

REQUEST FOR PROPOSAL**Stormwater****I-405, Brickyard to SR 527 Improvement Project****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, Intermediate, and a Final Hydraulic Report for the constructed Project in accordance with the WSDOT *Hydraulics Manual*, WSDOT *Highway Runoff Manual*, and this Section.
- Prepare a Technical Information Report (TIR) for the constructed project to address compliance with Local Agency storm drainage policy and Mandatory Standards for local street improvements outside of or through WSDOT limited Access.
- Prepare individual Best Management Practices (BMP) Maintenance Plans for stormwater treatment facilities.
- Prepare evaluations of 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, rehabilitate, 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.
- 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.

- Construct new enclosed storm system along 17th Avenue SE to facilitate collection and treatment for the 17th Avenue SE runoff separate from the adjacent private drainage systems.
- 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, 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 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 B)
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)
<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)

The following are Mandatory Standards that apply within the City of Bothell-owned and maintained portions of the Project including SR 527, 220th Street SE, and 17th Avenue SE, and as described in the GCB 3261 Bothell Cooperative Agreement (Appendix I):

1. *City of Bothell Surface Water Design Manual*
<http://www.bothellwa.gov/DocumentCenter/View/8051/Surface-Water-Design-Manual-PDF>
2. *King County Department of Natural Resources and Parks, 2016 King County, Washington, Surface Water Design Manual* (Appendix H)

The following Mandatory Standards apply within the City of Kirkland-owned and maintained portions of the Project, including 116th Avenue NE, the Brickyard Road Park and Ride access road, and as described in the GCB 3671 Kirkland Cooperative Agreement (Appendix I):

1. City of Kirkland, Addendum to the 2021 King County Surface Water Design Manual (Appendix H)
2. King County Department of Natural Resources and Parks, *2021 King County Surface Water Design Manual* (Appendix H)
3. City of Kirkland Public Works, Storm Drainage Pre-Approved Plans (Appendix D)
4. WSDOT Hydraulics Manual M 23-03 (Appendix D) within WSDOT limited access

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
- Western Washington Continuous Simulation Hydrology Model (WWHM2012) Version 4.2.17 or higher
- U.S. Army Corps of Engineers, HEC-RAS Version 5.0.5 or higher

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 responsible for the stormwater design. The

1 Drainage Design Lead Engineer shall also be responsible for all drainage design
2 revisions made throughout the duration of the Contract.

3 The Drainage Design Lead Engineer shall obtain certification for completing the
4 WSDOT *Highway Runoff Manual* training course prior to beginning the
5 stormwater design.

6 The Drainage Design Lead Engineer shall have direct design experience and
7 current knowledge of designing and implementing low impact development-type
8 stormwater treatment techniques.

9 **2.14.3.2 Peer Reviewer**

10 The I-405/SR 167 Corridor Program includes staff that serve as peer reviewers as
11 part of the WSDOT review process. There are no independent peer reviewer
12 requirements for the Design-Builder as part of Work required to comply with this
13 Section.

14 **2.14.4 Design Requirements**

15 **2.14.4.1 Stormwater Design Criteria**

16 The Design-Builder shall use the Mandatory Standards, permit commitments, and
17 the design criteria described in this Section and Section 2.15, *Roadside*
18 *Restoration*, to develop the stormwater and hydraulic designs of the Project. If
19 any of the design criteria are not achievable, the Design-Builder shall follow the
20 WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual* for
21 deviations and submit documentation of what cannot be achieved to the WSDOT
22 Engineer. The Design-Builder shall provide an explanation of why it cannot be
23 achieved, and a proposed alternative for Review and Comment.

24 The conceptual design relies on a *Highway Runoff Manual* deviation for
25 Minimum Requirement 4, Maintaining Natural Drainage Systems applicable to
26 basin transfer between Stream KL 14, Stream 42, Queensborough Creek and
27 North Fork Perry Creek. The deviation was approved by the Demonstrative
28 Approach Team (Appendix H). The Design-Builder has the option to follow all or
29 part of the approved design deviation. If the Design-Builder chooses not to use the
30 approved deviation, it will be at the risk of the Design-Builder.

31 Category 1 (open top vault) Type BMPs shown in the conceptual design have
32 been reviewed and accepted by WSDOT Maintenance but did not fully detail
33 maintenance access and details needed for WSDOT authorization for Alternative
34 BMP Options. The Design-Builder shall complete the coordination and
35 documentation for WSDOT authorization during final design as outlined in the
36 WSDOT *Highway Runoff Manual*.

37 The Design-Builder is encouraged to seek cost-effective solutions that provide
38 equal or greater environmental benefits and reduced long-term maintenance. The
39 final design shall maximize the innovative use of runoff treatment and flow
40 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.

2.14.4.2 Conceptual Level Hydraulic Report and the Design-Builder's Hydraulic Reports and Intermediate Drainage Designs

Conceptual Level Hydraulic Reports (Appendix H) have 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. Conceptual level TIRs have been prepared (Appendix H) to document initial concepts for compliance with City of Bothell policy and standards.

The *Conceptual Level Hydraulic Reports* (Appendix H) and *Conceptual Technical Information Report* are 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 Level Hydraulic Reports* (Appendix H) if used in the Design-Builder's Preliminary Hydraulic Report, Intermediate Hydