a figure in the table, use the next higher value.

6. For each test property determine P_L (the percent within the LSL which corresponds to a given Q_L) from Table 1 of this Section. If a LSL is zero or not specified, P_L will be 100.

   For negative values of Q_L, P_L is equal to 100 minus the table P_L. If the value of Q_L does not correspond exactly to a figure in the table, use the next higher value.

7. For each test property determine the quality level (the total percent within specification limits):

   Quality Level = (P_U + P_L) - 100.

8. Using the quality level from step 7, determine the PF_i from Table 2 of this Section for each property tested.

   Where:

   PF_i = Individual Pay Factor (for each property being tested). (The maximum PF_i is 1.05)

9. Determine the CPF for each lot:

$$\text{CPF} = \frac{f_1(PF_1) + f_2(PF_2) + \cdots + f_i(PF_i)}{\sum f_i}$$

i=1 to j

Where:

CPF = Composite Pay Factor (of all individual Pay Factors (PF_i) for the lot)

Maximum CPF for Aggregates = 1.00

Maximum CPF for Aggregate Compaction = 1.00

Maximum CPF for PCCP Air & Compressive Strength = 1.05

Maximum CPF for HMA Mixture = 1.05

Maximum CPF for Compaction of Subgrade in a cut = 1.00

Maximum CPF for Embankment Compaction = 1.00

f_i = price adjustment factor for the test property, from Table 4

j = number of test properties being evaluated.

10. Determine the Material Compliance Price Adjustment, using the following formula:

MCPA = (CPF – 1) x Q x (K x UP)

Where:

MCPA = Material Compliance Price Adjustment ($)

K = "K" Factor

K = 0.6 for Aggregates

K = 0.4 for Aggregates Compaction

K = 0.60 for HMA Mixture

K = 1.00 for PCCP Air & PCCP Compressive Strength

K = 0.4 for Compaction of Subgrade in a Cut

K = 0.4 for Embankment Compaction

CPF = Composite Pay Factor (from step 9 above)

Q = Total Quantity of Material

UP = Unit Price (from table 5)

A payment or credit, for each lot, in the amount of the MCPA will be taken under bid item Material Compliance Price Adjustment."

For CCP, the Material Compliance Price Adjustment is adjusted based on the volume adjustment as determined by Section 5-05.5(1) of the Standard Specifications.

2.25.11.4.5 *Quality Level Calculation – Hot Mix Asphalt Compaction*

The procedure of determining the quality level and *PFi* for HMA compaction are as follows:

1. Determine the arithmetic mean X_m, for the compaction of the lot:

$$X_m = \frac{\Sigma x}{n}$$

Where:

x = individual compaction test values for each sublot in the lot

Σx = summation of individual compaction test values

n = total number test values

2. Compute the sample standard deviation, "S", for each test property:

$$S = \left[\frac{n\Sigma x^2 - (\sum x)^2}{n(n-1)}\right]^{\frac{1}{2}} \left[\frac{n\Sigma x^2 - (\sum x)^2}{n(n-1)}\right]^{\frac{1}{2}}$$

Where:

Σx^2 = summation of the squares of individual compaction tests

$(\Sigma x)^2$ = summation of the individual compaction test values squared

3. Compute the lower quality index, (QL):

$$Q_L = \frac{X_m - LSL}{S}$$

Where:

LSL = 92

4. Determine P_L (the percent within the LSL which corresponds to a given Q_L from Table 1). For negative values of Q_L, P_L is equal to 100 minus the P_L. If the value of Q_L does not correspond exactly to a figure in the table, use the next higher value.
5. Determine the quality level (the total percent within specification limits): Quality Level = P_L
6. Using the quality level from step 5, determine the CPF from Table 2.
7. If the CPF determined from step 6 is 1.00 or greater: use that CPF for the compaction lot however, the maximum HMA compaction CPF using an LSL = 92 shall be 1.05. If the CPF from step 6 is not 1.00 or greater: repeat steps 3 through 6 using an LSL = 91.5. The value thus determined shall be the HMA compaction CPF for that lot; however, the maximum HMA compaction CPF using an LSL = 91.5 shall be 1.00.
8. Determine the HMA Compaction Price Adjustment (CPA) from the table below, selecting the equation for CPA that corresponds to the value of CPF determined above.

Calculating HMA CPA

Value of CPF	Equation for Calculating HMA CPA
When CPF > 1.00	CPA = [1.00 x (CPF – 1.00)] x Q x UP
When CPF = 1.00	CPA = $0
When CPF < 1.0	CPA = [0.60 x (CPF – 1.00)] x Q x UP

Where:

CPA = Compaction Price Adjustment for the HMA compaction lot ($)

CPF = Composite Pay Factor for the compaction lot from step 7 above

Q = Quantity in the compaction lot (tons)

UP = Unit price of the HMA in the compaction lot ($/ton) (from Table 5)

A payment or credit, for each HMA compaction lot, in the amount of the CPA will be taken under the bid item "HMA Compaction Price Adjustment".

2.25.12 *Materials Tables*

2.25.12.1 Table 1 - Quality Levels/Quality Level Analysis by Standard Deviation Method

Estimated Percent of Work Within Specification Limits

Estimated Percent Within Specification Limits (P_U or P_L)	Upper Quality Index Q_U or Lower Quality Index Q_L								
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10 to 11	n=12 to 14
100	1.16	1.49	1.72	1.88	1.99	2.07	2.13	2.20	2.28
99	-	1.46	1.64	1.75	1.82	1.88	1.91	1.96	2.01
98	-	1.43	1.58	1.66	1.72	1.75	1.78	1.81	1.84
97	1.15	1.40	1.52	1.59	1.63	1.66	1.68	1.71	1.73
96	-	1.37	1.47	1.52	1.56	1.58	1.60	1.62	1.64
95	1.14	1.34	1.42	1.47	1.49	1.51	1.52	1.54	1.55
94	-	1.31	1.38	1.41	1.43	1.45	1.46	1.47	1.48
93	1.13	1.28	1.33	1.36	1.38	1.39	1.40	1.41	1.41
92	1.12	1.25	1.29	1.31	1.33	1.33	1.34	1.35	1.35
91	1.11	1.22	1.25	1.27	1.28	1.28	1.29	1.29	1.30
90	1.10	1.19	1.21	1.23	1.23	1.24	1.24	1.24	1.25
89	1.09	1.16	1.18	1.18	1.19	1.19	1.19	1.19	1.20
88	1.07	1.13	1.14	1.14	1.15	1.15	1.15	1.15	1.15
87	1.06	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.11
86	1.04	1.07	1.07	1.07	1.07	1.06	1.06	1.06	1.06
85	1.03	1.04	1.03	1.03	1.03	1.03	1.02	1.02	1.02
84	1.01	1.01	1.00	0.99	0.99	0.99	0.99	0.98	0.98
83	0.99	0.98	0.97	0.96	0.95	0.95	0.95	0.95	0.94
82	0.97	0.95	0.93	0.92	0.92	0.92	0.91	0.91	0.91
81	0.95	0.92	0.90	0.89	0.88	0.88	0.88	0.87	0.87
80	0.93	0.89	0.87	0.86	0.85	0.85	0.84	0.84	0.84
79	0.91	0.86	0.84	0.82	0.82	0.81	0.81	0.81	0.80
78	0.88	0.83	0.81	0.79	0.79	0.78	0.78	0.77	0.77
77	0.86	0.80	0.77	0.76	0.75	0.75	0.74	0.74	0.74
76	0.83	0.77	0.74	0.73	0.72	0.72	0.71	0.71	0.70
75	0.81	0.74	0.71	0.70	0.69	0.69	0.68	0.68	0.67
74	0.78	0.71	0.68	0.67	0.67	0.65	0.65	0.65	0.64
73	0.75	0.68	0.65	0.64	0.63	0.62	0.62	0.62	0.61
72	0.73	0.65	0.62	0.61	0.60	0.59	0.59	0.59	0.58
71	0.70	0.62	0.59	0.58	0.57	0.57	0.56	0.56	0.55
70	0.67	0.59	0.56	0.55	0.54	0.54	0.53	0.53	0.52
69	0.64	0.56	0.53	0.52	0.51	0.51	0.50	0.50	0.50
68	0.61	0.53	0.50	0.49	0.48	0.48	0.48	0.47	0.47
67	0.58	0.50	0.47	0.46	0.45	0.45	0.45	0.44	0.44
66	0.55	0.47	0.45	0.43	0.43	0.42	0.42	0.42	0.41
65	0.51	0.44	0.42	0.40	0.40	0.39	0.39	0.39	0.38

Estimated Percent Within Specification Limits (P_U or P_L)	Upper Quality Index Q_U or Lower Quality Index Q_L								
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10 to 11	n=12 to 14
64	0.48	0.41	0.39	0.38	0.37	0.37	0.36	0.36	0.36
63	0.45	0.38	0.36	0.35	0.34	0.34	0.34	0.33	0.33
62	0.41	0.35	0.33	0.32	0.32	0.31	0.31	0.31	0.30
61	0.38	0.30	0.30	0.30	0.29	0.28	0.28	0.28	0.28
60	0.34	0.28	0.28	0.25	0.25	0.25	0.25	0.25	0.25
59	0.31	0.27	0.25	0.23	0.23	0.23	0.23	0.23	0.23
58	0.30	0.25	0.23	0.20	0.20	0.20	0.20	0.20	0.20
57	0.25	0.20	0.18	0.18	0.18	0.18	0.18	0.18	0.18
56	0.20	0.18	0.16	0.15	0.15	0.15	0.15	0.15	0.15
55	0.18	0.15	0.13	0.13	0.13	0.13	0.13	0.13	0.13
54	0.15	0.13	0.10	0.10	0.10	0.10	0.10	0.10	0.10
53	0.10	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.08
52	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
51	0.05	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Estimated Percent Within Specification Limits (P_U or P_L)	Upper Quality Index Q_U or Lower Quality Index Q_L					
	n=15 to 17	n=18 to 22	n=23 to 29	n=30 to 42	n=43 to 66	n=67 to ∞
100	2.34	2.39	2.44	2.48	2.51	2.56
99	2.04	2.07	2.09	2.12	2.14	2.16
98	1.87	1.89	1.91	1.93	1.94	1.95
97	1.75	1.76	1.78	1.79	1.80	1.81
96	1.65	1.66	1.67	1.68	1.69	1.70
95	1.56	1.57	1.58	1.59	1.59	1.60
94	1.49	1.50	1.50	1.51	1.51	1.52
93	1.42	1.43	1.43	1.44	1.44	1.44
92	1.36	1.36	1.37	1.37	1.37	1.38
91	1.30	1.30	1.31	1.31	1.31	1.31
90	1.25	1.25	1.25	1.25	1.26	1.26
89	1.20	1.20	1.20	1.20	1.20	1.20
88	1.15	1.15	1.15	1.15	1.15	1.15
87	1.11	1.11	1.11	1.11	1.11	1.11
86	1.06	1.06	1.06	1.06	1.06	1.06
85	1.02	1.02	1.02	1.02	1.02	1.02
84	0.98	0.98	0.98	0.98	0.98	0.98
83	0.94	0.94	0.94	0.94	0.94	0.94
82	0.91	0.90	0.90	0.90	0.90	0.90
81	0.87	0.87	0.87	0.87	0.87	0.87
80	0.83	0.83	0.83	0.83	0.83	0.83
79	0.80	0.80	0.80	0.80	0.80	0.79
78	0.77	0.76	0.76	0.76	0.76	0.76
77	0.73	0.73	0.73	0.73	0.73	0.73
76	0.70	0.70	0.70	0.70	0.70	0.70
75	0.67	0.67	0.67	0.67	0.67	0.66
74	0.64	0.64	0.64	0.64	0.64	0.63
73	0.61	0.61	0.61	0.61	0.61	0.60
72	0.58	0.58	0.58	0.58	0.58	0.57
71	0.55	0.55	0.55	0.55	0.55	0.54
70	0.52	0.52	0.52	0.52	0.52	0.52
69	0.49	0.49	0.49	0.49	0.49	0.49
68	0.47	0.46	0.46	0.46	0.46	0.46
67	0.44	0.44	0.43	0.43	0.43	0.43
66	0.41	0.41	0.41	0.41	0.41	0.40
65	0.38	0.38	0.38	0.38	0.38	0.38

***Estimated Percent Within Specification Limits (P_U or P_L)	Upper Quality Index Q_U or Lower Quality Index Q_L					
	n=15 to 17	n=18 to 22	n=23 to 29	n=30 to 42	n=43 to 66	n=67 to ∞***
64	0.36	0.35	0.35	0.35	0.35	0.35
63	0.33	0.33	0.33	0.33	0.33	0.32
62	0.30	0.30	0.30	0.30	0.30	0.30
61	0.28	0.28	0.28	0.28	0.28	0.28
60	0.25	0.25	0.25	0.25	0.25	0.25
59	0.23	0.23	0.23	0.23	0.23	0.23
58	0.20	0.20	0.20	0.20	0.20	0.20
57	0.18	0.18	0.18	0.18	0.18	0.18
56	0.15	0.15	0.15	0.15	0.15	0.15
55	0.13	0.13	0.13	0.13	0.13	0.13
54	0.10	0.10	0.10	0.10	0.10	0.10
53	0.08	0.08	0.08	0.08	0.08	0.08
52	0.05	0.05	0.05	0.05	0.05	0.05
51	0.03	0.03	0.03	0.03	0.03	0.03
50	0.00	0.00	0.00	0.00	0.00	0.00

2.25.12.2 Table 2 – Pay Factors

PAY FACTOR	Minimum Required Percent of Work Within Specification Limits for a Given Factor ($P_U + P_L$) – 100														
Category	n=3	n=4	n= 5	n=6	n=7	n=8	n=9	n= 10 to 11	n= 12 to 14	n= 15 to 17	n= 18 to 22	n= 23 to 29	n= 30 to 42	n= 43 to 66	n= 67 to ∞
1.05						100	100	100	100	100	100	100	100	100	100
1.04					100	99	97	95	96	96	96	97	97	97	97
1.03				100	98	96	94	92	93	93	94	95	95	96	96
1.02				99	97	94	91	89	90	91	92	93	93	94	94
1.01	100	100	100	98	95	92	89	87	88	89	90	91	92	92	93
1.00	69	75	78	80	82	83	84	85	86	87	88	89	90	91	92
0.99	66	72	76	78	80	81	82	83	84	85	86	87	89	90	91
0.98	64	70	74	76	78	79	80	81	82	84	85	86	87	88	90
0.97	63	68	72	74	76	77	78	79	81	82	83	84	86	87	88
0.96	61	67	70	72	74	75	76	78	79	81	82	83	84	86	87
0.95	59	65	68	71	72	74	75	76	78	79	80	82	83	84	86
0.94	58	63	67	69	71	72	73	75	76	78	79	80	82	83	85
0.93	57	62	65	67	69	71	72	73	75	76	78	79	80	82	84
0.92	55	60	63	66	68	69	70	72	73	75	76	78	79	81	82
0.91	54	59	62	64	66	68	69	70	72	74	75	76	78	79	81
0.90	53	57	61	63	65	66	67	69	71	72	74	75	77	78	80
0.89	51	56	59	62	63	65	66	68	69	71	72	74	75	77	79
0.88	50	55	58	60	62	64	65	66	68	70	71	73	74	76	78
0.87	49	53	57	59	61	62	63	65	67	68	70	71	73	75	77
0.86	48	52	55	58	59	61	62	64	66	67	69	70	72	74	76

***PAY FACTOR	Minimum Required Percent of Work Within Specification Limits for a Given Factor ($P_U + P_L$) – 100														
Category	**n=3**	**n=4**	**n= 5**	**n=6**	**n=7**	**n=8**	**n=9**	**n= 10 to 11**	**n= 12 to 14**	**n= 15 to 17**	**n= 18 to 22**	**n= 23 to 29**	**n= 30 to 42**	**n= 43 to 66**	**n= 67 to ∞*** **
0.85	46	51	54	56	58	60	61	62	64	66	67	69	71	72	75
0.84	45	49	53	55	57	58	60	61	63	65	66	68	70	71	73
0.83	44	48	51	54	56	57	58	60	62	64	65	67	69	70	72
0.82	43	47	50	53	54	56	57	59	61	62	64	66	67	69	71
0.81	41	46	49	51	53	55	56	58	59	61	63	64	66	68	70
0.80	40	44	48	50	52	54	55	56	58	60	62	63	65	67	69
0.79	39	43	46	49	51	52	54	55	57	59	61	62	64	66	68
0.78	38	42	45	48	50	51	52	54	56	58	59	61	63	65	67
0.77	36	41	44	46	48	50	51	53	55	57	58	60	62	64	66
0.76	35	39	43	45	47	49	50	52	54	56	57	59	61	63	65
0.75	33	38	42	44	46	48	49	51	53	54	56	58	60	62	64
REJ E C T	Values Less Than Those Shown Above														

Reject Quality Levels Less Than Those Specified for a 0.75 *PFi*.

Note: If the value of ($P_U + P_L$) - 100 does not correspond to a ($P_U + P_L$) - 100 value in this table, use the next smaller ($P_U + P_L$) - 100 value.

2.25.12.3 Table 3 – Allowable Tolerance for Non-Statistical Materials

Quality Verification Test vs. Quality Assurance Test

SOILS	
TEST	**QUALITY VERIFICATION TEST vs. QUALITY ASSURANCE TEST, +/-**
Plasticity Index (AASHTO T 90)	3
No. 200 Sieve, % (WAQTC FOP for AASHTO T 11/T 27)	1.5
Optimum Moisture, % (WAQTC FOP for AASHTO T 265)	1.0
Proctor Density, lb/ft^3 (WAQTC FOP for AASHTO T 99)	2
Compaction, % (AASHTO T 310)	2.0

Aggregate (Base, Subbase, Backfill, and Mineral Aggregates)	
TEST	**QUALITY VERIFICATION TEST vs. QUALITY ASSURANCE TEST, +/-**
Sieve Analysis (Non-statistical Item) WAQTC FOP for AASHTO T 11/T 27	
No. 4 sieve & larger	5.0
No. 6 to No. 10 sieve	4.0
No. 10 to No. 80 sieve	3.0
No. 80 and No. 200 sieve	2.0
Fractured Faces (WAQTC FOP for AASHTO T 335)	5
Sand Equivalent (WAQTC FOP for AASHTO T 176)	5

HOT MIX ASPHALT	
TEST	**QUALITY VERIFICATION TEST vs. QUALITY ASSURANCE TEST, +/-**
Sieve Analysis (Non-statistical Item) WAQTC FOP for AASHTO T 30	
No. 4 sieve & larger	5.0
No. 6 to No. 10 sieve	4.0
No. 10 to No. 80 sieve	3.0
No. 80 and No. 200 sieve	2.0
HMA Binder (WAQTC FOP for AASHTO T 308)	0.3
Compaction, % (WAQTC FOP for AASHTO T 355)	2.0

CEMENT CONCRETE	
TEST	**QUALITY VERIFICATION TEST vs. QUALITY ASSURANCE TEST, +/-**
Slump of Concrete, (WAQTC FOP for AASHTO T 119)	
¾ inch-Max. Aggregate and Specified Slump 3 inches or less	½
1 ½ inch-Max. Aggregate and Specified Slump greater than 3 inches	1
Air Content, % (WAQTC FOP for AASHTO T 152)	1.0
Temperature, °F (WAQTC FOP for AASHTO T 309)	1
Grout Cubes (WSDOT T 813)	20 percent of the average
Concrete Cylinders (WSDOT FOP for AASHTO T -22)	15 percent of the average

2.25.12.4 Table 4 – Price Adjustment Factors

Item	Maximum Size Sieve: 100 % pass (Note 1)	Nominal Maximum Size Sieve (Note 2)	Other Specification Sieves #4 and Larger	Specification sieves #8 to #100	#200 Sieve	Sand Equivalent	Fracture (Note 3)	Dust Ratio	Other	Compaction
Crushed Screening	2	2	5	5	20		15	-		
Ballast	2	2	5	5	10	15	-	15		(Note 4)
Permeable Ballast	2	2	5	5	-	-	15	-		(Note 4)
Crushed Surfacing	2	2	5	5	10	15	15	-		(Note 4)
Maintenance Rock	2	2	5	5	10	15	15	-		
Streambed Sediment	2	2	5	5	10	-	-	-		
Gravel Base	-	2	5	-	6	10	-	10		(Note 4)
Gravel Backfill for Foundations Class A (Note 5)	2	2	5	5	6	10	15	10		(Note 4)
Gravel Backfill for Foundations Class B	-	2	5	-	6	10	-	10		(Note 4)
Gravel Backfill for Walls	2	2	5	-	6	10	-	10		(Note 4)
Gravel Backfill for Pipe Zone Bedding	2	2	5	5	6	10	-	-		(Note 4)
Gravel Backfill for Drains	2	2	5	-	6	-	-	-		
Gravel Backfill for Drywells	2	2	5	-	6	-	-	-		
Backfill for Sand Drains	-	2	5	3	10	-	-	-		
Sand Drainage Blankets	-	2	5	3	10	-	-	-		
Gravel Borrow	2	2	5	5	5	10	-	-		
Select Borrow	2	2	5	5	6	10	-	-		
Gravel Borrow for Structural Earth Walls	2	2	5	5	5	10	-		Resistivity 10, pH 10, Chlorides 5, Sulfates 5	

Item	Maximum Size Sieve: 100 % pass (Note 1)	Nominal Maximum Size Sieve (Note 2)	Other Specification Sieves #4 and Larger	Specification sieves #8 to #100	#200 Sieve	Sand Equivalent	Fracture (Note 3)	Dust Ratio	Other	Compaction
Foundation Material, Class A & B	-	2	3	-	-	-	-	-		
Foundation Material, Class C	2	-	3	-	-	-	-	-		
Bank Run Gravel for Trench Backfill	2	2	5	-	6	10	-	10		(Note 4)
Hot Mix Asphalt	2	2	2	15	20	-	-	-	Asphalt Binder Content 40 VMA 2, V_a 20	
HMA Mineral Aggregate	-	-	-	-	-	15	15		Uncompacted Void Content 15	
Structural Concrete	-	-	-	-	-	-	-	-	Cylinder Strength	
Paving Concrete	-	-	-	-	-	-	-	-	Cylinder Strength 6/Air Content 4	
Concrete Aggregate	2	2	2	10	20	-	-	-		
Embankment									Compaction 1.0	

Note 1: 100 percent passing size shall be analyzed with a LSL of 99 percent.
Note 2: Nominal maximum size sieve is the largest sieve in the applicable specifications upon which any material is permitted to be retained.
Note 3: Price adjustment factor applies where criteria are contained in the material specification.
Note 4: Compaction has a price adjustment factor of 1.0 and shall be statistically evaluated independently from other test properties in this table.
Note 5: Use the price adjustment factors for either Section 9-03.9(1) Ballast or 9-03.9(3) CSBC for the material that is actually used.

1 **2.25.12.5 Table 5 – Materials Unit Prices**

Material	Unit Price/Ton	Unit Price/CY
Select Borrow	$15.00	$30.00
Gravel Borrow	$15.00	$30.00
Foundation Material Class A & B	$25.00	$50.00
Foundation Material Class C	$25.00	$50.00
Bank Run Gravel for Trench Backfill	$30.00	$60.00
Ballast	$20.00	$40.00
Permeable Ballast	$25.00	$50.00
Streambed Sediment	$30.00	$60.00
Crushed Surfacing	$20.00	$40.00
Maintenance Rock	$20.00	$40.00
Gravel Base	$20.00	$30.00
Crushed Screenings	$20.00	$40.00
Gravel Backfill for Walls	$30.00	$60.00
HMA - Mineral Aggregate, Fracture, SE and Uncompacted Void Content	$15.00	
Hot Mix Asphalt - All Mixes	$85.00	
Gravel Backfill for Foundation Cl. A	$30.00	$60.00
Gravel Backfill for Foundation Cl. B	$30.00	$60.00
Gravel Backfill for Pipe Zone Bedding	$30.00	$60.00
Gravel Backfill for Drains	$30.00	$60.00
Gravel Backfill for Drywalls	$30.00	$60.00
Backfill for Sand Drains	$30.00	$60.00
Sand Drainage Blanket	$30.00	$60.00
Concrete Aggregate (Note 1)	$15.00	$30.00
Cement Concrete		$300.00
Cement Concrete Pavement		$150.00
Gravel Borrow for Structural Earth Walls	$30.00	$60.00
Roadway Excavation (compaction)		$8.00
Embankment	$6.00	$12.00
Note 1: Material Compliance Price Adjustment only applies to the actual type and quantity of aggregate used in the concrete.		

2

1 **2.25.12.6 Table 6 – Sampling and Testing Frequency**

Materials or Item	Test Description	Test Method	Quality Assurance Sample	Quality Verification Sample	F and t Statistical Evaluation	Statistical Acceptance
Aggregates						
Gravel Borrow	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
Select Borrow	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
Sand Drainage Blanket	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
Gravel Base	Grading	WAQTC FOP for AASHTO T 27/T 11		Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
	Dust Ratio	Calculate	Note 1	Note 2	No	Yes
Crushed Surfacing	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	Yes	Yes
	Fracture	WAQTC FOP for AASHTO T 335	Note 1	Note 2	Yes	Yes
Maintenance Rock	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes

	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	Yes	Yes
	Fracture	WAQTC FOP for AASHTO T 335	Note 1	Note 2	Yes	Yes
Streambed Sediment	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
Ballast	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
	Dust Ratio	Calculate	Note 1	Note 2	No	Yes
Permeable Ballast	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Fracture	WAQTC FOP for AASHTO T 335	Note 1	Note 2	No	Yes
Backfill for Sand Drain	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
Crushed Screenings	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
	Fracture	WAQTC FOP for AASHTO T 335	Note 1	Note 2	Yes	Yes
Gravel Backfill for Foundations Class A	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	Yes	Yes
Gravel Backfill for Foundations Class B	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
	Dust Ratio	Calculate	Note 1	Note 2	No	Yes

Gravel Backfill for Walls	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
	Dust Ratio	Calculate	Note 1	Note 2	No	Yes
Gravel Backfill for Pipe Zone Bedding	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
Gravel Backfill for Drains, and Drywells	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
Gravel Borrow for Structural Earth Walls	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	No	Yes
	Sand Equivalent	WAQTC FOP for AASHTO T 176	Note 1	Note 2	No	Yes
CC Paving						
Coarse Aggregate	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
Fine Aggregate	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
Combined Aggregate	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
CC Paving (Completed Mix)	Compressive Strength (28 day)	WAQTC FOP for AASHTO T 23	Note 1	Note 2	Yes	Yes
	Air Content	WAQTC FOP for AASHTO T 152	Note 1	Note 2	Yes	Yes
CC Paving Cores	Thickness	AASHTO T 359	Note 1Note 1	Note 2Note 2	No	No
CC Paving Cement	Chemical and Physical		Certification			

CC Structures						
Coarse Aggregate	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
Fine Aggregate	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
Combined Aggregate	Grading	WAQTC FOP for AASHTO T 27/T 11	Note 1	Note 2	Yes	Yes
CC Structures (Completed Mix)						
	Slump – Consistency	WAQTC FOP for AASHTO T 119	Note 3	Note 2	No	No
	Air Content	WAQTC FOP for AASHTO T 152	Note 3	Note 2	Yes	No
	Compressive Strength (28 day)	WAQTC FOP for AASHTO T 23	Note 1	Note 2	Yes	No
CC Structures Cement	Chemical and Physical		Certification			
Grouts	Grout Cube Strength	WSDOT FOP for AASHTO T 106	One set per day	One set for every 5 days	Yes	Yes
Reinforcement						
Reinforcing Bars	Mill Testing		Manufacturer's Certification of Compliance and Certified Mill Test Report	Random sampling form fabrication verification program	No	N/A
Prestressing/Post-Tensioning Reinforcement – Strand	Yield Strength Elongation Breaking Strength Thickness	Sample per AASHTO M 203 Test per AASHTO T 244	Manufacturer's Certification of Compliance, Certified Mill Test	One sample for every 25 reels	No	N/A

			Report, and the stress/strain curve Verification testing at one sample for every five reels			
Prestressing/Post-Tensioning Reinforcement – Bars	Yield Strength Elongation Breaking Strength	Sample and Test per AASHTO T 244	Two samples from each heat	Samples every five heats, two samples per heat	No	N/A
Asphalt Concrete Pavement						
Asphalt Concrete Pavement (Completed Mix) See Note 4	Grading	WAQTC FOP for AASHTO T 308 and WAQTC FOP for T 30	Note 1	Note 2	Yes	Yes
	Asphalt Content	WAQTC FOP for AASHTO T 308	Note 1	Note 2	Yes	Yes
	Air Voids (Va) ***and Voids in Mineral Aggregate (VMA)*** Voids in VMA	WSDOT FOP for AASHTO T 312 and WSDOT SOP 731	Note 1	Note 2	Yes	Yes
	Maximum Density (Rice Density)	WSDOT FOP for AASHTO T 209	Note 1	Note 2	Yes	Yes
	Compaction	WAQTC FOP for AASHTO T 355	Note 1	Note 2	Yes	Yes
	Cyclic Density	WSDOT SOP 733		As needed	No	No

Combined Aggregate	Sand Equivalent (Sampled at cold feed)	WAQTC FOP for AASHTO T 176	Note 1	Note 2	Yes	Yes
	Fracture (Sampled at cold feed)	WAQTC FOP for AASHTO T 335	Note 1	Note 2	Yes	Yes
	Uncompacted Void Content (Sampled at cold feed)	WSDOT FOP for AASHTO T 304	Note 1	Note 2	Yes	Yes
Mineral Filler	Sp. G and PI		Certification			
Asphalt Materials						
Paving Asphalt (PG, Etc.)	Sampling for DOT Verification Testing	WAQTC FOP for AASHTO R 66	Two 1 Qt. cans Every other mix acceptance sample of HMA		No	N/A
Emulsion for Bituminous Surface Treatment (BST)	Sampling for DOT Verification Testing	WAQTC FOP for AASHTO R 66	–Two 1 Qt. cans Every other shipment		No	N/A
Emulsion for HMA Tack Coat		WAQTC FOP for AASHTO R 66	Two 1 Qt. cans, one sample per Project (Statistically Evaluated Projects Only)		No	N/A
Compaction						
Embankment	Compaction	WAQTC FOP for AASHTO T 310 and WSDOT SOP 615	Note 1	Note 2	Yes	Yes

Cut Section	Compaction	WAQTC FOP for AASHTO T 310 and WSDOT SOP 615	Note 1	Note 2	Yes	Yes
Surfacing	Compaction	WAQTC FOP for AASHTO T 310 and WSDOT SOP 615	Note 1	Note 2	Yes	Yes
Backfill	Compaction	WAQTC FOP for AASHTO T 310 and WSDOT SOP 615	Note 1	Note 2	Yes	Yes
Compaction Standards						
Subgrade Embankment	Granular Compaction Standards	WSDOT T 606 or WAQTC FOP for AASHTO T 180	Develop density curve for each material type used on Project.	Split sample provided to QV for testing	N/A	N/A
	Moisture Density Curve	WAQTC FOP for AASHTO T 99, WAQTC FOP for AASHTO T 272	Develop density curve for each material type used on Project.	Split sample provided to QV for testing	N/A	N/A
Granular Embankment	Granular Compaction Standards	WSDOT T 606 or WAQTC FOP for AASHTO T 180	Develop density curve for each material type used on Project.	Split sample provided to QV for testing	N/A	N/A
	Moisture Density Curve	WAQTC FOP for AASHTO T 99, WAQTC FOP for AASHTO T 272	Develop density curve for each material type used on Project.	Split sample provided to QV for testing	N/A	N/A
Backfill	Granular Compaction Standards	WSDOT T 606 or WAQTC FOP for AASHTO T 180	Develop density curve for each	Split sample provided to	N/A	N/A

			material type used on Project.	QV for testing		
	Moisture Density Curve	WAQTC FOP for AASHTO T 99, WAQTC FOP for AASHTO T 272	Develop density curve for each material type used on Project.	Split sample provided to QV for testing	N/A	N/A
Surfacing	Granular Compaction Standards	WSDOT T 606 or WAQTC FOP for AASHTO T 180	Develop density curve for each material type used on Project.	Split sample provided to QV for testing	N/A	N/A
	Moisture Density Curve	WAQTC FOP for AASHTO T 99, WAQTC FOP for AASHTO T 272	Develop density curve for each material type used on Project.	Split sample provided to QV for testing	N/A	N/A

Note 1: See the WSDOT *Construction Manual*, Section 9-3.7 for sampling and testing frequencies.

Note 2: One QV test for every five QA tests, once process is under control. See section 2.25.5.5.

Note 3: If at any time one load of concrete fails to meet specifications for slump, air content, or temperature, continue testing every load until one successive load meet specifications, and then continue with the established sampling frequency.

Note 4: Mix design conformation samples shall be submitted to the State Materials Laboratory Bituminous Concrete Section. For all projects, submit one sample per day from the first 5 days of production for each plant and one sample every 5th day of production thereafter. The conformation samples shall be taken in conjunction with and be a representative quarter of the acceptance samples taken for the Project as described in WAQTC FOP for AASHTO R47.

If an acceptance sample is not required for any day of production, then a confirmation sample is not required.

Note 5: When Compaction Standards or Moisture Density Curves are developed by QA and QV, whichever value is greater shall be used for testing purposes. Differences of greater than 3lbs/ft3 in Compaction Standards or Moisture Density Curves shall be investigated by the Independent Assurance Inspector for purposes of procedural resolution by the Quality Assurance Task Force.

1 **End of Section**

2.26 Vacant

2.27 Vacant

2.28 Quality Management Plan

2.28.1 *General*

The Design Builder shall generate a Quality Management Plan (QMP) to guide and direct the quality of all design and construction required to deliver the Work. This QMP shall include all elements necessary to provide quality in all aspects and scopes of design, construction, change management and final project documentation/closeout. The QMP shall fully describe the management structure, personnel, roles and responsibilities, standards adopted and specific procedures to be used to ensure the proper quality and contract compliance of all work products delivered in fulfillment of this Contract.

The Quality Management Plan (QMP) shall be consistent with the summary information submitted with the Design-Builder's Proposal, and all comments from its review be resolved to the satisfaction of the WSDOT Engineer. Review and Comment of the QMP by the WSDOT Engineer does not constitute a waiver of any Request for Proposal (RFP) requirements, nor revise the WSDOT Engineer's authority within the RFP. RFP requirements shall take precedence over any of the Design-Builder's QMP provisions that provide a lower standard of performance. If the Design-Builder's Proposal proposes a higher standard of performance than is required in the RFP, the Proposal shall take precedence over the respective RFP requirement. A Draft QMP shall be submitted to the WSDOT Engineer within 30 Calendar Days of Notice to Proceed. The WSDOT Engineer will not accept any Final Design Submittals until the Design-Builder's Final QMP for design has had all comments from its review resolved to the satisfaction of the WSDOT Engineer. No construction Work activities that require Quality Assurance (QA) and Quality Control (QC) inspection and testing shall commence until the Design-Builder's Final QMP for construction has had all comments from its review resolved to the satisfaction of the WSDOT Engineer. The QMP shall remain in effect until all requirements of the Contract have been fulfilled and the Project is accepted.

Fundamental elements of the QMP will include, at a minimum, design, materials, construction, permit compliance, Project closeout, and Project documentation. The QMP shall include a design section to establish how the Design-Builder will oversee, review, correct, verify and document the quality of the design documents (plans, specifications, reports, etc.) generated for this Project.

The Design-Builder's QA Team is responsible for obtaining all documentation necessary for approval and acceptance of materials; obtaining materials certifications as required; ensuring that all required materials testing is completed; and ensuring that all test results meet the Contract requirements. The Design-

Builder's QA Team shall inspect all Work and ensure that sufficient QA staff is present to determine whether the Work complies with Contract requirements, in accordance with the process required in the Contract Documents and the approved QMP.

The Design-Builder shall be responsible for all materials acceptance testing on this Project except for the materials listed in Section 2.25, *Control of Materials*. The Design-Builder's QA Team is responsible for performing all materials acceptance testing referenced in the Standard Specifications, the WSDOT *Construction Manual*, or any other Contract Document.

The QMP shall detail how the Design-Builder shall provide QA and QC for design and construction of the Project, and verify that all environmental and permit commitments are met to ensure the Work conforms to the Contract requirements. The Design-Builder shall comply with the applicable environmental requirements and the WSDOT and AASHTO publications listed in these Technical Requirements (TR) in preparing the QMP. The Design-Builder shall revise the QMP and its implementation when repetitive or recurring quality issues arise.

The Design-Builder's QMP shall include an organizational chart of the QA and QC personnel, listing the number of full-time equivalent employees, specific responsibilities for each employee, and the lines of authority and reporting responsibilities. The QA and QC teams and personnel shall be completely independent of each other, with separate reporting authorities. This organizational chart shall be updated to reflect any changes in QA and QC personnel as the Project progresses. The personnel and organizations performing QA functions shall have sufficient authority and organizational autonomy to identify quality issues, and to be able to initiate, recommend, and verify implementation of Corrective Action Plans. Personnel performing QA functions shall be at an organizational level that ensures they will not be influenced by the impact of the QA measures on the Project schedule, performance, or cost. The QMP shall list by discipline the name, qualifications, applicable certifications, duties, responsibilities, and authority for all personnel proposed to be responsible for QA and QC. Personnel performing QA functions shall not be assigned to perform conflicting duties.

WSDOT has developed a non-project-specific QMP Outline that is available on the WSDOT Design-Build website.

2.28.1.1 Partnering and Dispute Resolution

Partnering shall be considered an integral part of the QMP. A partnering agreement shall be included in the QMP for handling disputes related to quality. During the initial partnering session, a separate procedure for conflict resolution

shall be developed and agreed to by the partners. The procedure shall at a minimum include the following elements:

- Before the Project begins, a time frame for resolving disputes at each level of authority shall be established and a list of typical disputes that could occur on the Project shall be developed.
- Disputes shall be delegated to the lowest appropriate level of authority on the Project team for resolution within the specified time frame.
- If the dispute is not resolved to the satisfaction of both parties within the specified time frame, the dispute shall be automatically elevated to the next level of authority on the Project team. The elevation process shall be developed by and agreed to by both the WSDOT Engineer and the Design-Builder at the conclusion of the initial partnering session.
- If still unresolved, the dispute shall then be directed 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 WSDOT Engineer and Design-Builder, describing the dispute, all subsequent actions, and final disposition of the dispute shall be submitted to the Project records.
- If subsequent disputes arise regarding the same issue, the written report shall be included as a resource during the resolution process.

2.28.1.2 Pre-Activity Meetings

The Design-Builder shall hold pre-activity meetings to ensure that all Project personnel have a thorough understanding of the Work to be accomplished prior to beginning construction on a Work activity. If the scope of a Work activity changes or if different Subcontractors are used to perform a Work activity, additional pre-activity meetings shall be held. Work activities include design, survey, fabrication, and construction activities that generally correspond to the sections of the Standard Specifications, such as clearing and grubbing, earthwork, aggregate base, and Hot Mix Asphalt (HMA), or a definable feature of Work, such as pre-paving conference and pre-pour conferences for bridge decks.

The pre-activity meetings shall include discussions relating to what type of Work shall be accomplished, by whom it will be performed, tools and resources required, and where, when, and how the Work will be done. The pre-activity meetings are to ensure that all parties have the same understanding of the design intent; have the appropriate plans, specifications, environmental requirements, and any special details; and are aware of safety regulations and procedures that need to be followed. The QA inspection checklist for each activity shall be reviewed in the meeting.

Pre-activity meetings shall be scheduled a minimum of 3 Calendar Days, but not more than 10 Calendar Days, or as mutually agreed upon by the Design-Builder and the WSDOT Engineer, prior to the start of each Work activity. The Design-

Builder's Design QA Manager (DQAM) or Construction QA Manager (CQAM) shall plan, conduct, and take minutes at the pre-activity meetings. The Design-Builder shall document any clarifications and understandings related to the Work activity that are not documented elsewhere in the minutes of the meeting. The Design-Builder shall distribute the minutes to attendees and other QA, QC, and Quality Verification (QV) staff who require the information. Pre-activity meetings are classified as Hold Points, and shall be identified in the QMP.

Example topics for a Pre-Activity Meeting:

- 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
- Traffic Control Plan
- Environmental requirements
- Best Management Practices to be installed prior to Work
- Notification, monitoring, and reporting requirements
- Work area ingress/egress
- Coordination and Utilities
- Inspection Plan/QA procedures
- Concurrent Work activities and QA staff coverage
- Status of submittals
- Acceptance criteria, including Hold Points
- Status of materials approval and acceptance requirements
- Frequency of materials testing
- Examination of the Work area
- Examination of stored material
- Open discussion

2.28.1.3 Quality Assurance Task Force

The WSDOT Engineer and the Design-Builder will jointly form a QA task force team. The QA Task Force Meetings will address and rectify issues relating to inspection, substandard material quality, inadequate QA and QC processes that need to be adjusted, test results that are out of tolerance, disparity between QA and QV test data, future quality concerns, disputes regarding correction of Nonconformance Reports (NCRs) and Nonconforming Issues (NCIs), and any issues that the WSDOT Engineer and the Design-Builder may have regarding quality of the Project.

At a minimum, the Design-Builder shall assign the Project Quality Manager (PQM), the CQAM, the DQAM, the QC manager/superintendents, the personnel in charge of QA and QC activities, and any other personnel the Design-Builder acknowledges as having quality-related concerns from the design-build team to the QA Team. The WSDOT Engineer may assign similar personnel related to the Project or others having quality concerns on the Project to the QA Team.

Either the PQM, the DQAM, or the CQAM shall schedule meetings, develop agendas, document the meeting minutes, and distribute minutes to attendees. At the start of the design and construction phases, meetings shall be held weekly to discuss quality issues. The meeting frequency may decrease as quality issues decrease. In the event that Contract performance becomes substandard, the WSDOT Engineer will require that the QA Team meet more frequently.

The Design-Builder shall review all of the current and unresolved NCRs and NCIs during the QA Task Force Meetings. For each NCR and NCI, the Design-Builder shall address the following items at the QA Task Force Meetings:

- Action taken by QC – How will QC or production ensure the NCR/NCI will not be repeated? How has this action been addressed in the QMP?
- Action taken by QA – How will QA ensure the NCR/NCI will not be repeated? How has this action been addressed in the QMP?
- Resolution of the initial issue that caused the NCR/NCI – How was it corrected?
- How to prevent the issue from becoming a recurring error?

Example topics for a weekly Quality Assurance Task Force Meeting:

- Safety
- Schedule
- Review of previous action items from prior weeks
- Current and upcoming activities
- QA/QC inspections and testing
- Materials documentation status
- Review of statistical materials evaluation
- Open NCRs/NCIs
- New issues
- Lessons learned

Note: For each item, the Design-Builder shall record clear action items, due dates, and responsibilities in the meeting minutes.

2.28.1.4 Nonconforming Work

The Design-Builder's QA staff shall identify and document all elements of Work that have not, or are believed to have not, been performed in accordance with the approved drawings and specifications, the Contract Documents, and the reason for

nonconformance in an NCR. The NCR shall be submitted to the WSDOT Engineer in writing within 24 hours of identification, and a copy sent to the Design Manager.

2.28.1.5 Nonconformance Report Remediation

For every instance of Nonconforming Work that is cited by the Design-Builder or by the WSDOT Engineer, the Design-Builder shall perform remediation to bring the Work into compliance with the Contract Documents. The method of remediation shall be chosen by the Design-Builder's Construction Manager and the Engineer of Record (EOR). Remediation may involve additional Work in the field and shall always involve documentation. The remediation chosen by the Design-Builder shall be contractually compliant. When the Design-Builder chooses to repair the Work or to let the Work remain in its As Built condition, the EOR shall evaluate the effect the Nonconforming Work and its remediation has on the performance, safety, durability, long-term maintenance, and the life of the item of Work. This evaluation shall be in the form of a memorandum, sealed and signed by the EOR in accordance with Title 18 RCW and submitted to the WSDOT Engineer for acceptance. For certain circumstances (i.e. temporary Work), the Design-Builder may propose a written letter submitted to WSDOT explaining why an evaluation is not needed, the merits of which will be judged by WSDOT in its sole discretion.

The documentation of the EOR's evaluation submittal shall be included in every NCR or NCI file and submitted to the WSDOT Engineer as part of a Nonconformance Closure Report prepared by the Design-Builder for the WSDOT Engineer. The Design-Builder shall submit copies of the chosen remediation to the WSDOT Engineer for Review and Comment within 7 Calendar Days of completing the Nonconforming Work remediation. If the remediation involves Work in the field, the Design-Builder shall submit an advance copy of the sealed and signed Remediation Plan to the WSDOT Engineer for Review and Comment 24 hours prior, not including weekends and holidays, to starting the remediation. The CQAM shall also sign the NCR/NCI file stating the remedial actions implemented have undergone inspection and testing as required by the Contract Documents. Any new sealed and signed Design Documents that are prepared by the Design-Builder as result of remediation shall be subject to the complete QA and QC process as provided for elsewhere in this Section.

2.28.1.6 Work with Nonconformance Reports

When the WSDOT Engineer does not agree with the remedial actions set forth in the NCR, the WSDOT Engineer has the authority to call for removal of the Nonconforming Work, or to stop Work within that area until the Corrective Action Plan has been approved by the WSDOT Engineer.

2.28.1.7 Nonconformance Reports Reporting

The CQAM shall maintain a log of all NCRs and Corrective Action Plans, and present them at the QA Team meetings. The CQAM shall number each NCR and

Corrective Action Plan sequentially, and shall maintain an active summary log that provides a brief description and status of the Nonconforming Work. The CQAM shall not grant acceptance for any portion of Work that has an outstanding NCR.

2.28.1.8 WSDOT Nonconforming Issues and Audit Findings

WSDOT retains the right to write its own NCIs and audit findings based on its observance of Work. NCIs and Audit Findings generated by the WSDOT Engineer will be entered into the Construction Audit Tracking System (CATS), and will require the same review and ultimate closure as NCRs generated by the CQAM.

2.28.1.9 Executive Management Review

The Design-Builder's executive management (Person or group with overall project management responsibilities) shall approve the QMP, and conduct a review or an internal audit of the QMP at least quarterly, and more frequently if repetitive QA issues and Corrective Action Reports have been issued. This review or internal audit shall ensure the QMP's ongoing suitability and effectiveness in satisfying the requirements of the Contract and the Design-Builder's stated quality policy and objectives.

The Design-Builder shall invite the WSDOT Engineer to participate in the Executive Management Reviews.

At a minimum, the Executive Management Review or internal audit shall evaluate the results of the review, WSDOT audit results, Corrective Action Reports, and plans implemented as a result of the NCRs and NCIs. The Design-Builder shall respond within 20 Calendar Days to requests for the implementation of Corrective Action Plans that result from Executive Management Reviews. The Design-Builder shall incorporate the updated Corrective Action Plan into the QMP in a timely manner. Any changes to the QMP shall be approved by the WSDOT Engineer.

2.28.1.10 Quality System

2.28.1.10.1 General

The Design-Builder shall prepare a QMP that includes a quality system, which meets the Contract requirements.

The hierarchy of the documents describing the quality system shall be:

- Quality policy (for the entire system)
- Quality objectives
- Resources (for each section of the QMP)
- Procedures
- Work instructions

The QMP shall include a flow chart or other graphical representation showing the processes and their relationships to each other, the inspection and test controls, and a narrative for each process.

The QMP shall include written procedures that describe the purpose, overview, responsibilities, and steps of the quality system process, and records resulting from the process.

The QMP shall include an Inspection and Test Plan describing all of the proposed QA inspections and tests to be performed throughout the construction process. The CQAM shall review and approve all Inspection and Test Plans.

In addition, the QMP shall:

- Describe all of the material receiving, in-process, and final inspections and tests to be undertaken.
- Identify what products or services are to be Subcontracted or supplied that require QMP training.
- Describe the process to verify compliance by suppliers and Subcontractors with requirements.
- Identify who within the Construction QA organization has stop Work authority.

2.28.1.10.2 Vacant

2.28.1.10.3 Other Project Documents

The QMP shall describe how it is applied to all submittals required by the Contract. The following is a list of plans and documents that may be required in addition to the design and construction documents specifically addressed in this Section. This is not a comprehensive list; other documents may be required to complete the Work.

- Safety Management Plan, including Accident Prevention Program, and Site Safety Plan
- Project Communications Plan
- Environmental Compliance Plan
- Environmental Commitment Close Out Report
- Environmental permit application materials
- Utility Management Plan
- Project progress schedule
- Submittal schedules
- Design schedule, acknowledging documents, or packages that will be submitted for review
- Roadside Work Plan
- Traffic Management Plan

- Traffic Incident Management Plan
- Issue Resolution Plan
- Document Control Work Plan
- Construction documentation at a minimum including:
  - Inspector's Daily Reports (IDRs)
  - NCRs and NCIs
  - QA and QC inspection checklists
  - Materials Testing Reports
  - Traffic Control Supervisor's Daily Report

2.28.1.11 Pre-Approved Corrective Action Plan

The Design-Builder shall develop a Pre-Approved Corrective Action Plan that shall be incorporated into the QMP. The Pre-Approved Corrective Action Plan shall be approved by the WSDOT Engineer.

The Pre-Approved Corrective Action Plan shall address Work that does not meet specifications, out of specification material, or pre-approved re-work and repair procedures.

The following is a sample list of items for which pre-approved retesting, re-work, and repair procedures are commonly needed. Anticipated failures may include, but are not limited to, the following:

Soil

- Use of improper or incorrect density standards
- Lack of compaction
- Subgrade too wet
- Subgrade too soft
- Slope failure
- Materials out of specification
- Soil too wet

Hot Mix Asphalt

- Materials out of specification
- Low density

Rebar

- Poor or incorrect locations
- Insufficient clearance or lack of support
- Damaged epoxy coating on reinforcing steel, including damage due to field cutting or bending
- Broken ties or displaced bars

- Out-of-specification, post-tension tendon elongations
- Post-tensioning ducts that fail air pressure testing

Concrete

- Slump out of specification
- Improper cold weather curing
- Rock pockets, small and large
- Repair of cracked concrete
- Temperature out of specification
- Air content out of specification (too low or too high)
- Inadequate counter reporting
- Improper certification of compliance
- Exceeding maximum allowed time between concrete lifts
- Over time limit
- Incorrect mix design
- Non-functioning concrete sample cure box

The Design-Builder shall add retesting, re-work, and repair procedures to the QMP as repetitive nonconformances are identified.

2.28.2 *Design-Builder Quality Assurance and Quality Control Staff*

2.28.2.1 Project Quality Manager

The Design-Builder shall designate a PQM who shall be responsible for developing and updating the QMP, ensuring that all elements of Work are performed by the Design-Builder in accordance with the Contract, ensuring adequate staffing and expertise is being utilized for the Design-Builder's QA and QC effort, and scheduling and facilitating the Executive Management Review. The PQM shall report directly to the Person or group with overall project management responsibilities such as the Project Manager, an off-site principal with binding authority for the Design-Builder or an executive oversight committee established for the Project. The PQM could also be the DQAM or the CQAM, but cannot be both the DQAM and CQAM.

Minimum Qualifications

The PQM shall have at least 10 years of recent experience in the management of a quality management program for ***major freeway interchange and highway-widening projects, including fish passage elements ***.

2.28.2.2 Design Quality Assurance Manager

The Design-Builder shall designate a DQAM who shall have overall responsibility for the design portion of the QMP. Through audits, the DQAM shall be responsible for verifying and validating that the QA and QC procedures

required by the QMP are administered and being followed. The DQAM shall audit design packages for both temporary and permanent Work. The DQAM shall report to the PQM. The DQAM could also be the PQM, but cannot be the CQAM.

In accordance with this Section and the QMP, the DQAM shall certify that all Design Documents have been subjected to all required QC checking procedures; all documentation has been completed and filed in an acceptable manner; and all design packages have been subjected to a QA audit prior to submittal to the WSDOT Engineer or prior to release.

Minimum Qualifications

The DQAM shall be a Professional Engineer and have at least 10 years of recent experience in the design or quality management of ***major freeway interchange and highway-widening projects, including fish passage elements .***

2.28.2.3 Construction Quality Assurance Manager

The Design-Builder shall designate a CQAM who shall have overall responsibility for implementation of the construction portion of the QMP. The CQAM shall be responsible for implementing, monitoring, and adjusting the processes to ensure acceptable quality. The CQAM shall report directly to the Project Quality Manager. The CQAM could also be the PQM or the Quality Testing Supervisor (QTS), but cannot be the DQAM.

It is the responsibility of the CQAM to implement quality planning; oversee the QA testing and inspection; and coordinate with WSDOT's verification testing, inspection, and Independent Assurance (IA) requirements. All duties listed for the Project Engineer in Section 9-1.4 of the WSDOT *Construction Manual* shall be the responsibility of the CQAM or designee. The CQAM shall not be assigned to perform conflicting duties on the Project. The CQAM is an oversight position, therefore, shall not perform testing or inspection duties. The CQAM shall have the authority to stop any Work that does not meet the standards, specifications, or criteria established for the Project.

The CQAM or a designated Assistant CQAM shall be available so that they can be on the Project Site within 2 hours of being notified of a problem regarding the QA of any Work being performed by the Design-Builder, or any of its Subcontractors or agents.

Minimum Qualifications

The CQAM shall have at least 6 years of recent experience overseeing the inspection and materials testing on major highway construction projects. Of the 6 years minimum, the CQAM shall have a minimum of 3 years of experience in construction materials acceptance administration and a minimum of 3 years of experience in construction inspection administration. The experience of an assistant to the CQAM may be used to meet the experience requirement of up to 3 years of either construction inspection or construction materials administration.

2.28.2.4 Materials Approval Engineer

The Design-Builder shall designate a Materials Approval Engineer who shall have authority for the approval of all materials, and shall review and approve all materials submitted through Request for Approval of Materials, QPL, and proprietary items for the Project in accordance with Section 9-1.3 of the WSDOT *Construction Manual*. The Materials Approval Engineer shall report directly to the Design Manager. The Materials Approval Engineer could also be the PQM or the DQAM, but cannot have responsibility for construction production.

Minimum Qualifications

The Materials Approval Engineer shall have 5 years of design experience in major highway design or equivalent and shall be a Professional Engineer. The Materials Approval Engineer shall be an employee of the firm that leads the design for the Design-Builder, shall be independent from construction QA, and shall report to the EOR.

2.28.2.5 Quality Testing Supervisor

The Design-Builder shall provide a QTS who may be an employee of the Design-Builder's QA testing laboratory or of the independent testing laboratory hired to perform the QA testing. The QTS shall be a WAQTC certified tester in the Aggregate module, Asphalt level II module, in-Place and Embankment Densities modules. The QTS shall also be certified in concrete testing by the American Concrete Institute (Level I). The QTS or their representative shall be at the Site where the testing is being performed. The QTS shall schedule, review, and verify for compliance all test reports performed by the QA testing laboratory. The QTS shall report to the CQAM. The QTS cannot have responsibility for construction production.

Minimum Qualifications

The QTS shall meet one of the following qualifications:

- Professional Engineer; an Engineer-In-Training; or a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology, Construction, or related degree; and at least 4 years of highway materials testing experience
- Certification by the National Institute for Certification in Engineering Technologies in the Construction Materials Testing field as an Engineering Technician (Level III) or higher, with at least 4 years of experience in the appropriate subfield in which sampling and testing is being performed
- A minimum of 8 years of highway materials testing and construction experience

2.28.2.6 Electrical/Intelligent Transportation Systems Field Inspector

The Design-Builder shall provide an Electrical/Intelligent Transportation Systems (ITS) Field Inspector. The Electrical/ITS Field Inspector shall report to the CQAM. The Electrical/ITS Field Inspector cannot have responsibility for

construction production or QA inspection. The Design-Builder may supply more than one Electrical/ITS Field Inspector if desired or as needed to meet Contract inspection requirements.

The Design-Builder's Electrical/ITS Field Inspector is responsible for the following:

1. Verify that material supplied in the field matches the appropriate material approvals
2. Observe the installation of all illumination, traffic signal, and ITS materials in the field. No Work may be performed and no materials may be installed without the Electrical/ITS Field Inspector present or notified.
3. Notify the WSDOT Engineer when there is a question in regards to any illumination, traffic signal, or ITS equipment installation.
4. Notify the WSDOT Engineer when electrical and ITS components are ready to be inspected for code compliance, functionality, and acceptance as required by WAC 296-46B-010. This notification is required prior to energizing any new equipment, including additions to existing systems.

2.28.2.6.1 Minimum Qualifications

The Electrical/ITS Field Inspector shall have the following minimum qualifications:

- Journey Level Electrician certificate (EL-01) issued by the Washington State Department of Labor and Industries and a minimum of 2 years of experience in the installation of highway electrical systems, including any combination of illumination, traffic signal, and ITS systems experience; or
- A minimum of 4 years of continuous practical experience in the installation or inspection of highway electrical systems, including any combination of illumination, traffic signals, and ITS systems experience; or
- A minimum of 2 years of electrical training in a college of electrical engineering of recognized standing and 2 years continuous practical experience in the installation or inspection of highway electrical systems, including any combination of illumination, traffic signal, and ITS systems experience.

The Design-Builder's Electrical/ITS Inspector shall attend the WSDOT Advanced Electrical Inspection Class at the first available opportunity.

2.28.2.7 Quality Assurance Testing Technicians and Quality Assurance Inspection Technicians

2.28.2.7.1 Quality Assurance Testing Technicians

The QA Testing Technicians performing the field and laboratory QA sampling and testing shall be employed by the Design-Builder or an agent's laboratory. The

QA Testing Technicians shall not be affiliated with or employed by any materials supplier or subsidiaries or the QC organization. The QA Testing Technicians shall not perform QC testing and shall be a separate role from the QA inspector. The QA Testing Technicians shall report to the CQAM or the QTS.

Minimum Qualifications

The QA Testing Technicians shall have the following qualifications for all tests they perform:

- Qualified/certified in accordance with WAQTC Aggregates module, Asphalt Level II module, In–Place Density module and AASHTO R-18, using the procedural checklist in the WSDOT *Materials Manual* (Appendix D). All acceptance testing in the laboratory or in the field that is part of a WAQTC module shall be performed by a WAQTC certified testing technician. The qualifications of the laboratory technicians employed by an AASHTO accredited laboratory will be accepted for performing AASHTO test methods only when confirmed by the laboratory's training and evaluation records. Copies of the qualification/certification records and the procedural checklists for each tester shall be provided to the WSDOT Engineer for review 3 Calendar Days prior to the tester performing any QA testing.
- Qualified in concrete testing by the American Concrete Institute (Level I)
- A minimum of 4 years of experience in WSDOT roadway or highway structures construction inspection.

The competency of each QA Testing Technician shall be re-evaluated annually in all tests they perform, in accordance with the laboratory's *Laboratory Quality Systems Manual* approved by the WSDOT Engineer.

2.28.2.7.2 Quality Assurance Inspection Technicians

The QA Inspection Technicians shall be on-site during all Work activities and shall inspect, verify materials, and document all construction activities for compliance to the Contract. The QA Inspection Technicians shall not be affiliated with or employed by any materials suppliers or subsidiaries or the QC organization. The QA Inspection Technicians shall not perform QC inspection and shall be a separate role from the QA tester. The QA Inspection Technicians shall report to the CQAM.

Minimum Qualifications

The QA Inspection Technicians shall have the following qualifications:

- A minimum of 4 years of experience in WSDOT roadway or highway structures construction inspection.
- Shall be certified in an inspection certification program considered reciprocal to the WSDOT Inspector Certification Program.
    - Acceptable certification programs include but are not limited to: Associated General Contractors of Washington Education

Foundation's (AGCWEF), WSDOT Construction Inspector Certification Program (WSDOTCICP), National Institute for Certification in Engineering Technologies (NICET) and other state DOT inspector certification programs.

2.28.2.7.3 Quality Assurance Staff Training

The Design-Builder shall provide training to the QA staff in the applicable procedures for inspection of Work and material sampling and testing. The professional training and experience of the QA staff (including biologists, hydrologists, and geotechnical engineers) shall be commensurate with the scope, complexity, and nature of the activity to be inspected, monitored, or tested.

The QA Testing Technicians and construction Inspectors may attend the instructional courses WSDOT provides its personnel on a space-available basis, at no cost to the Design-Builder. These classes may be offered only once a year. The following classes will be available:

Course	Hours
Asphalt Paving Street Inspection	4
Drainage Inspection	4
Bridge Substructure Inspection	4
Bridge Superstructure Inspection	4
Drilled Shafts	4
Mechanically Stabilized Earth Walls	4
Project Documentation	4
Excavation and Embankment Inspection	4
Nuclear Gauge, Embankment/Surfacing/Pavement Applications	4
Portland Cement Concrete Pavement Production, Placement, and Field Testing Procedures	4
Electrical – Illumination and Signals	4

2.28.2.7.4 Quality Assurance Staffing Levels

QA staffing levels shall be identified in the QMP and updated as necessary during the course of the Project to reflect the actual construction schedule. The size of the QA staff shall reflect the complexity, needs, shifts, and composition of the construction activities consistent with the construction schedule, relative locations of the Work to be covered, and specific nature of the Work. Revision to the Staffing Plan or organizational chart will not require revision to the QMP unless it is a position identified in the Proposal. If an update is required due to Staffing Plan or organizational chart changes, this may occur as part of the next update to the QMP. The WSDOT Engineer will Review and Comment on proposed staffing levels to ensure the Project requirements are adequately met. Construction shall not take place when QA staffing levels are inadequate to provide the inspection and testing required by the Contract. At a minimum, there shall be at least one QA

Inspector on the Project Site at all times when permanent Work is being incorporated into the Project. The Design-Builder shall identify and provide adequate QA staff to fulfill all inspection and testing requirements, particularly during concurrent Work activities.

2.28.2.7.5 Rights to Remove Quality Assurance Staff

By written notice, the WSDOT Engineer reserves the right to permanently remove any of the following personnel from the Project:

- A QA Testing Technician who does not perform the QA tests in accordance with the test methods
- A QA Testing Technician who does not report test results accurately
- A QA Inspecting Technician or geotechnical or environmental monitor who, in the opinion of the WSDOT Engineer, does not exercise good judgment in the performance of their duty
- A QA Testing Technician who is not certified in accordance with the Contract requirements

2.28.2.8 Quality Control Testers and Personnel

The Design-Builder shall perform, control, and ensure that operational techniques and activities provide acceptable quality, and are in compliance with the Contract. The QC personnel shall be a separate organization within the Design-Builder's organization; the Design-Builder's front line supervisors; the supplier, producer, or manufacturer; but in no case shall be associated with the QA organization. The QC personnel shall be trained and provided the necessary tools, testing procedures, and inspection checklists to ensure the Work product meets the Contract requirements. The QC Testers and Inspectors shall report to the Construction Manager or designee. The designee shall not be the CQAM.

2.28.3 *Design Quality Assurance and Quality Control Requirements of the Quality Management Plan*

2.28.3.1 General

The QMP shall specify all aspects of the QA and QC for design. The QA and QC procedures for each type of Design Document and Released for Construction (RFC) Document shall be organized by engineering discipline. The Design-Builder shall include measures and objective evidence to ensure that appropriate quality standards are specified and included in the Design Documents and RFC Documents.

The QMP shall include the following:

- QA and QC procedures for preparing, submitting, checking, back-checking, correcting, and verifying all plans, calculations, Special Provisions, drawings, and other items to ensure that they are independently checked and back-checked by experienced architects and engineers, in accordance with

generally accepted architectural and engineering practices. The Design-Builder originator, checker, back-checker, corrector, and verifier shall be clearly identified on the face of all submittals.

- Specific procedures for validating computer programs used on the Project
- QA and QC procedures for verifying that all submittals meet the requirements of the Contract
- Assurance that all materials, equipment, and elements of Work have been specified and designed to perform satisfactorily for the purpose intended
- A defined process for stamping, signing, and dating, plans, reports, and other documents by the responsible Professional Engineer, where required by the Contract
- The level, frequency, and methods of review for the adequacy of the design of the Project, ***including technical and peer reviews
- Peer reviews may be necessary as defined in other Sections of the Technical Requirements. The process and procedure for these types of reviews shall be detailed within the QMP.***
- The method by which drawing changes are incorporated into a plan sheet. This shall include specific definitions of Minor Change and Revision, the threshold between them, and how such changes will be reflected in a Design Document or RFC Document. The QMP shall also identify the specific process by which Revisions will be reviewed and stamped by the original EOR including the process for evaluating the effect that nonconformances will have on the performance, durability, long-term maintenance, and life of the item of Work.
- The procedures for coordinating Work performed by different personnel in the same area, in adjacent areas, or on related tasks to ensure that conflicts, omissions, or misalignments do not occur between the drawings or between the drawings and the specifications; and to coordinate the review, approval, release, distribution, and revision of documents involving such personnel
- Identification of those elements of the Contract, Design Documents, or RFC Documents requiring special QA and QC attention or emphasis, including applicable standards of quality or practice to be met, and level of completeness, extent of detailing required, or both
- Identification by discipline of the name, qualifications, duties, responsibilities, and authorities for all persons responsible for QA and QC
- Description of the name, qualifications, duties, responsibilities, and authorities of external technical experts necessary to ensure the quality of the design of the Project. Information regarding the anticipated timing, use, anticipated availability, and any coordination required with respect to any experts.
- Procedures for ensuring that the documents fully provide for constructability and compatibility of materials

- Identification of the inspection guidelines for each item of Work to determine what significant characteristics of each item needs 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 guidelines shall include the appropriate criteria, tests, and inspection requirements described in this Section.
- Descriptions of the required design QA and QC functions, including scheduled activities for design QA and QC identifying the Design Documents and RFC Documents to be delivered to the WSDOT Engineer for Review and Comment at each stage of the design or construction phase of the Project. The QMP shall specify written certifications by the DQAM for each submittal document showing that all QMP requirements have been completed satisfactorily.
- Development and maintenance of an accessible Document Control System (DCS) by the Design-Builder to provide all relevant design inputs, including a list of references to design inputs that shall be used by design personnel in the design
- Verification by the Design-Builder that the design inputs are communicated to, and accessible by, the relevant designers responsible for incorporating design inputs into the design
- Specification of QA procedures to verify the construction surveying, property surveying, establishment of Right of Way (ROW) markers, As Built Plans, re-established city, county, and subdivision monuments, and Record of Survey Map
- A defined process for tracking the design drawings through the Final Design Documents, including the RFC Documents
- Geotechnical Special Inspection Plan (GSIP)

The QMP shall describe procedures to require that a written certification is signed by the DQAM verifying that all quality procedures have been completed in accordance with the QMP prior to being sent to the WSDOT Engineer for Review and Comment

2.28.3.2 WSDOT Design Review

The QMP shall define the timing, content, and format of all design reviews and shall incorporate all of the requirements of the TR. The Design-Builder shall include a monthly design submittal schedule prior to design review submittals as specified in the QMP. Unless otherwise stated in the Contract, the Design-Builder shall provide a 14 Calendar Days review period for the WSDOT Engineer Review and Comment on all design submittals, except for submittals received between 6:00 pm Friday and 6:00 am the following Monday, in which case the WSDOT Engineer reserves the right to extend the review time by 2 Calendar Days. WSDOT reserves the right to extend the review time by up to 7 Calendar Days for submittals that are received between November 15 and January 1, for submittals

with overlapping review periods, which are being reviewed by the same discipline team, and for submittals that contain over 100 pages of plans or calculations.

The Design-Builder shall address all comments made by the WSDOT Engineer in each submittal, and shall include comment resolutions in subsequent submittals.

The Design-Builder shall schedule and maintain minutes of all resolution meetings with the appropriate WSDOT staff to document and resolve the Design-Builder's responses to the comments. It is intended that all comments shall be resolved at these meetings. If agreement is not reached on any specific comment, it shall be resolved as described in the QMP.

2.28.3.3 Design Task Forces and Over-The-Shoulder Reviews

The QMP shall also include processes and procedures for how regular (weekly) scheduled task force meetings between the WSDOT Engineer and the Design-Builder will be used to support quality goals. These meetings, combined with over-the-shoulder reviews, shall be an integral part of the process to discuss and resolve design issues outside of the formal review process.

The QMP shall define how over-the-shoulder reviews with WSDOT during the course of the development of each design package will be included. The over-the-shoulder reviews are not Hold Points that restrict the progress of design. They are reviews of the design as it progresses, and opportunities for the WSDOT Engineer to provide comments and feedback on the design.

2.28.3.4 Released for Construction Document Review

At a minimum, the Design-Builder shall provide a preliminary and a final submittal of all plans, Technical Specifications, and resolve, all comments prior to being RFC. Working Drawing comments shall be resolved prior to being RFC. Special Provisions shall not be included by reference, but shall have their full text included in the Final Design Submittal and RFC Documents. Special Provisions that are not part of the Work shall not be included in the RFC Documents. Any deviation from the Mandatory Standards and these TR shall be approved by the WSDOT Engineer prior to a submittal being RFC.

Construction shall not proceed on any element of Work until the relevant submittal is stamped "Released for Construction" by the DQAM, and all required approvals have been obtained by the Design-Builder.

2.28.3.4.1 Technical Specifications

The Standard Specifications are supplemented and modified by, the Special Provisions, and these TR. The Design-Builder shall develop any Project Specifications required to address Work not covered by the Standard Specifications, Special Provisions, or these TR. If a Project Specification is determined by the WSDOT Engineer, in its sole discretion, to be a change to the Standard Specifications, , or Special Provisions; the Design-Builder shall submit a Design-Builder Initiated Change in accordance with Section 1-04.4 of the *General Provisions*.

2.28.3.4.2 Preliminary Design Submittal

The Preliminary Design Submittal shall provide a formal opportunity for WSDOT, the Design-Builder, various design team disciplines, and other approved Project stakeholders to ensure through construction document review that the design is progressing appropriately and proceeding in the right direction; that the plans reflect Design-Builder requirements for construction; that design features are coordinated; and that there are no fatal flaws within a given discipline or between disciplines. The minimum contents of the Preliminary Design Submittal for each discipline shall be as specified in this Section and as mutually agreed upon by members of the applicable task force; or by agreement between the WSDOT Engineer and the Design-Builder if no specific task force applies.

The Design-Builder shall include calculations, MicroStation, and InRoads files as necessary to allow for adequate review.

2.28.3.4.3 Final Design Submittal

The Final Design Submittal shall be prepared when the design for a given element or area is complete. The Final Design Submittal shall include plan sheets, specifications, technical memorandums, reports, calculations, Hold Points, and other pertinent data, as applicable. As a result of the on-going discussion and resolution of design and construction issues through the regularly-scheduled task force meetings and over-the-shoulder reviews, it is anticipated that there will be very few revisions or changes at this stage.

The Final Design Submittal shall include the Technical Specifications. Following resolution of all comments, the Final Design Submittal may proceed through the written certification process described below in preparation for being RFC.

2.28.3.4.4 Released for Construction Documents

The QMP shall describe how the Design-Builder will ensure that the RFC Documents reflect all QA, QC, and design reviews required by the QMP and the Contract. The QMP shall also describe the written certification process to be used to verify to the WSDOT Engineer that all QA procedures have been completed to ensure that all review comments have been incorporated as agreed to during the comment resolution process between the WSDOT Engineer, any affected municipalities, and the Design-Builder, and that the documents are ready to be RFC.

Each sheet of the plan set and the cover of each set of Technical Specifications in the RFC Documents shall carry the Professional Engineer's stamp and signature, and shall be stamped "Released for Construction" and initialed and dated by the DQAM.

Once plans, associated Hold Points, and Technical Specifications have been RFC, the Design-Builder shall provide the WSDOT Engineer with files of all RFC Documents. Electronic files shall be provided in both MicroStation, InRoads, and PDF formats, shall be in accordance with the WSDOT *Electronic Engineering Data Standards* (Appendix D), and shall be submitted electronically. The

electronic drawing files shall include copies of all sheet and reference files used in the RFC Documents.

Prior to submittal, electronic files for all RFC Documents, except the Traffic Control Plans, shall be checked by the Design-Builder to ensure that they conform to the WSDOT *Plans Preparation Manual* file naming and drawing symbology (e.g., level contents, and line and text symbology). The drawing symbology and file naming for each electronic drawing file shall meet or exceed a minimum conformance level of 90 percent, and the average conformance level for all drawing files shall be 95 percent or greater. Traffic Control Plans are not required to meet the conformance level criteria. The Design-Builder shall provide the WSDOT Engineer with a Microsoft Excel spreadsheet for each RFC submittal containing the file name and the corresponding conformance level for every file that is part of the submittal. Certain files provided to the Design-Builder by the WSDOT Engineer, such as base mapping or vicinity maps, may be excluded from the conformance level requirement. The Design-Builder shall obtain written confirmation from the WSDOT Engineer as to which files are exempt from compliance with the WSDOT *Plans Preparation Manual*.

Construction shall not proceed on any element of Work until the relevant submittal is stamped "Released for Construction" by the DQAM, and all required government and private approvals have been obtained by the Design-Builder.

2.28.3.5 Quality Assurance and Quality Control of Design Changes

The QMP shall describe the process for implementing design changes, including field changes, shown on the Design Documents and RFC Documents. The design changes shall be subject to QA and QC measures and procedures, commensurate with those applied to the original design or that portion of the Project under consideration for change.

The QMP shall explain how changes will be identified as a Minor Change or Revision and then identify how Revisions to Design Documents and RFC Documents will be incorporated, stamped, and reviewed before being re-released.

The QMP shall also address and clearly define the number of changes to a drawing that will result in a drawing revision, and the time frame for the release of the updated drawing. Each drawing revision shall 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 document with an explanation of the change.

2.28.3.6 Working Drawings

The QMP shall describe the personnel assigned to Working Drawing review and approval, the procedures for documenting reviews and obtaining approvals, the process for implementing corrective actions, the procedures for auditing and checking compliance to Working Drawings, and the distribution to the WSDOT

Engineer. The Design-Builder shall check and verify that Working Drawings are in compliance with the Technical Specifications and RFC drawings.

The Design-Builder shall include in their QMP a complete listing of all Working Drawings, including the classification category (Type 1, 2, 2E, 3, or 3E) of each drawing, that are required for the Project.

Working Drawings requiring Engineering, Types 2E and 3E, shall be prepared by (or under the direction of) a Professional Engineer, and in accordance with WAC 196-23-00. Associated supporting calculations shall carry the Professional Engineer's seal with registration number, signature, and date of signature on the cover page. The cover page shall also include the Contract number, the Contract title, and a sequential index to the calculation page numbers.

Working Drawings classified as Type 2, 2E, 3, and 3E shall be reviewed by the Engineer of Record of the RFC drawings if the Working Drawing contains shop/fabrication drawings, installation plans, formwork or falsework plans, erection plans, repair procedures, or any proposed modification to the Work or sequence of Work as shown the RFC drawings.

The Design-Builder shall submit all Working Drawings to the WSDOT Engineer. The submittal shall be in PDF format; drawing details shall be prepared in accordance with conventional detailing practices. If the WSDOT Engineer offers any comments, they will be submitted to the Design-Builder in accordance with this Section. Illegible documents will be returned and resubmittal will be required.

Prior to submittal to the WSDOT Engineer, the Design-Builder shall resolve all comments from the Design-Builder's reviewer and provide a submittal that clearly indicates the Design-Builder has no further comments. The Design-Builder shall certify that the information on the Working Drawing meets the requirements of the Contract and is in conformance with RFC Documents, including the plan sheets and Technical Specifications.

Type 1, 2, and 2E Working Drawings shall be submitted to WSDOT after RFC and a minimum of 7 Calendar Days before Work represented by the submittal begins.

The Design-Builder shall provide a 14 Calendar Day review period for the WSDOT Engineer to Review and Comment on Type 3 and 3E Working Drawing Submittals, except for submittals received between 6:00 pm on Friday and 6:00 am the following Monday, in which case the WSDOT Engineer reserves the right to extend the review time by 2 Calendar Days. The WSDOT Engineer reserves the right to extend the review time by up to 7 Calendar Days for submittals that are received between November 15 and January 1. The Design-Builder shall resolve all comments prior to RFC.

2.28.3.7 As Built Documentation

The QMP shall describe how the Design-Builder will ensure that the As Built Plans meet the requirements of the Contract and accurately represent the as-constructed conditions in the field; and how the As Built Plans are updated

continuously to reflect all changes and made available for periodic reviews conducted by the WSDOT Engineer or their designees.

2.28.3.8 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 DCS, in accordance with Section 2.1, *General Information*, to store and record records including, at a minimum, all correspondence, meeting minutes, design inputs, drawings, progress reports, technical reports, specifications, Contract Documents, submittals, calculations, test results, inspection reports, NCRs, administrative documents, and other documents generated under the Contract. The Design-Builder shall ensure that its DCS is compatible with the DCS used by the WSDOT Engineer.

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 the 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 the WSDOT Engineer upon Final Acceptance unless required to be delivered earlier pursuant to the Contract; or within 7 Calendar Days of receipt of request from the WSDOT Engineer, even if the documents are incomplete. The documents shall include all test documentation, including those prepared by the WSDOT Engineer.

2.28.3.8.1 Document and Data Approval and Issuance

The QMP shall include a requirement that all submittals include a signed and dated certification by the originator of the submittal, and that the submittal is complete and meets the Contract requirements.

2.28.3.8.2 Document and Data Changes

The QMP shall include a requirement that any changes to documents provided to the WSDOT Engineer are in a format that shows the changes clearly, and in a method that is easily trackable (e.g., documents use the redline/strikeout method).

2.28.3.9 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 and meets the requirements of the Contract Documents.

2.28.4 *Materials Quality Assurance and Quality Control Plan Requirements*

2.28.4.1 General

The QMP shall specify all aspects of the Materials QA and QC Plan. At a minimum, the Materials QA and QC Plan shall include the items described in this Section to verify that all materials conform to the Contract requirements. The Materials QA and QC Plan shall be separate functions performed by separate personnel who have no affiliation to each other or to the same organization.

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 QC measures are intended to ensure that operational techniques and activities provide material of acceptable quality.

The Materials QA organization shall be responsible for the acceptance of all materials and workmanship incorporated into the Project. The Materials QA organization shall also perform sampling and testing, determine acceptance or rejection of the materials, and implement a tracking system to monitor nonconforming materials and disposition of nonconforming materials, according to the Contract.

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 shall be carried out at appropriate stages of construction in accordance with the planned Work and minimum frequencies for sampling and testing as described in Section 2.25, *Control of Materials.*

The Design-Builder's QA test data shall be used for acceptance, provided it can be statistically verified by the WSDOT Engineer's QV test data, except as noted in this Section. In the event of discrepancies between the WSDOT Engineer's and the Design-Builder's test data: the QA Team will attempt to resolve them through the QA task force. If a resolution cannot be reached, then WSDOT's QV test results shall be used for acceptance.

The levels of quality management provided by the Design-Builder and the WSDOT Engineer where testing is being used for acceptance are:

Quality Control – The Design-Builder shall be responsible for QC, which is defined as activities performed by the Design-Builder, the producer, or the manufacturer to ensure that a product is of uniform quality, meeting the Contract requirements. Components of QC may include inspecting and obtaining material certifications, materials handling, construction procedures, calibration and maintenance of equipment, production process controls, and any sampling, testing, or retesting conducted for these purposes.

Quality Assurance – The CQAM shall be responsible for the materials sampling, testing, and processes for QA. Testing for QA includes all planned (e.g., audits and assessments) and systematic actions necessary to ensure that all materials incorporated into the Work meet the Contract requirements for the material being used, and will perform satisfactorily for the purposes intended. All materials sampling and testing for QA shall be performed by a statistically valid, random sampling method using testing methods and minimum frequencies defined in this Section, the WSDOT *Construction Manual*, the WSDOT *Materials Manual,* and the Contract.

Quality Verification – The WSDOT Engineer or its agent will perform an independent material QV 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 using testing methods defined in the WSDOT *Construction Manual,* the WSDOT *Materials Manual*, and the Contract.

WSDOT Acceptance Testing – WSDOT will perform Inspection and Acceptance Testing in accordance with Section 2.25, *Control of Materials*.

Independent Assurance – The IA is an independent verification performed by the WSDOT Engineer which includes an observation of sampling and testing procedures, a review of the qualifications of the tester, and a verification of the testing equipment used to perform acceptance testing activities. The IA will validate both the Design-Builder's QA processes and WSDOT's QV processes. The IA may include auditing of acceptance testing records, observing the tests being performed by the Design-Builder's technicians, or taking split samples with the Design-Builder on a random basis for verifying the Design-Builder's testing equipment. WSDOT will enter findings of all IA observations into the CATS. Any deficiency will result in a NCI. The Design-Builder shall take corrective action immediately for any noted deficiencies.

Quality Assessment – WSDOT will perform nonscheduled quality assessments of the Design-Builder's Work, including sampling, testing, and documentation reviews.

2.28.4.4 Materials Testing Laboratory

All QA testing that will be used for acceptance of materials shall be performed by a laboratory approved by the WSDOT Engineer. The QA Laboratory Manager shall report directly to the QTS. The Design-Builder or a Subcontractor shall employ the laboratory personnel. The materials testing laboratory that is used for QA testing shall not perform QC testing, and shall not be owned, operated, equipped, or staffed by material suppliers. The laboratory shall meet the requirements of AASHTO R 18 for WAQTC certified/qualified testers and calibrated/verified equipment, and be able to accomplish the testing according to the test procedure they are performing.

The Design-Builder's laboratory shall develop and maintain a *Laboratory Quality Systems Manual*. The Manual shall include the following:

- Staff qualifications, position descriptions, and the qualification process
- Listing of test procedures approved for performance throughout the Project
- Equipment including verification, calibration, recall procedures, and inventory
- Test reports, worksheet, summary logs, and forms
- Sample management procedures
- Diagnostic and Corrective Action Reports
- Quality systems review

The WSDOT Engineer will perform an on-site evaluation of the facility, in accordance with WSDOT QC 3, Quality Systems Laboratory Review in the WSDOT *Materials Manual*, to ensure all Work is being performed according to the Contract. The evaluation will include audit and inspection functions, review of training, equipment calibration, verification of records, and observance of testers as they perform the test procedures. For laboratories located outside of Washington State, or laboratories performing only minor testing, WSDOT may use the AASHTO Accreditation Program, or another state's Department of Transportation to inspect the laboratory.

The Design-Builder shall request the WSDOT inspection a minimum of 14 Calendar Days prior to the start of testing. Together with the request, the Design-Builder shall submit a copy of the *Laboratory Quality Systems Manual*, and a list of the testing procedures that the laboratory shall perform throughout the Project. The laboratory shall be properly equipped, staffed, and fully operational at the time of WSDOT's inspection and for the duration of its use on the Project.

WSDOT will advise the Design-Builder in writing of any deficiencies noted during the inspection, and the Design-Builder shall take immediate action to correct them. Work requiring laboratory acceptance will not proceed until the laboratory and its staff has been inspected and has received written approval from the WSDOT Engineer.

The test equipment for the following test procedure shall be as shown below and in the Field Operation Procedure (FOP) in accordance with the WSDOT *Materials Manual* so that proper correlation between the QA and QV test results may be established.

- WAQTC FOP for AASHTO T 310 In-place Densities by Nuclear Method (Troxler 3430, or 3440 Series Moisture/Density Gauge)

2.28.4.5 Materials Testing Frequencies and Random Sampling

The Design-Builder shall perform field and laboratory sampling and testing as specified in the Standard Specifications and the WSDOT *Materials Manual* to control these processes. The Design-Builder shall provide a minimum of 3 Calendar Days notification to the WSDOT Engineer prior to sampling and testing. Sampling and testing shall be performed by qualified testing personnel described

in this Section. Representative samples shall be randomly obtained by the Design-Builder at specified frequencies as shown in Section 2.25, *Control of Materials*. The Design-Builder shall furnish copies of all test results to the WSDOT Engineer within 24 hours of completion of the test or the next Calendar Day For concrete cylinders, the test results shall be furnished within 24 hours after cylinder break.

The WSDOT Engineer or its agent will perform nondestructive shaft QV tests on at least one and up to 10 percent of the drilled shafts constructed for bridges. The Design-Builder shall make the shafts accessible to WSDOT Inspectors for nondestructive shaft testing and shall notify the WSDOT Engineer when drilled shaft concrete is placed in each shaft so the WSDOT Engineer can schedule nondestructive shaft QV testing. The WSDOT Engineer will inform the Design-Builder if a shaft will be nondestructive shaft tested within 2 Calendar Days of receiving the Design-Builder's notification that shaft concrete has been placed.

The WSDOT Engineer or its agent will perform independent materials QV sampling and testing to validate the Design-Builder's sampling and testing QA program. Typically, the testing rate will be one verification test to every five of the Design-Builder's acceptance tests. During production startup, the QV testing will be performed at the same frequency as the Design-Builder's QA program for the first five samples, to establish a statistical base for verification and acceptance. If at any time the QA and QV statistical base is not statistically validated, the QV testing may increase until the F and t variances are considered under control. When QV testing reaches 25 samples, and the QA and QV testing can be statistically validated, the frequency of the QV tests may be reduced to one in 20. If at any time the QA and QV testing results have wide variances or cannot be validated, the QV testing frequency shall be increased to one in five until 25 samples are reached again with satisfactory statistical validation.

If the Design-Builder elects to take extra samples, the QV sampling frequency shall continue to be based on the frequency described in Section 2.25, *Control of Materials*.

For HMA, the Design-Builder shall conduct the acceptance testing for asphalt treated base and HMA aggregate, mixture, in-place density, and cyclic density at the frequency described in Section 2.25, *Control of Materials*.

Materials that require less than five tests for acceptance, or that have less than five sublots, will require the WSDOT Engineer and the QA personnel to test at the same frequency. Refer to Chapter 9 of the WSDOT *Construction Manual* for testing requirements. For all materials that are not addressed by WSDOT standards, the material testing specifications, testing procedures, and frequencies shall be determined by the QA Team with the EOR's concurrence.

Small quantities of materials 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 shall not be considered as a small quantity. The CQAM shall follow the procedure for acceptance of small quantities described in this Section.

2.28.4.6 Testing Plan

All acceptance and verification sampling and testing shall be randomly obtained, at the location and frequency stated in the Contract. The Design-Builder shall provide a Testing Plan for each material to the WSDOT Engineer. The Testing Plan shall identify the frequency, location for testing, test procedures, attributes to test, material acceptance requirements, Sampling Plan developed using WSDOT Test Method T 716 Method of Random Sampling, or other random number generator, and the estimated Project quantity. The Testing Plan shall be submitted prior to the beginning of production or placement of the material. The QMP shall include a method for notifying the QA organization of the quantity of material produced, placed, or delivered to the Project, so that the testing effort can be current.

2.28.4.7 Materials Quality Analysis Program

The Design-Builder's QA sampling and testing results shall be used for acceptance provided that they are validated by WSDOT's QV sampling and testing.

Both the Design-Builder's QA and WSDOT's QV test results shall be recorded in the statistical analysis of materials software that will be provided by the WSDOT Engineer. This software shall be used to statistically evaluate the QA test data against the QV test data to determine the acceptability of the QA test data. This evaluation shall be performed by using the F and t Test analysis tool. This evaluation shall be performed on all test results for the total quantity of material placed for a single material type such as gravel backfill for walls, Crushed Surfacing Base Course, or gravel borrow. There needs to be at least three QA and three QV test results to perform the F and t analysis.

The CQAM shall be responsible for performing this evaluation. Any test data that is found to be outside the normal F and t distribution shall be reviewed by the QA Team, and a determination shall be made as to why the test data is outside the normal distribution.

The QA Team shall identify the cause of discrepancies in the test results and generate a report defining the problems, the cause of the problems, and the solutions to prevent a recurrence. At a minimum, the review shall include the following actions:

- A check of test data, calculations, and results
- An observation of the sampling and testing by the IA Inspector
- A check of test equipment by the IA Inspector

The investigation and resolution of the discrepancy shall be documented by the QA Team in the QA Task Force Meeting minutes within 14 Calendar Days of the noted discrepancy, unless IA investigation is delayed due to scheduling. If the QA Team fails to identify the cause of discrepancies in the test results, then WSDOT's QV test results shall be used for acceptance.

2.28.4.8 Materials Documentation Review

The Design-Builder shall schedule regular documentation reviews to ensure that all materials documentation and certifications are complete prior to the material being installed on the Project.

WSDOT will perform periodic formal materials documentation reviews at approximately 25 and 75 percent Completion of construction. Items to be reviewed will be randomly selected by the WSDOT Engineer. These reviews are intended to ensure the Design-Builder is maintaining all necessary materials documentation and records. A final review will be performed at the Completion of the Project to ensure that all materials documentation is correct. A separate materials review may be performed by the State Materials Laboratory.

In addition to the formal reviews, WSDOT on-site personnel will perform periodic 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 Assurance and Quality Control Plan Requirements*

2.28.5.1 General

The QMP shall include a program for construction inspections, examinations, measurements, and tests of materials or elements for each Work operation, where appropriate, to verify quality. The requirement for these inspections is not limited to those required for quality testing purposes.

The QMP shall specify all aspects of QA and QC for construction. At a minimum, the QMP shall include the following items to verify that all construction activities conform to the Contract requirements:

- Project progress schedule
- Submittal schedule
- Design schedule, acknowledging documents, and packages that will be submitted for review
- Inspection requirements
- Instrumentation and survey monitoring for verification of the performance of the Project geotechnical features
- Specific documentation for QA and QC activities, including control charts
- WSDOT requirements for corrective action and Corrective Action Plans when QC or acceptance QA criteria are not met

2.28.5.2 Weekly Scheduling Notice to WSDOT

The Design-Builder shall notify the WSDOT Engineer in writing before the close of business on Thursday of each week of planned construction activities, including fabrication, and shall describe the anticipated construction activities for the following week (Sunday through Saturday) to allow the WSDOT Engineer to

schedule its resources. For activities occurring further than 60 miles from the Project, the Design-Builder shall give the WSDOT Engineer notification at least 14 Calendar Days prior to the planned Work.

2.28.5.3 Coordination and Notification

The CQAM shall designate a primary point of contact for notifications of inspections at Hold Points. An alternate contact may be designated to function in the primary contact's absence. The WSDOT Engineer will designate one Person to handle responses to the Design-Builder for written reports or releases for Hold Points.

The time necessary to respond to the notification for inspection at Hold Points shall be included in the QMP, and mutually agreed to by the Design-Builder and the WSDOT Engineer.

2.28.5.4 Hold Points

Hold Points shall be identified in the construction process where critical characteristics are to be measured and maintained, and at points where it is impractical to determine the adequacy of either materials or workmanship once Work proceeds past this point. Pre-activity meetings shall be included in the Design-Builder's QMP as Hold Points. Hold Points shall be established where required QA inspection is mandatory. The Design-Builder shall provide the WSDOT Engineer with a minimum of 3 Calendar Days' notice of each Hold Point so that the WSDOT Engineer, at its discretion, can observe or visually examine a specific Work operation or test. Work shall not proceed until inspection is performed and a written release is granted by the Design-Builder's QA organization.

The development of Hold Points shall occur during final design. The EOR and the Designer of Record shall submit specific Hold Points with the Final Design Submittal and the RFC Documents.

At a minimum, the CQAM 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.

Utility Relocations

- Prior to any relocation of existing Utilities
- Prior to backfill of Utility Relocations and as required by the Utility Owner's permit

Temporary Erosion and Sediment Control

- After installation of High Visibility Fencing around Environmentally Sensitive Areas, clearing limits, travel corridors, and stockpile sites
- After completion of placement of Temporary Erosion and Sediment Control (TESC) devices, and prior to any construction operations

- Prior to any TESC dewatering operations

Embankments (includes backfill behind walls and abutments)

- After clearing and grubbing and prior to placing embankment fill
- After completion of drainage (see drainage Hold Points)
- At all EOR Hold Points including settlement and pore pressure dissipation at a minimum
- At intervals of embankment construction every 5 vertical feet
- Prior to constructing foundations or structures supported in or on the embankments
- Prior to backfilling Utilities
- Completion of the subgrade

Structures

- At completion of bridge embankment or excavation, and before the start of structure foundation
- Before saw cutting of concrete occurs
- Before pile driving or drilled shaft operations
- After completion of the first piling driven at each structure support, and at the completion of each pile group, for each structure support
- After completion of each drilled shaft along with nondestructive shaft testing, and 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 installation of grout pad or anchor bolts prior to setting bearing or girder
- After girder and diaphragm placement
- Before concrete placement of bridge deck, approach slabs, diaphragms, moment slabs, traffic barrier, and parapet walls (with formwork, inserts, and reinforcement in place)
- After completion of excavation and prior to box culvert construction
- Before concrete placement of 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 a hydraulic jack on the Site
- After completion of bridge deck grinding, overlay removal, and deck repair

Retaining Wall

- After completion of soil foundation and before the placement of the leveling pad of a structural earth wall or the foundation of any other type of retaining wall
- Panel tolerances after completion of placement of panels for each structural earth wall prior to beginning of coping placement
- Before concrete placement of cast-in-place retaining walls with formwork, inserts, and reinforcement in place
- Before installation of any soldier pile, tieback, or ground anchor wall; and before/after verification tests

Noise Wall

- After completion of soil foundation and before the placement of footing formwork
- For precast panels, after the placement of 10 panels

Drainage

- After placement of pipe or box culvert and prior to backfilling
- After installation and placement of bands or gaskets and prior to backfilling
- After placement of catch basins and manholes and prior to backfilling
- After completion of drainage systems behind walls and before backfill of wall

Stormwater Facility (including bioswales)

- After layout of stormwater facility
- After excavation and prior to installation of drainage structures
- Prior to operation of facility

In-Water Work

- Before conducting any in-water construction activities and prior to operating any equipment below the ordinary high water mark. This includes Work in wetlands, streams, or mitigation sites.
- Culvert replacement, removal, and extensions
- Prior to capturing and removing fish from the Site at any area that includes water bypass, in-water cofferdam, and any water area likely to be disturbed
- Prior to installing riprap or other bank stabilization
- Prior to reintroducing a stream into a newly constructed or previously dewatered channel

Subgrade, Surfacing, and Pavement

- After completion of subgrade and prior to surfacing placement
- After completion of surfacing placement and prior to asphalt treated base, HMA, and reinforcement for approach slab placement

Signs

- After signs are staked in the field and prior to installation

Local Agency

- Prior to any Work within Local Agency ROW

Electrical, Intelligent Transportation Systems, and Illumination

- Prior to removal of existing ITS equipment, and after new or temporary ITS equipment is in place and operational, in accordance with Section 2.18, *Intelligent Transportation Systems*
- Prior to removal of existing Closed-Circuit Television (CCTV) cameras, and after new CCTV cameras are in place and operational
- As required by WAC 296-46B-010, inspection of electrical and traffic management systems that will be performed by WSDOT
- Prior to removal of existing illumination, and after new or temporary illumination is in place or operational, in accordance with Section 2.16, *Illumination*
- Prior to disconnection of any existing traffic signal or ITS communication system equipment, including copper and fiber-optic cables and connections, and after new or temporary communication system equipment is in place and operational
- Prior to any fiber-optic splicing operation

Landscaping and Aesthetics

- After preparation of the planting area and prior to installation of wood chip mulch or bark. Plant inspection prior to planting any plant material.

American with Disabilities Act (ADA) Compliance

- After layout and prior to installation of required ADA components.

2.28.5.5 Traffic Electrical Inspection

The Design-Builder shall inspect all electrical and ITS systems. In addition, WSDOT will inspect all electrical and ITS systems for code compliance, functionality, and acceptance as required by WAC 296-46B-010.

2.28.5.6 Performance Verification of Project Geotechnical Elements/Features

The QMP shall include a GSIP.

2.28.5.7 WSDOT Oversight

WSDOT will periodically audit the field performance of the Design-Builder's QA staff, testing frequencies, and acceptance testing results. The WSDOT Engineer will conduct oversight inspection audits to verify the adequacy of the Design-Builder's inspection activities and testing procedures.

2.28.5.8 Quality Assurance Inspection

The QMP shall contain Inspection Plans for each construction Work item included in the Project, whether performed by the Design-Builder, a Subcontractor, or a vendor. Work items may be definable features or items of Work defined by the Standard Specifications.

2.28.5.9 Inspection Guidelines

During the design of the Project, the Design-Builder shall review each item of Work to determine which 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 guidelines shall include the appropriate criteria, tests, and inspection requirements identified in the Standard Specifications, the WSDOT *Construction Manual,* and the WSDOT *Materials Manual.* The Inspection Plan shall address the following elements within each item of Work:

- Identification - Work items included in the Inspection Plan
- Characteristics - What characteristics of the item will be inspected?
- Acceptance Criteria - Directly or by reference, the Design-Builder shall 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.

Inspections shall be performed during all phases of the Project from start to Completion in order to ensure that the Work meets and is being performed in accordance with the Contract, RFC Documents, approved submittals, and any requirements of Local Agencies.

The Design-Builder shall conduct an examination of the quality of workmanship to confirm that all Work is being performed in accordance with the RFC Documents, and any understandings reached at the pre-activity meeting for that item of Work.

The Design-Builder shall conduct appropriate follow-up inspections, and sampling and testing of materials as each item of Work progresses, to ensure consistency in workmanship, compliance with Contract requirements, Design Documents, and RFC Documents; and to ensure satisfactory performance of the Work in service.

2.28.5.10 Inspection Documentation

Each of the QA Inspectors shall summarize their daily inspections, tests, and material sampling activities in a daily report. The QA Inspectors shall use WSDOT's IDR, or a similar form approved by the WSDOT Engineer, to maintain a written record of inspection results, and shall provide copies of the daily reports to the WSDOT Engineer the next Calendar Day. The IDR shall include the following key points of record:

- Equipment

- Subcontractors, identifying Disadvantaged Business Enterprise Subcontractors (if applicable)
- Work performed by the Design-Builder, Subcontractor, or Material Supplier
- Weather conditions
- Inspections performed, the timing of the inspection, and their results, including any corrective actions taken. List special inspections and the timing of the inspection. Provide a summary of the results and any corrective actions taken, if available.
- Materials used, the manufacturer or source, product identity, and quantities
- Communications
- Temporary Work, such as shoring and falsework
- Type, location, and results of all tests performed
- Delays encountered
- Type of traffic control setup in accordance with approved Traffic Control Plans, and any inspection and corrective action taken by the Design-Builder
- Any safety-related problems and corrective action taken
- All Nonconforming Work and the corrective action taken
- A copy of any checklist used for the inspection
- The Inspector's signature

2.28.5.11 Construction Inspection Forms and Checklists

The Design-Builder's QMP shall include construction inspection forms and checklists for all anticipated construction operations and processes, which shall be used by the Design-Builder's QA inspection personnel and other personnel responsible for QC, such as foremen and individual workers.

Construction inspection forms shall be used to document all construction Work activities required in the QMP. For each critical construction Work activity, construction inspection forms shall include activity specific checklists approved by the WSDOT Engineer, prior to the start of the Work activity, and shall include photographs of specific activities after which it would be difficult to assess the Work. The checklist for each Work activity shall include the construction requirements described in the Standard Specifications or the Contract for that Work activity. At 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 including applicable design plan sheet
Frequency	Indicated test or inspection frequency if any (Refer to Section 2.25, *Control of Materials*, of the TR for material test requirements)
Items Inspected	List elements or items inspected (e.g., rebar, chair placement or pipe size and type, grate box, pipe bedding, etc.)
Conformation to Specifications	Verify Work and materials meet the appropriate specifications
Deficiencies Noted	Note any deficiencies to specifications
Individual Notified	Individual notified for corrective action (WSDOT notified)
Corrective Action Noted	What corrective action is required to ensure products conform to specifications

2.28.5.12 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, the WSDOT Engineer 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 perform the following:

- Correct conditions that are unsafe for Project personnel or the general public
- Correct unacceptable construction practices

2.28.6 *Submittals*

2.28.6.1 Quality Management Plan

The Design-Builder shall submit the Draft QMP for Review and Comment. The WSDOT Engineer will provide comments to the Design-Builder on the Draft QMP. Following resolution of the comments, the Design-Builder shall submit the Final QMP.

Modifications to the Final QMP shall be submitted to the WSDOT Engineer for Review and Comment. When all comments on the modifications are resolved, the Design-Builder shall correct the Final QMP, and submit the revised QMP file ***via email or other electronic transfer method approved by WSDOT***. Each shall be clearly labeled with the revision.

2.28.6.2 Executive Management Reviews and Internal Audits

The Design-Builder shall provide its Executive Management Reviews to the WSDOT Engineer within 20 Calendar Days of completion of the reviews.

The Design-Builder shall provide its internal audits of the QMP to the WSDOT Engineer within 20 Calendar Days of completion of the audit.

2.28.6.3 Review Documents

Prior to every design review, the Design-Builder shall provide the WSDOT Engineer with each design submittal to be reviewed, unless specified otherwise in this Section.

2.28.6.4 Quality Assurance/Quality Control Documentation

The Design-Builder shall include documentation with each submittal showing that the QA and QC processes have been completed by the DQAM. The WSDOT Engineer will not accept submittals without documentation that the QA and QC processes have been completed. Acceptable documentation for design submittals will include a marked set and a corrected clean set of plans and specifications, including annotations by the originator, checker, back-checker, corrector, and verifier, as described in this Section and in accordance with industry standards.

Submittal documentation shall demonstrate review and approval of submittal content from the various design team disciplines responsible for coordinating temporary and permanent Project elements

2.28.6.5 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.29 Maintenance During Construction

2.29.1 *General*

The Design-Builder shall perform all Work necessary to meet the maintenance requirements described in this Section. Elements of Work shall include operation, maintenance, and repair of the existing facilities; and facilities constructed under the Contract beginning at the earlier of the following two milestones: 45 Calendar Days after Notice to Proceed or 7 Calendar Days prior to installation of any High Visibility Fence (HVF), High Visibility Silt Fence, or other Best Management Practices (BMPs); and ending on the day of Physical Completion.

The Design-Builder shall perform maintenance during construction 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 maintenance during construction. Refer to the WSDOT *Maintenance Manual* for maintenance standards of items listed as the Design-Builder's responsibility. When referencing the WSDOT *Maintenance Manual*, all references to "should" or "may" shall be interpreted as "shall" unless approved by the WSDOT Engineer.

For the purpose of maintenance during construction, the Project limits are defined as all Right of Way (ROW), including any easements which may be necessary to construct the Project, that are located within the following areas:

Project Maintenance Limits

- ***I-90 milepost (MP) 19.93 to MP 27.49, I-90 eastbound and westbound on-ramps and off-ramps
- SR 18, MP 25.41 to MP 27.91
- Snoqualmie Parkway, between I-90/SR 18 interchange and SE 99th Street
- SE 104th Street, between SR 18 and Rattlesnake Road SE
- Existing weigh station and truck return loop road***

The Design-Builder shall provide maintenance, inspections, and repairs required on an "as needed" basis throughout the duration of the Contract in accordance with the WSDOT *Maintenance Manual*. If WSDOT determines that the Design-Builder has failed to provide adequate routine maintenance, emergency and operational response, or inspections and repairs, the WSDOT Engineer will issue a verbal notification of the failure to the Design-Builder.

The WSDOT Engineer will follow the verbal notification with a written notification to commence and continue correction of the failure. Failure by the Design-Builder to correct the stated deficiency within 24 hours of the verbal notification may result in WSDOT performing the Work without prejudice to other remedies WSDOT may have. In such case, WSDOT will deduct the cost of correcting such deficiencies from payments then or thereafter due to the Design-Builder. If payments then or thereafter due are not sufficient to cover the cost of correcting the deficiencies, the Design-Builder shall pay the difference to WSDOT upon demand.

2.29.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
4. WSDOT *Roadside Manual* M 25-30 (Appendix D)
5. WSDOT *Right of Way Manual* M 26-01 (Appendix D)

2.29.3 *Maintenance of the Right of Way*

2.29.3.1 General

Outside the Sensitive Area boundaries enclosed by HVF, the Design-Builder shall maintain the roadside vegetation disturbed by the Design-Builder's operations. The Work includes nuisance vegetation control, noxious weed control, tree and brush control, and turf and grass care.

2.29.3.2 Nuisance Vegetation Control

The Design-Builder shall control knotweed, scotch broom, and blackberry within the Project limits. The Design-Builder shall treat all nuisance vegetation to ensure it is dead prior to removal. Scotch broom shall be removed prior to blooming. Once knotweed has been treated, dead knotweed stems shall be removed from the Project limits. The Design-Builder shall control all alder, cottonwood, and willow within new stormwater facilities during the plant establishment period. The Design-Builder shall maintain all stormwater treatment facility access routes in a vegetation-free state. The nuisance vegetation control shall occur for the life of the Contract, including the plant establishment period.

2.29.3.3 Noxious Weed Control

The Design-Builder shall control all Class A & B noxious weeds within the Project limits including designated Sensitive Areas as required by law. Notification by WSDOT or the county weed control board will be considered notification. Weed control shall be accomplished by the Design-Builder.

Notices to comply typically allow up to 10 Calendar Days to complete the activity. The performance measure for control is 100 percent. Herbicides used within the Project limits shall be applied at recommended label rates to the target vegetation, and only during weather conditions that will allow use of the control agent. The Design-Builder shall use an herbicide at legal rates and as recommended by the herbicide manufacturer for the target vegetation, and shall ensure that a Person who is licensed to apply herbicide performs the Work. A copy of the application record shall be submitted to the WSDOT Engineer.

The Design-Builder shall provide WSDOT with access to the area the herbicide will be applied, and shall ensure that all materials, equipment, and personnel are outside of the area when the herbicide is applied.

If the Design-Builder decides to remove noxious weeds by hand, the Design-Builder shall remove the root of the plant, and dispose of it in a container. The Design-Builder shall dispose of the plant and the container in a refuse disposal, and shall complete the activity within the time limit specified on the notice to comply. If the Design-Builder fails to respond to a notice to comply, the Design-Builder shall pay all fines assessed, including Subcontractor, administrative overhead, personnel, material, equipment, and excess penalties. ***WSDOT and King County Noxious Weed Control*** reserve the right to control weeds in an area identified as out of compliance by any means they choose, and at any time of day they deem appropriate.

2.29.3.4 Tree and Brush Control

The Design-Builder shall remove or trim all trees or brush that obscure roadway signs or cause a reduction in sight distance. The Design-Builder shall remove trees that are identified as hazards or dangers within the Project limits, roadway, or structures adjacent to or within the ROW. The WSDOT Engineer will identify and notify the Design-Builder of trees and brush that fall within this criteria. The Design-Builder shall remove danger/hazard trees within 24 hours of verbal or written notification from the WSDOT Engineer. The Design-Builder shall remove downed trees that have fallen and are within 30 feet of the edge of paved shoulder of an active travel lane, or that may be a safety concern for public travel or create a restriction or obstruction to drainage conveyances or other water quality features.

2.29.3.5 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. When the average grass height reaches 30 inches, the grass or turf shall be mowed to a height between 6 and 12 inches. The Design-

Builder shall not scalp the ground within Sensitive Areas. Mowing will not be required on slopes steeper than 2H:1V (Horizontal:Vertical).

2.29.3.6 Health Hazards

The Project area is occupied by transients, birds, bats, and rodents; and will contain biological and associated physical hazards. The areas under the ends of the bridges within the Project are most impacted by these hazards. Other areas may also be impacted.

2.29.3.6.1 Transients

The Project limits include materials and waste that pose a physical, biological safety, and health hazard, such as waste associated with transients and drug users. Materials and waste may include, but are not limited to, hypodermic needles, food, garbage, clothing, bedding, broken glass, human and animal excrement, drug paraphernalia, makeshift dwellings, and other hazards. The Project area may also be occupied by violent and dangerous individuals.

In the event transients are encountered within the Project limits and are hampering Work or causing unsafe Work conditions, the Design-Builder shall notify the responsible enforcement agency (Washington State Patrol (WSP), local law enforcement agency, community service patrol), who will assist the Design-Builder with removing the transients. The Design-Builder shall schedule a place, date, and time to meet the enforcement agencies, so that the enforcement agencies can escort the transients from the Project limits.

The Design-Builder shall ensure that the public, including persons who may be non-English speaking or those who may not be able to recognize potential safety and health hazards within the Project area, are not harmed by the Design-Builder's activities.

The Design-Builder shall follow the instructions in the *Illegal Encampments within State Right of Way* (Appendix R). All costs to remove the transients and cleanup the Site within the Project limits shall be included in the Contract Price.

2.29.3.6.2 Health and Safety Requirements

The Design-Builder shall coordinate with the WSDOT Engineer to provide and maintain a safe and healthy Project area for the WSDOT Engineer's and the Design-Builder's personnel as described in this Section and in accordance with Applicable Laws and these Technical Requirements.

2.29.3.6.3 Construction Requirements

The Design-Builder shall be responsible for the sanitation measures required to provide and maintain a safe and healthy Project Work area for the duration of the Project, in accordance with Applicable Laws and this Request for Proposal. The Design-Builder shall develop and maintain a plan for mitigation of health hazards at the Project Site. The plan shall be available at the WSDOT Engineer's request.

2.29.3.6.4 Site Maintenance for Biological and Physical Hazards

Prior to commencement of the construction Work, the Design-Builder shall perform an initial cleanup of the Project Work area, including all preparatory Work required to make the Project area sanitary and safe in accordance with Applicable Laws and the Health Hazards Plan, and to address all biological and physical hazards present. Necessary training of personnel, on-site and off-site preparations, and safety equipment shall be provided by the Design-Builder to complete the initial cleanup and disposal of the biological and physical hazards.

2.29.3.6.5 Public Notification

The Design-Builder shall furnish and install informational signs approved by the WSDOT Engineer 3 Calendar Days prior to performing hazardous activities within the Project area known to be occupied by transients. Hazardous activities include, but are not limited to, cleaning, clearing brush, overhead activities, excavating, or operating other heavy equipment. The Design-Builder shall conduct a visual reconnaissance of the area at least 3 Calendar Days in advance to determine the type of cleanup and removal effort needed. The signs shall include dates and locations of the activity and state that trespassing is not authorized. The signs shall be visible from each apparent access route into the Work area. Each sign shall be weather resistant and post mounted; be written in both English and Spanish; state "No Trespassing"; and include the dates and location of the Work. Signs shall be maintained in legible condition until the hazardous Work at the Work area is physically completed, at which time the signs shall be removed from the Project.

The Design-Builder shall provide notification to homeless service organizations, homeless advocacy groups, shelters, and free health clinics. WSDOT will provide contact information and flyer templates for the Design-Builder's use. The Design-Builder's flyer shall contain the information included in the flyer templates. The Design-Builder shall submit the flyer and general Plans to the WSDOT Engineer for Review and Comment at least 14 Calendar Days prior to commencing the hazardous activities.

The Design-Builder shall distribute the approved flyers by mail or hand delivery 7 Calendar Days prior to commencing activities within areas known to be occupied by transients.

2.29.3.6.6 Periodic Site Maintenance

If the Project Work area becomes unsanitary or unsafe due to biological and physical hazards after the Design-Builder prepares the Site for the first phase of construction activities, the Design-Builder shall perform additional Site maintenance and take additional measures as needed to protect the public, and WSDOT’s and the Design-Builder's personnel. The nature and frequency of the Site maintenance activities shall be included in the Health Hazards Plan. Periodic maintenance of the Project area may include the use of signs, fencing, lighting, law enforcement, or security.

2.29.3.6.7 Irrigation and Fire Systems

Irrigation and fire systems, including any and all supply valve communication systems, are the responsibility of the Design-Builder to maintain in working condition. Fire systems must be kept working or a Transition Plan must be approved by the WSDOT Engineer.

2.29.4 *Maintenance of Roadways*

2.29.4.1 General

The Design-Builder shall complete all components of the Work to allow for unrestricted traffic access to lanes and shoulders in accordance with Section 2.22, *Maintenance of Traffic*.

2.29.4.2 Roadway Sweeping

The Design-Builder shall maintain all paved areas within the Project limits to prevent the accumulation of dirt and gravel. The Design-Builder shall periodically and when designated by the WSDOT Engineer, perform street sweeping or other BMPs to remove debris from the roadway and shoulders. Design-Builder shall on a routine basis remove debris from the paved shoulder and shall not allow debris larger than 1-square foot to accumulate.

The Design-Builder shall take care to prevent spillage on haul routes. If spillage occurs, the Design-Builder shall remove it and clean the area within 1 hour of the spillage being observed or verbal notification from the WSDOT Engineer. Tracking of dirt and gravel from the Work zone is prohibited.

2.29.4.3 Existing Pavement

Design-Builder shall have a crew identified to respond to Project issues including potholes 24 hours a day, 7 days per week. The Design-Builder shall maintain all existing pavement including roadway and bridge pothole repair. Any pothole greater than a total of 36-cubic inches in volume or 2 inches in depth shall be repaired within 24 hours of being observed by the Design-Builder or notified by the WSDOT Engineer. If the pothole is causing traffic to slow or deviate from normal traffic patterns, the Design-Builder shall perform pothole repair within 1 hour of being observed by the Design-Builder or notified by the WSDOT Engineer. Temporary pothole repairs will be allowed if weather conditions will not allow for permanent repairs, or if traffic conditions dictate that permanent repairs are scheduled for another time to reduce impacts. Materials used for temporary pothole repairs shall be approved by the WSDOT Engineer. All temporary pavement repairs shall be inspected by the Design-Builder at least once every business day or more often if the temporary repair shows any signs of failure. If the temporary repair shows signs of imminent failure, the repair shall be reinforced within 1 hour of being observed by the Design-Builder, or notified by the WSDOT Engineer.

Permanent pothole repair shall be performed in accordance with Section 2.7, *Pavement*. Materials used for permanent pothole repair shall be of the same type and depth as the adjacent pavement. For pavement maintenance activities that require closures, the Design-Builder shall submit a Traffic Control Plan meeting the requirements of Section 2.22, *Maintenance of Traffic*.

2.29.4.4 Pavement Markings

The Design-Builder shall maintain existing and new pavement with painted, plastic, or raised pavement markings. The WSDOT Engineer will notify the Design-Builder when existing markings require refreshing. Paint for temporary pavement markings shall be in accordance with Section 9-34 of the Standard Specifications. The Design-Builder shall anticipate that, at a minimum, existing markings will need to be refreshed once per calendar year. Refer to Chapter 8 of the WSDOT *Maintenance Manual* for additional pavement marking requirements.

All costs to maintain, install, move, or remove permanent or temporary pavement markings, lines, or raised pavement markings that are considered part of the Work, are the responsibility of the Design-Builder.

2.29.4.5 Guardrail, Concrete Barrier, and Attenuators

The Design-Builder shall replace or repair all guardrail, concrete barrier, and attenuators that become damaged by the public or by the Design-Builder's operations. Attenuators that are damaged and must be replaced shall meet current National Cooperative Highway Research Program and WSDOT standards. All parts used to repair a damaged attenuator shall be direct replacement parts as required by the manufacturer. Payment for damaged guardrail, concrete barrier, or attenuators qualifying for relief under Section 1-07 of the *General Provisions* shall be in accordance with Section 1-09 of the *General Provisions*, except for temporary devices installed by the Design-Builder.

2.29.4.6 Traffic System Signs

The Design-Builder shall be responsible for maintenance of existing permanent signs. Maintenance of existing permanent signs includes cleaning, repairing, and replacing damaged signs and posts. Cleaning will only be required when designated by the WSDOT Engineer. Payment for maintenance of existing permanent signs shall be in accordance with Section 1-09 of the *General Provisions*.

Payment for repairing permanent signs qualifying for relief under Section 1-07 of the *General Provisions* shall be in accordance with Section 1-09 of the *General Provisions*. Repair of damage caused by the Design-Builder's operations shall be at the Design-Builder's expense.

2.29.4.7 Stormwater Management

The Design-Builder shall maintain and provide adequate stormwater management on the Project until Physical Completion. Maintenance shall include cleaning and repair to maintain the functionality of riprap, cribbing, ditches, channels, culverts, cross-drains, drainage structures, and gutters.

Catch basins and BMPs shall be inspected and cleaned once per year in accordance with the WSDOT *Highway Runoff Manual*.

2.29.4.8 Access to Public Facilities

The Design-Builder shall maintain uninterrupted access to all public facilities affected by the Project. Access shall mean providing a clear and easily understood route into and out of existing public and private facilities and businesses. The Design-Builder shall provide all necessary signing to convey that the route to the facilities and businesses is open to traffic. The WSDOT Engineer will determine whether the signing is adequate. The Design-Builder shall provide access for all types of vehicles, including delivery trucks.

2.29.4.9 Protection of Drainage Structures and Junction Boxes

The Design-Builder shall verify that all existing and new drainage structures, Utility boxes, and junction boxes that are located within 2 feet of temporary or permanent travel lanes have sufficient strength to safely carry highway traffic loads without failing. Structures or boxes that do not have sufficient strength shall be reinforced, protected, or both prior to opening the travel lanes to traffic.

2.29.4.10 Animal Carcasses

Animal carcasses that present a traffic hazard, such as damaging vehicles, blocking a lane, or causing traffic to slow below the posted speed limit, shall be removed from the travel lanes by the Design-Builder within 1 hour of observation by the Design-Builder or notification from the WSDOT Engineer. The carcass shall be removed from the Project limits and disposed of by proper means at an approved location. Failure to remove the carcass within 1 hour will result in WSDOT correcting such deficiencies. In such case, WSDOT will deduct from payments then or thereafter due, the cost of correcting such deficiencies. If payments then or thereafter due are not sufficient to cover the cost of correcting the deficiencies, the Design-Builder shall pay the difference to WSDOT upon demand.

2.29.5 *Snow and Ice Operations*

2.29.5.1 Public Travel Way

WSDOT or the Local Agency will perform snowplowing and application of deicing agents or abrasives for public travel lanes. The snowplowing will be done as part of the normal course of plowing the public roadways within and in the vicinity of the Project. Snow or ice will not be removed from the public travel lanes to facilitate the Work or construction.

When plowing within the Project limits, WSDOT or the Local Agency will take no special measures to protect materials, traffic control devices, or equipment the Design-Builder has stored or stockpiled on shoulders or within the Project limits. The Design-Builder shall maintain any channelization devices that may be displaced or damaged by snowplowing operations and application of deicer or abrasives.

Snow, ice, abrasives, or other debris (such as car parts and tire chains) that are plowed or migrate from the public traffic lanes or shoulders into the Work area will not be removed by WSDOT or the Local Agency. Any removal of this material within the Project limits shall be at the Design-Builder's expense.

2.29.5.2 Work Zone

The Design-Builder shall perform any snow and ice removal for the Design-Builder's operations within the Work area. The Design-Builder shall not allow any snow and ice removal from its operations to be placed within the public traffic lanes.

2.29.6 *Electrical*

2.29.6.1 General

The Design-Builder shall maintain and operate all electrical systems in accordance with the requirements of the maintenance requirements described in Sections 2.16, *Illumination*, 2.17, *Traffic Signals*, and 2.18, *Intelligent Transportation Systems*, the WSDOT *Maintenance Manual* (Appendix D), and the following:

- For existing systems that are to remain operational, WSDOT will retain responsibility for all maintenance activities required to be performed inside traffic signal or ITS cabinets.
- For new traffic signal and ITS cabinets being installed as part of the Contract, WSDOT will only be responsible for programming of controllers and conflict monitors until the cabinet is accepted for maintenance by WSDOT. The Design-Builder shall retain responsibility for the cabinet and cabinet components until Physical Completion.

Maintenance and operation shall also include, at a minimum, the following:

- Replacement of lamps or LED luminaires/displays, as required.
- Replacement or repair of any damaged equipment or underground cables.
- Maintaining access and clear working space to poles and cabinets, including trimming vegetation and removing debris within four feet in any direction from any cabinet or pole.
- Maintenance concerning public safety (including exposed wires and damaged/knocked down poles and cabinets), within 1 hour of observation by the Design-Builder, notification from the WSDOT Engineer, or notification from the public.

- Routine maintenance and other maintenance that does not affect the public safety, within 24 hours of observation by the Design-Builder or notification from the WSDOT Engineer.

Unless otherwise defined in the WSDOT *Maintenance Manual* (Appendix D), and Sections 2.16, *Illumination*, 2.17, *Traffic Signals*, and 2.18, *Intelligent Transportation Systems*, preventative maintenance shall be performed at the following intervals:

- Systems addressed by Section 9-11 of the WSDOT *Maintenance Manual* (Appendix D) shall have preventative maintenance performed ***every other month***. Items listed under Section 9-11.4 will be performed by WSDOT personnel for cabinets where WSDOT has maintenance responsibility.
- The preventative maintenance items listed under Section 9-7.2 of the WSDOT *Maintenance Manual* (Appendix D) for Gate and Barrier Systems shall be performed annually.
- All other preventative maintenance items shall be performed ***quarterly***.

Payment for repairing damaged permanent equipment qualifying for relief under Section 1-07 of the General Provisions shall be in accordance with Section 1-09 of the General Provisions.

2.29.7 *Hazardous Spills Response*

2.29.7.1 Public Travel Way

Cleanup of hazardous spills by third parties within the public traffic lanes and shoulders will be coordinated by the WSDOT Engineer, the Washington State Department of Ecology (Ecology), and Local Agencies. The Design-Builder shall allow access to the Project area for spill response. The Design-Builder shall make personnel and equipment available to respond to all emergencies, except when such emergencies are life threatening to the personnel.

In the event the hazardous spill is caused by the Design-Builder's equipment, operations, or Work, the Design-Builder shall be responsible for cleanup under the direction of the WSDOT Engineer and Ecology. All costs for cleanup including all costs incurred by the Design-Builder, the WSDOT Engineer, the Ecology, other resource agencies, and contractors required to mitigate the hazard shall be borne by the Design-Builder.

2.29.7.2 Work Zone

Any hazardous spills within the Work area and outside of the public travel lanes shall be the responsibility of the Design-Builder. The Work shall be performed in accordance with the Spill Prevention, Control, and Countermeasures Plan described in Section 2.8, *Environmental.*

2.29.8 *Structures*

2.29.8.1 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.

2.29.9 *Emergency Response*

2.29.9.1 Cooperation

The Design-Builder shall cooperate with law enforcement and other emergency response agencies in response to accidents, fires, spills, or other emergencies in any area affected by the Project, including the Project area and public traffic lanes. The Design-Builder shall cooperate in all WSDOT investigations of accidents and other incidents within the Project area.

2.29.9.2 Emergency Access

The Design-Builder shall work with emergency service providers to address their concerns about emergency access to and through the Project. This may include installing gates to allow emergency personnel to access the Project area.

The Design-Builder shall allow WSDOT Maintenance and all affected Local Agencies access to the Project Site to respond to urgent safety concerns.

2.29.9.3 Notification

The Design-Builder shall notify the WSDOT Engineer, 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 and telephone numbers (business, residence, and cellular) of Project personnel to contact in case of emergencies. This contact list shall be updated as necessary.

2.29.9.4 Use of Design-Builder Resources

The Design-Builder shall make personnel and equipment available to respond to all emergencies, except when the emergency is life-threatening to the personnel.

2.29.10 *Maintenance of Property*

2.29.10.1 General

The Design-Builder shall preserve public and private property at all times in accordance with Section 1-07 of the *General Provisions*.

The Design-Builder shall witness or reference land monument and property marker locations by a Land Surveyor licensed in the State of Washington, before moving, disturbing, or damaging any property.

2.29.10.2 Restoration of Property and Landscape

The Design-Builder shall restore, at its own cost, property and landscaping that is damaged in the course of construction to a condition similar, equal, or better to that existing prior to the occurrence of damage by repairing, replacing in kind, rebuilding, replanting, or compensating the property owner.

2.29.10.3 Temporary Fencing

The Design-Builder shall be required to furnish and install temporary chain link security fencing in order to contain animals and people, prior to removal of any existing sound barrier or ROW fencing within the Project limits.

2.29.11 *Maintenance of Aesthetic Treatment*

2.29.11.1 General

The Design-Builder shall monitor the appearance of the aesthetic treatments on walls or bridges for any defects, flaws, or vandalism until Physical Completion. The Design-Builder shall note and bring to the WSDOT Engineer's attention defects, flaws, and vandalism.

Defects and flaws shall be corrected in accordance with Section 1-05 of the *General Provisions*.

The Design-Builder shall be responsible for cleaning up and restoring property impacted by vandalism until Physical Completion.

The use of paint or permanent marking of any type on permanent barrier, railing, and walls will not be allowed except as required by the Contract.

2.29.12 *Submittals*

2.29.12.1 Herbicide Application

A copy of the application record of herbicide for noxious weed removal shall be submitted to the WSDOT Engineer within 2 Calendar Days of herbicide application.

2.29.12.2 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related Submittals that do not fit in the previous categories, but are prepared in accordance with this Section.

End of Section

2.30 Water Crossings

2.30.1 *General*

The Design-Builder shall perform all Work necessary to design, document, obtain permits, and construct fish passage and restoration of natural drainage courses for the Project. At a minimum, elements of Work shall include the following:

- Design and construct new fish passable stream channels and incorporate stream restoration elements in accordance with the Contract to eliminate the fish barriers at the following locations:

Fish Passage ID Number	SR	Milepost	Name
934823	90	25.74	Tributary to Lake Creek
934820	90	25.69	Tributary to Lake Creek
990236	18	27.57	Lake Creek
07.0396 0.80	18	25.70	Deep Creek
934821	90	25.68	Tributary to Lake Creek
934829	90	25.68	Tributary to Lake Creek
934828	18	27.83	Tributary to Lake Creek
934689	18	25.68	Tributary to Deep Creek

- Prepare Specialty Report(s) in accordance with the WSDOT *Hydraulics Manual* and the Contract.
- *** Barriers 934822, 934824, 934825, 934826, 934827, and 934786 will no longer be classified as barriers but will still contribute hydrology to the Tributary to Lake Creek at the I-90/SR 18 interchange. Reclassification of these barriers is contingent on the basic configuration design of the interchange and current stream design of the Tributary to Lake Creek. If modifications are made to either of these designs, conversations shall be initiated with Tribal and WDFW representatives to confirm that these crossings can still be reclassified. Otherwise, these barriers will need to be replaced with fish passable structures.***

- ***Any new water crossing structures that convey fish-bearing streams are required to be fish-passable per state law (WAC 220-660-190), federal regulations (Regional General Condition 6 from USACE), and the *US v. WA (2013) Federal Court Injunction* (Appendix H). Fish-bearing waters are identified in the *Wetland and Stream Assessment Report* (Appendix E) and subject to the Design-Builder's verification. The PHDs provided are for new or replaced structures as part of the Conceptual design for this Project. Additional fish-passable structures may be required based on the Design-Builder's final design and shall meet current fish passage standards including, but not limited to, the design standards identified in this Section. Any added fish passible structure and modification or replacement of an existing fish passable structure that is not included in the Conceptual Design shall require the Design-Builder to prepare the necessary documentation and exhibits needed for all permit modifications and additional WDFW and tribal consultation. Additional time or cost associated with additional and modification or replacement of existing fish passible structures or associated coordination with the permitting agencies shall be the responsibility of the Design-Builder.***
- Host multiple task force and other meetings, as required, to coordinate environmental documentation, permit acquisition and the design with the WSDOT Engineer, WSDOT Headquarters and Region hydraulics, maintenance, and environmental staff; the Washington Department of Fish and Wildlife (WDFW), the Washington State Department of Ecology, and Tribal representatives.
- Ensure all permit application materials are complete and in compliance with guidance from WDFW and the U.S. Army Corps of Engineers prior to submittal.
- Obtain acceptance from the Tribe(s), WDFW, and WSDOT on the entire permit application package (including the Joint Aquatic Resource Permit Application (JARPA)) before submitting the completed package to the U.S. Army Corps of Engineers.
- The U.S. Army Corps of Engineers considers comments from the Tribes before issuing the Section 404 permit. It is a material requirement of the Contract for the Design-Builder to consult with the Tribes and design and construct a fish passage that is acceptable to the Tribes.

2.30.2 *Definitions*

The following definitions apply to the terms used in this Section. The "Structure Free Zone Definitions Exhibit" (Appendix H) is hereby incorporated into and made part of the following definitions and shall be used in interpreting the meaning of these defined terms.

100 Year Design Freeboard – The minimum dimension so designated in Table 2.30-B. It shall be measured as shown on the Structure Free Zone Definitions Exhibit.

Average 100 Year Stream Slope Under Structure (A100SS) – The slope calculated by dividing the difference in elevation of the 100-year stream elevation, between the extreme ends of the measurement of Hydraulic Length, by the Hydraulic Length.

Bearing of Stream - The imaginary line that meets all of the following: (1) equidistant between the Structure walls (or abutments) to the left and right of the stream, and (2) at

the A100SS slope, and (3) at the 100 year stream elevation. This line is irrespective of the location of the thalweg or any sinuosity in the stream bed.

Controlling Bottom Elevation (CBE) – An imaginary surface that represents the bottom boundary of the Structure Free Zone (SFZ). At any vertical cross section of the SFZ, taken at a horizontal angle of 90 degrees to the Bearing of Stream, the CBE shall be a horizontal line 2 feet below the calculated 500 year scour elevation.

Controlling Top Elevation (CTE) – An imaginary surface that represents the top boundary of the SFZ. At any given cross section of the SFZ, taken perpendicular to the Bearing of Stream, the CTE shall be either case 1 or case 2:

Case 1: For the case when the 'thalweg elevation plus Maintenance Clearance' is less than or equal to the '100 year stream elevation plus 100 Year Design Freeboard', the CTE shall be a horizontal line at the elevation of the '100 year stream elevation plus 100 Year Design Freeboard'.

Case 2: For the case when the 'thalweg elevation plus Maintenance Clearance' is greater than the '100 year stream elevation plus 100 Year Design Freeboard', the CTE shall be an inverted "V", with apex at the 'thalweg elevation plus Maintenance Clearance' vertically over the Bearing of Stream, and lower point at the '100 year stream elevation plus 100 Year Design Freeboard' on each side of the Hydraulic Clear Span.

Design Methodology - Design Methodology has the meaning used in the *Washington Department of Fish and Wildlife Water Crossing Design Guidelines.*

Fish Passage Operationally Complete Date – The date, determined by the WSDOT Engineer, that all construction necessary to begin the fish passage warranty period has been completed. This construction includes all Work of any kind below the 100 year storm elevation and diverting the stream to its final location. Each fish passage shall have its own Fish Passage Operationally Complete Date.

Hydraulic Clear Span – A horizontal distance measured perpendicular to the Bearing of Stream, between the nearest face of the Structure to the left of the stream and the nearest face of the Structure to the right of the stream, at all points between the CBE and the CTE. See Table 2.30-B for the minimum allowable Hydraulic Clear Span.

Hydraulic Length – The longest measurable length along the stream of any components of a structure (bridges and buried structures) above the 500 year scour elevation. The Hydraulic Length is measured as shown in the Structure Free Zone Definitions Exhibit. For bridges and buried structures, the Hydraulic Length shall not include wing walls that are at a horizontal skew angle of 60 degrees or greater from the Bearing of Stream, but shall include wing walls that are at a horizontal skew of less than 60 degrees. For buried structures, components of the structure included in the measurement of the Hydraulic Length include but are not limited to the following items that are at a horizontal skew of less than 60 degrees from the Bearing of Stream: tapered, sloped, or beveled ends on any structural cross section including elliptical, circular, arched, rectangular, and segmented; wing walls of any shape. See Table 2.30-B for the maximum allowable Hydraulic Length.

Injunction, the - United States of America, et al., v. State of Washington, et al. Permanent Injunction Regarding Culvert Correction, United States District Court, Western District of Washington at Seattle, No. C70-9213 Subproceeding No. 01-1 (Culverts), ordered March 29, 2013.

Projects of Similar Scope and Complexity (Relates to fish passage Work) – Projects that have the following characteristics:

- Construction of the fish passage(s) was completed within the last 5 years
- The fish passage(s) was of similar size and cost
- The fish passage included stream restoration components
- Design and construction of stream crossings that follow the *Washington Department of Fish and Wildlife Water Crossing Design Guidelines* (2013) for Stream Simulation or Bridge Design Methodologies
- The fish passage structure(s) passed under a facility (such as a roadway) which had a width over the stream and height above the stream equal to or greater than those required on this Contract
- Construction was delivered utilizing bid-build, design-build, General Contractor/Construction Manager (GC/CM), or an emergency contract

Maintenance Clearance – At any given cross section of the SFZ, Maintenance Clearance is a vertical dimension added to the thalweg elevation, horizontally centered on the Bearing of Stream, which is used to evaluate the shape and elevation of the CTE. See Table 2.30-B for the minimum allowable Maintenance Clearance.

Regrade, Channel Regrade, Natural Channel Regrade, Natural Regrade – Each of these terms shall be understood to mean the natural process of a stream to establish an equilibrium slope by means of aggradation or degradation over time. Regrade is expected to effect changes to the stream, its bed and banks, and may include at a minimum, incision, deposition, debris loading, downstream flooding, lateral shifting, and bank erosion. The Regrade process will be set in motion by removal of the existing barrier to fish passage, and is intended to allow the stream to return to its natural channel, by processes that are unencumbered by the design and construction of a new fish passable stream crossing. Furthermore, the Regrade process may extend to areas outside of State right of way, although the degree, extent, and timing are unpredictable. To determine whether or not a structure is required to be designed to Regrade, refer to Table 2.30-B.

Stream Team – The meaning given in Section 2.30.4.2.

Structure Free Zone (SFZ) – An imaginary prism of infinite length both upstream and downstream, (for CTE Case 1, a rectangular prism; for CTE case 2, a pentagonal prism) that is horizontally centered on the Bearing of Stream, is parallel to the Bearing of Stream, and which represents the minimum boundary within which no part of the fish passage structure, including footings, shall be allowed. It is bounded on top and bottom by the CTE and the CBE respectively, with minimum interior width equal to the Hydraulic Clear Span.

Total Scour – the meaning as defined by FHWA *Hydraulic Engineering Circular Number 18* (HEC-18).

2.30.3 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

If the requirements of a Mandatory Standard, programmatic agreement, or permit issued for the Project conflict, then the provisions within the Project-specific permit shall take precedence.

1. WSDOT *Hydraulics Manual* M 23-03 (Appendix D)
2. *Washington Department of Fish and Wildlife Water Crossing Design Guidelines* (Appendix H)
3. *FHWA Evaluating Scour at Bridges* (HEC-18)
4. *FHWA Stream Stability at Highway Structures* (HEC-20)
5. *FHWA Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance Volume 1 and 2* (HEC-23)
6. *U.S. Army Corps of Engineers, Hydraulic Design of Flood Control Channels* (EM 1110-2-1601)
7. WSDOT *Temporary Erosion and Sediment Control Manual* M 3109 (Appendix D)
8. WSDOT *Geotechnical Design Manual* (GDM) M 46-03 (Appendix D)
9. WSDOT *Design Manual* M 22-01 (Appendix D)
10. WSDOT *Bridge & Structures Office Design Memoranda* (Appendix D)
11. WSDOT *Bridge Design Manual LRFD* M 23-50 (Appendix D)
12. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
13. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
14. WSDOT *Construction Manual* M 41-01 (Appendix D)
15. WSDOT *Materials Manual* M 46-01 (Appendix D)
16. WSDOT *Environmental Manual* M 31-11 (Appendix D)
17. WSDOT General Special Provision (GSP) regarding temporary stream diversion, either 7-06.SA1.FR7 or 7-06.SA2.FR7, whichever is appropriate for each culvert site.
18. WSDOT *Guidance on Wildlife Habitat Structures in Wetland Mitigation Sites* (Appendix H)
19. United States of America, et al., v. State of Washington, et al. Permanent Injunction Regarding Culvert Correction, United States District Court, Western District of Washington at Seattle, No. C70-9213 Subproceeding No. 01-1 (Culverts), ordered March 29, 2013 (Appendix H)
20. Standard Specifications (Appendix B)

2.30.3.1 Approved Design Reference Documents

The WSDOT *Hydraulics Manual* is the primary stream design manual.

The following reference documents are accepted by WSDOT for use on the Project. If any conflicts occur in design criteria, the WSDOT *Hydraulics Manual* supersedes the design reference documents listed below. The Design-Builder shall obtain approval through the WSDOT Engineer by the WSDOT State Hydraulics Engineer prior to use of other design manuals.

1. *Washington State Aquatic Habitat Guidelines Program, Integrated Streambank Protection Guidelines* (Appendix H)
2. *Washington State Aquatic Habitat Guidelines Program, Stream Habitat Restoration Guidelines* (Draft April 2012) (Appendix H)
3. *Washington Department of Fish and Wildlife Fish Passage Inventory, Assessment, and Prioritization Manual, 2019* (Appendix H)
4. *U.S. Department of Agriculture Forest Service, Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings*

2.30.4 *Personnel Requirements*

2.30.4.1 Stream Design Engineer

Stream Design Engineer Job Duties

The Stream Design Engineer (SDE) shall lead the day-to-day effort for designing the stream and its habitat and provide design support for National Environmental Policy Act/State Environmental Policy Act and permitting. This design work shall include specialty design Work including compliance with the Injunction, hydraulic design, hydrology, stream grading, stream restoration with large woody material (LWM) placement with and without anchor system design, stream restoration with natural habitat diversity features, stream or river embankment stabilization, flood risk analysis, geomorphology, zero rise analysis, scour analysis, streambed material design, and backwater analysis. The channel design and other elements as described above shall be designed by, or under the direct supervision of the SDE. The SDE shall be the Engineer of Record (EOR) for these specialty designs. The SDE shall be responsible for all hydraulic and hydrology Work revisions for the duration of the Contract.

Stream Design Engineer Required Minimum Qualifications:

- Shall have a minimum of 10 years of experience in the Work listed above.
- Shall have completed the design, within the last 5 years, of a minimum of three successful fish passage Projects of Similar Scope and Complexity. To be considered successful, the fish passage structures must have been in service and remained fish passable, without modification, for at least 2 years.
- Shall be a Professional Engineer in the State.

SDE Desirable Qualifications

- Experience includes direct field construction support that facilitated successful implementation and modification on a Project of Similar Scope and Complexity.

2.30.4.2 Stream Team

The Stream Team shall be composed of the SDE, a Geomorphologist, and a Biologist.

Before each member of the Stream Team starts any Work on this Project, said member of the Stream Team shall complete all 13 modules of the WSDOT Fish Passage and Stream Restoration Training and obtain certification. The modules and test are available at https://wsdot.wa.gov/Design/Hydraulics/Training.htm

The Geomorphologist shall be a Licensed Geologist in the State and have design and construction experience with stream restoration including stream grading, step-pool design and construction, LWM placement, and stream or river embankment stabilization.

The Biologist shall be an Aquatic or Fisheries Biologist who has a minimum of 3 years of design and construction experience with stream restoration including stream grading, step-pool design and construction, LWM placement, and stream or river embankment stabilization.

The Design-Builder shall submit to the WSDOT Engineer for Review and Comment all relevant documents to establish the required experience of the Geomorphologist and the Biologist assigned to the Stream Team.

Table 2.30-A defines the design components of the stream channel that the individual members of the Stream Team, at a minimum, are responsible for:

Table 2.30-A Stream Team Responsibilities

Design Components	SDE	Geomorphologist	Biologist
Site Assessment	X	X	X
Watershed Assessment	X	X	X
Fish Resources and Habitat Assessment	X		X
Hydrology	X		
Hydraulic Analysis	X		
Fish Passage Design	X		X
Streambed Design	X	X	X
Habitat Features	X	X	X
Scour Analysis	X		

2.30.5 *Design Requirements*

2.30.5.1 Draft Preliminary Hydraulic Design Reports

Draft Preliminary Hydraulic Design Report(s) ("PHDs") for the fish passages in this Contract are found in Appendix H. These draft PHDs are Reference Documents and shall

not be construed to provide Contract requirements or guarantees beyond the extent to which they are explicitly referenced to do so in the Technical Requirements (TRs).

2.30.5.2 Flood Risk Analysis

If any earthwork activity associated with the Work is within a Federal Emergency Management Agency (FEMA)-mapped 100-year floodplain, a flood risk analysis shall be performed and documented in the Specialty Report showing changes in floodplain elevations and the locations where the Project creates a changed condition in the hydraulics of features that convey the 100-year floodwaters. If the results of the flood risk analysis show a change to the existing FEMA map then a Conditional Letter of Map Revision or Letter of Map Revision process, or both, shall be required.

If any crossing is within a FEMA regulatory floodway, then a No-Rise Analysis and Certification is required per FEMA's *Procedures for "No-Rise" Certification For Proposed Development in the Regulatory Floodway* (Appendix H).

The Design-Builder shall work with the Flood Plain Administrator (FPA) or Chief Executive Officer (CEO) of the community, or both, to determine whether a FEMA flood map revision is necessary based on the Design-Builder's final design. If a flood map revision is determined to be necessary, the Design-Builder shall support the FPA/CEO with hydraulic modeling and design. All costs for this Work and associated fees shall be borne by the Design-Builder.

2.30.5.3 Fish Passable Structures

Fish passable structures shall be in accordance with Section 2.13, *Bridges and Structures*.

Galvanizing and zinc coatings shall not be used below the water surface elevation based on the 100 year Mean Recurrence Interval.

Where aluminum pipe or pipe arch is in contact with cement concrete or controlled density fill, two coats of paint shall be applied in accordance with the Mandatory Standards.

Construction of fish passable structures and support activities shall be included in the Environmental Compliance Plan.

2.30.5.3.1 Certain Structure and Channel Design Characteristics

Some of the design characteristics required to be addressed in the JARPA are addressed in Table 2.30-B. WSDOT warrants that designs which comply with all structure characteristics and all channel characteristics in Table 2.30-B for a given structure will be accepted by the Tribe and WDFW, provided the Design-Builder's design for characteristics which are not addressed in Table 2.30-B prove to be satisfactory to the Tribe and WDFW. Cells in Table 2.30-B that are blank shall be interpreted as meaning that particular characteristic is not addressed and therefore, not warranted by WSDOT. Also, this warranty is void for a given structure if the Design-Builder elects to make any change to any characteristic in Table 2.30-B for that given structure.

Table 2.30-B – Structure and Channel Design Characteristics

Notes	Characteristic (see Note 1)	Tributary to Lake Creek				Lake Creek	Deep Creek
		Structure Characteristics					
	Fish Passage and Diversion Screening Inventory site ID #	934823	934820	934821	934829	990236	07.0396 0.80
	bankfull width (minimum)	NA	NA	NA	NA	NA	26.7’
	Hydraulic Clear Span (minimum)	14’				44’	100’
	Structural Clear Span (minimum)	14’				44’	100’
	Hydraulic Length (maximum)	NA				NA	NA
	100 Year Design Freeboard (minimum)	3.0’				3.0’	3.0’
	Maintenance Clearance (minimum)	6.0’	6.0’	NA	NA	6.0’	60.0’
5	structure type required	Bridge or Buried Structure	Bridge or Buried Structure	Open Channel with Walls	Open Channel with Walls	Bridge	Bridge
	If a buried structure is used, is it required to be bottomless, such as a three-sided structure?	No	No	NA	NA	NA	NA
	What Design Methodology is required?	Bridge Design Methodology				Bridge Design Methodology	Bridge Design Methodology
7	Are wing walls with a skew angle less than 60 degrees to the Bearing of Stream allowed?	No				No	No
		Channel Characteristics					
	channel section geometry	NA	NA	Typical Section 2 on p. XS01 of PHD	Typical Section 2 on p. XS01 of PHD	Lake Creek on p. HY04 of PHD	Deep Creek on p. PR01 of PHD
2	Is the design required to allow, or prohibit, the	Allow				Allow	Allow

	channel to naturally Regrade?						
3	proposed bed material	30% Streambed Sediment and 70% 10-inch Streambed Cobbles				100% Streambed Sediment	40% Streambed Sediment and 60% 12-inch Streambed Cobbles
4, 6	minimum number of Type ***Key Piece*** LWM	57				0	16
4	LWM allowed within the Hydraulic Length of structure	No	No	Yes	Yes	No	Yes

Notes:

1. See this Section for definitions of terms used in this table.
2. If the design is required to allow for Natural Channel Regrading, the structure and channel shall be designed to meet all Contract requirements for both of the following cases: (1) the stream profile before Natural Regrade occurs (i.e., at initial completion of construction of this Contract), and (2) the stream profile after Natural Regrade occurs. "All Contract requirements" includes, but is not limited to, the Structural Characteristics in Table 2.30-B.
3. Morphology and stream gradation shall support the final design proposed by Design-Builder.
4. The number of LWM indicated is based on the proposed channel length in the PHD. Increases in impacted channel length will require installation of additional LWM.
5. Refer to Section 2.13, *Bridges and Structures* for allowable bridge and buried structure types.
6. The types of LWM are further described in Chapter 10 of the WSDOT *Hydraulics Manual*.
7. See the Structure Free Zone Definitions Exhibit and the definition of Hydraulic Length.

Where a culvert or buried structure(s) is allowed and is proposed by the Design-Builder, the minimum thickness of streambed aggregate, between the interior structure bottom and the lowest point of the channel cross section, shall equal a minimum of the Total Scour depth plus 2 feet.

The stream channel profile and section shall transition to match the upstream and downstream channel profile and section within the impact limits.

2.30.5.4 Streambed Aggregates

Streambed cobbles, sediment, and boulder sizing for the design of fish passable structures shall be in accordance with the WSDOT *Hydraulics Manual* and the Standard Specifications.

The combined streambed material shall have a D_{50} that is within 20 percent of the reference reach D_{50}, unless otherwise approved through the WSDOT Engineer by the WSDOT State Hydraulics Engineer.

2.30.5.4.1 Streambed Sediment

The table located in Standard Specifications, Section 9-03.11(1), is replaced with the following:

Streambed Sediment	
Sieve Size	Percent Passing
2 ½”	99-100
2”	85-100
1”	50-82
½”	28-68
No. 40	5-20
No. 200	5-10

All percentages are by weight

2.30.5.4.2 Fine Band Material

The following new Section is added to Section 9-03.11 of the Standard Specifications:

9-03.11(5) Fine Band Material

If the Project requires the use of coarse bands, fine bands shall also be included in accordance with the WSDOT *Hydraulics Manual*. Fine band material shall conform to the following gradation.

Fine Band Material	
Sieve Size	Percent Passing
No. 4	99-100
No. 10	46-86
No. 40	26-40
No. 200	10-20

All percentages are by weight.

2.30.5.4.3 Streambed Sand

The following new Section is added to Section 9-03.11 of the Standard Specifications.

9-03.11(6) Streambed Sand

Streambed sand shall conform to the following gradation.

Streambed Sand	
Sieve Size	Percent Passing
½”	99-100
3/8”	90-100
No. 4	90 Max
No. 8	32-67
No. 200	2-7

All percentages are by weight

2.30.5.5 Large Woody Material

Materials for LWM and LWM anchoring shall follow the guidance in Chapter 10 of the WSDOT *Hydraulics Manual*. The Design Builder shall use native conifers for LWM with branches and limbs intact. Metal components of the LWM anchors shall not be galvanized.

2.30.5.6 Stream Restoration

The Design-Builder shall design stream restoration through any new reaches or reaches disturbed by construction, and shall include, at a minimum, the following details:

- Streambed gravel and scour protection at the fish passable structures.
- Streambed gravel, LWM, and scour protection through the new stream channel sections.
- Horizontal alignment following natural stream radii and meanders following the Mandatory Standards.
- Vertical profile, incorporating complexities including at a minimum, riffles, pools, and pool-riffles in accordance with the Mandatory Standards.
- Anchors for buoyant features such as LWM and large plantings to address forces that occur in the 100-year recurrent storm event.
- LWM and other habitat features used for stream restoration shall be included in the hydraulic model and the Final Hydraulic Design Report submittal.

The Design-Builder shall use SRH 2D hydraulic modeling software for pre-Project and post-Project condition, including all habitat and stream restoration components.

The Design-Builder shall coordinate the design and construction of this Work considering fish windows, temporary erosion control, and plant establishment to minimize potential impacts to flood risk in adjacent properties upstream and downstream of any new reaches or reaches disturbed by construction. Refer to Sections 2.8, *Environmental* and 2.15, *Roadside Restoration* for additional requirements.

The Design-Builder shall provide As Built survey data, including the stream construction and gradation of the streambed gravel and other materials with the SDE's certification that the As Built condition meets the design plans. The Design-Builder shall include this documentation as part of the As Built Hydraulic Design Report(s) for Fish Barrier Removal.

2.30.5.6.1 Habitat Features

The Design-Builder shall host and lead meetings to coordinate the final design layout of LWM with the WSDOT Engineer, WSDOT Headquarters Hydraulics, WSDOT Headquarters Fish Passage Biologist, WDFW, and Tribal representatives.

The Design-Builder shall incorporate channel complexity elements inside the new structure(s). The channel complexity shall be accomplished through the use of habitat features that encourage the formation of pools and help maintain the channel shape. Final LWM and habitat features under and adjacent to structures shall be approved by the WSDOT State Hydraulics Engineer.

2.30.5.6.2 Channel Design

The Design-Builder shall design the channel top of bank, stream stabilization features, and woody vegetation in accordance with the Mandatory Standards, this Section 2.30 and the Contract. The channel bank shall be stabilized using bioengineering techniques and LWM to ensure that the channel will not erode into private property, WSDOT structures, or Utilities that are in the vicinity. Channel design shall avoid new armoring with rock.

2.30.5.6.3 Site Work

The Design-Builder shall grade the area between the new fish passable structures, stream channels, and adjacent floodplain areas to prevent fish stranding. This Work shall include a low-flow channel thalweg.

2.30.5.6.4 Floodplain Storage

The Design-Builder shall evaluate the floodplain volume resulting in grading (earthwork only) below elevations shown in the FEMA Flood Insurance Studies or Flood Insurance Rate Maps (FIRM). The Design-Builder shall verify the correct elevation ranges for floodplain volume calculations to assess change in floodplain storage for the correct elevation ranges shown in FIRMs or floodplain studies. The As Built conditions shall meet or exceed pre-Project floodplain volume for each of these elevation ranges.

2.30.5.7 Scour Analysis and Long Term Degradation/Aggradation

The Design-Builder shall perform a scour analysis that includes all habitat and stream restoration components in accordance with the Mandatory Standards and this Section. The scour analysis shall include all elements of Total Scour as defined by HEC-18. Scour depth shall be based on total scour without any countermeasures in place including final LWM layout. The scour analyses supporting all structures are considered part of the Specialty Report(s) and shall undergo a Peer Review.

At a minimum, the Peer Reviewer shall review the following aspects of the scour design and analysis:

- Geotechnical data collected and reasonableness of the assumptions made by the Design-Builder to develop the scour models used in the analyses
- Field data collection
- Assessments used to determine stream classification, stability, response, and level of analysis
- Hydrologic analysis
- Hydraulic analysis
- Scour analysis input and results
- Channel migration
- Equations used in the calculation, if applicable
- Verify compliance with the Mandatory Standards and this Section
- Construction document details and specifications that result from the scour analysis

2.30.6 *Construction Requirements*

2.30.6.1 Preconstruction Conference

A streambed preconstruction conference shall be held at least 5 Calendar Days prior to the Design-Builder beginning streambed construction to discuss the goals and methods of streambed construction which shall include the construction procedures, personnel, and equipment to be used.

Those attending shall include:

1. Design-Builder: The superintendent, on-site supervisor, Quality Assurance (QA), foreman, the Environmental Compliance Lead and any other personnel that will have on-site responsibility for streambed material, LWM, habitat features and coarse and fine band placement.
2. WSDOT: The WSDOT Engineer, Headquarters Hydraulics, and key inspection personnel.
3. Representatives from interested permitting agencies and affected Tribes shall be invited by WSDOT.

Notice of the meeting date shall be given to the WSDOT Engineer 14 Calendar Days prior to this meeting taking place.

2.30.6.2 Construction Oversight

The Design-Builder shall coordinate with the WSDOT Engineer for oversight during all stream restoration and streambed construction Work. This includes but is not limited to mixing and placement of streambed materials and installation of habitat features (key LWM pieces).

Notice of the Work shall be given to the WSDOT Engineer 14 Calendar Days prior to each element of Work beginning.

2.30.6.3 Protection and Restoration of Sensitive Resource Areas

All Design-Builder, Subcontractor, and supplier employees that will perform Work on the Project Site shall have environmental training in accordance with Section 2.8, *Environmental*, and shall be aware that no access or impacts are permitted beyond the high visibility construction fencing.

2.30.6.4 Placing Aggregate in Streambed

Streambed Material shall be placed in the prepared channel excavation to the lines and grades shown on the Design Documents and in such a way as to prevent material segregation. Streambed material shall be placed in lifts no thicker than 12 inches. Streambed material in its final location shall be a well graded mix.

Placement of streambed material shall be constructed to ensure that stream low flow rate of 30 gallons per minute or 95 percent exceedance interval, or as determined through the WSDOT Engineer by the WSDOT State Hydraulics Engineer, is conveyed above each channel layer. The Design-Builder shall apply water and 1-inch depth of streambed sand to each layer to facilitate filling the interstitial voids of the streambed materials. The voids are satisfactorily filled when water equivalent to the low flow rate of the stream does not go subsurface and there is no perceivable difference in the low flow rate from upstream of the Project limits to the downstream of Project limits. The Design-Builder shall apply water at the low flow rate to the stream channel for visual acceptance by the WSDOT Engineer. Water shall be free from contaminates, chlorination and any additive that has a risk on fish and other ecological life.

The entire process of placing all streambed material, all streambed sand, and watering in each layer shall be a Hold Point, with attendance by QA and a representative from WSDOT Hydraulics being mandatory.

The Design-Builder shall minimize the potential for increased turbidity in accordance with State water quality standards and Contract requirements. Any accumulated sediments shall be removed. The stream bypass shall remain in place until flows that are introduced to the new channel section at a rate equal to the existing stream flows comply with State water quality standards at the downstream end of the new channel. If no water is flowing in the creek at the time of the bypass removal, the Design-Builder shall apply water to the stream channel for visual acceptance by the WSDOT Engineer.

2.30.6.4.1 Streambed Test Section

Streambed test section shall include the Design-Builder supplying and mixing the streambed material into a test section no smaller than low flow channel width, the depth as shown in the plans, and a minimum length of 20 feet or three times low flow channel width, whichever is larger. The test section shall demonstrate the Design-Builder mixing methods of the streambed material into a uniform mix and placement of streambed sand including the layering and watering in methods as described above in 2.30.6.4, *Placing Aggregate in Streambed*. The process of constructing the streambed test section shall be a Hold Point, with attendance by QA and a representative from WSDOT Hydraulics mandatory.

2.30.6.5 Rewatering the Stream Channel

Re-watering the stream channel shall be a Hold Point. Prior to re-watering the stream channel, the WSDOT Engineer will meet with QA to conduct final inspection of As Built condition for channel shape, profile, and structure.

2.30.6.6 Abandonment of Existing Culvert Structures

Abandonment or removal of existing culverts shall be in accordance with Divisions 2 and 7 of the Standard Specifications. Any existing pipe or other structure that will be abandoned and will remain under any pavement shall be filled using methods and materials that ensure the pipe or structure is completely filled in a supported, non-void condition, prevent the pipe or structure from being a structural element and preventing future erosion of the fill material. The Design-Builder shall include the abandonment details, including any abandon-in-place filling methods and materials, in the Released for Construction (RFC) and As Built documents.

2.30.7 *Submittals*

All submittals shall be in electronic format. All pages of all submittals shall be in searchable PDF format. In addition to the searchable PDF format, submittals that include hidden information not visible in PDF format (such as calculations in the cells of a spreadsheet or drawing) shall be submitted in their original format (such as Word, Excel, InRoads) to facilitate WSDOT's full review and understanding of the basis and assumptions for calculations and other output.

Electronic modeling, maps, and spreadsheets may be on 11 by 17-inch pages when printed. Otherwise, electronic submittals, when printed, shall fit legibly on an 8.5 by 11-inch page.

2.30.7.1 Design Plans

The Design-Builder shall prepare stream plan sheets for the Project in accordance with Section 2.28 *Quality Management Plan and* the WSDOT Plans Preparation Manual. The stream plan sheets at a minimum shall have a plan, profile, upstream cross section(s) and downstream cross section(s) that provide enough information to layout and construct the details of the Work including elevation information.

2.30.7.2 Design Calculations

The Design-Builder shall complete all calculations necessary for the design of the Work and include these calculations in the applicable Specialty Report(s). The Design-Builder shall prepare calculations in accordance with the Mandatory Standards to support the design shown in the plans and details.

The Specialty Report(s) shall describe the approach taken and the order of the calculations, including sections on the methodologies used (appropriateness and accuracy requirements), design decisions made, and resultant summaries. The calculations shall include electronic copies of the input and output from the supporting computer programs, spreadsheets, hand calculations, exhibits, and sketches. At a minimum, the calculations shall also include the following items:

- Design Calculations – These calculations shall include design criteria, hydrology and hydraulics calculations, and pertinent computer input and output data (reduced to 8.5 by 11-inch sheet size). The calculations shall include a narrative of the approach taken, and 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 – The Design-Builder shall include a brief narrative of design decisions or revisions, electronic files from design calculations, and the reasons for them
- Design decision summaries
- Technical Specifications necessary for construction
- Drainage maps showing the fish passage structures and any other illustrations necessary to support and clarify the design calculations. Electronic design drawings and maps, when printed, shall be on 11 by 17-inch pages
- Hydraulic analysis (SRH-2D)
- Channel section design
- Streambed material sizing
- Scour analysis
- Scour analysis for streambed gravel sizing around LWM structures, if applicable
- LWM buoyancy and anchoring calculations, if applicable

2.30.7.3 Specialty Reports

The Design-Builder shall submit all Specialty Reports: the PHD, Draft Final, Final, and As Built Hydraulic Design Report(s). These shall be developed and completed by the Design-Builder following the *Hydraulic Design Report Template* (Appendix H). The Design-Builder shall include all elements of the design, and shall validate, refine, and detail the documentation to demonstrate that the design meets the requirements of this Section, complies with the Injunction and the WSDOT *Hydraulics Manual* and fulfills the Project's permit commitments included in Appendix C. Each stream shall have a

separate Specialty Report. The Design-Builder shall allow 14 Calendar days for the WSDOT Engineer's review and comment for each Specialty Report listed in this Section. All Specialty Reports shall undergo a Peer Review prior to each submittal of the Special Report to the WSDOT Engineer.

2.30.7.3.1 Preliminary Hydraulic Design Report

For all fish passage structures, the Design-Builder shall submit a PHD. If the Design-Builder elects to adopt, without any changes, the WSDOT Draft PHD (Appendix H), it shall so notify WSDOT in writing.

If the Design-Builder proposes a design that changes any component or element as described in the PHD (Appendix H), then a revised PHD shall be submitted for review that includes draft plans and draft model results that meet all of the requirements of the Mandatory Standards, Environmental Commitments, and Contract Requirements.

2.30.7.3.2 Draft Final Hydraulic Design Report(s)

For all fish passage structures, the Design-Builder shall submit a Draft Final Hydraulic Design Report for Fish Barrier Removal with the conceptual Stream Design Plans to support the WSDOT Engineer's Review and Comment of the stream design drawings for the Project. The Draft Final Hydraulic Design Report for Fish Barrier Removal shall follow the template provided in Appendix H and shall include habitat features and total scour. Comment resolution of the WSDOT Engineer's review of the Draft Final Hydraulic Design Report and model results shall be complete prior to the submittal of JARPA.

2.30.7.3.3 Final Hydraulic Design Report(s)

The Design-Builder shall assemble the Final Hydraulic Design Report(s) to reflect the final RFFC hydraulic design. The Final Hydraulic Design Report(s) shall bear the Professional Engineering stamp and signature of the SDE.

2.30.7.3.4 As Built Hydraulic Design Report(s)

The Design-Builder shall submit an As Built Hydraulic Design Report(s) to document any changes to the design that deviate from the Final Hydraulic Design Report(s).

2.30.7.4 Shop Drawing Submittals

This section intentionally omitted.

2.30.7.5 Design Revisions During Construction

Calculations for revisions made during construction shall be incorporated into the As Built Hydraulic Design Report when construction is complete.

When new plan sheets or revised sheets are required as part of a construction revision, the revisions shall be made in accordance with Section 2.28, *Quality Management Plan* and are subject to WSDOT Review and Comment.

2.30.7.6 List of Submittals

At a minimum, Project submittals shall include the following for each fish passage:

- Draft PHD for any crossing that does not use the provided PHD. This report shall include all sections and appendices that were completed in the WSDOT provided PHD (Appendix H). Each stream shall have a separate report.
- Draft hydraulic model submitted for review with the Preliminary Design Submittal
- Drainage design calculations submitted with the corresponding Stream Design Plans
- Draft Final Hydraulic Design Report(s)
- Final Hydraulic Design Report(s)
- As Built Hydraulic Design Report(s)
- Specialty Report Peer Reviewer credentials
- The Design-Builder fish passable structure inspection reports and documentation of any repairs during the Warranty period

2.30.8 *Fish Passage Warranty and Monitoring*

The fish passage Warranty shall begin on the Fish Passage Operationally Complete Date and have a duration of 5 years thereafter. During each annual period of fish passage Warranty period, the Design-Builder's representative shall accompany WSDOT annually at a mutually agreeable time and location, for a site inspection to determine whether any corrective action and for WSDOT to inform the Design-Builder of any discovered violations of the fish passage Warranty which require corrective action. In addition to the foregoing, at any time during the fish passage Warranty period, if WSDOT determines that any of the fish passage Work has not met the standards set forth in the Contract, the Design-Builder shall correct the Work, even if the performance of such correction extends beyond the stated fish passage Warranty period. The Design-Builder shall be responsible for obtaining any necessary permits, providing traffic control, modifying the channel or crossing, or both, and performing all other Work necessary to provide a fish passage that complies with the Contract requirements, at no cost to WSDOT.

2.30.8.1 Fish Passage Warranty Requirements

Monitoring results outside of expected anticipated natural adjustments that affect fish passage, such as subsurface flow, excessive turbulence, or channel spanning drops >0.80 feet, shall require Project modifications or repair Work by the Design-Builder. The Design-Builder is responsible for obtaining any necessary permits, providing traffic control, modifying the channel or crossing, or both, and performing all other Work necessary to provide fish passage that complies with the Contract requirements, at no cost to WSDOT.

The following information shall be used to determine if fish passage is satisfactory:

1. Bed material is present throughout the structure and matches the design D84, as measured using Wolman pebble count.

2. Distinct thalweg maintained throughout the crossing structure and is not entrained against the structure walls.
3. Water flows through the structure at sufficient depth to pass fish whenever fish would naturally seek fish passage as comparable to the natural adjacent stream channel.
    a. Measure depth at each riffle for 100 feet downstream and 100 feet upstream of Project to determine an average depth in the natural stream channel; take a minimum of three measurements within the wetted width that are representative of the range of depths across the riffle. Water depth within the structure should be within 20 percent of the average depth of the natural stream channel, measured at the thalweg.
4. There should not be subsurface flow when the natural stream channel is flowing, per Section 2.30.6.4.
5. Bed material within the Project shall not create turbulence or hydraulic drops that are greater than the intended design.
    a. There shall be a continuous non-turbulent path for fish, as evaluated during the injunction monitoring.
    b. There shall not be any channel spanning drops greater than 0.80 feet (0.24 meters).
6. No excessive scour
    a. Bed scour shall not exceed what was anticipated by the scour analysis as documented in the Final Hydraulic Design Report.
7. Constructed Habitat and complexity features (such as large wood, coarse bands, barbs, preformed pools, etc.) continued satisfactory performance:
    a) Habitat features shall continue to function as intended.
    b) Wood placed as fish habitat features shall remain in contact with the active channel and engaged at low flows.
    c) Key piece bank protection wood shall remain in place as intended by the design.
    d) Mobile wood shall be observed to transport at the intended design flow.

2.30.9 *Fish Passage Indemnity*

For specific indemnities regarding fish passages, see *General Provisions* 1-07.14(1).6 and 1-07.14(1).7.

End of Section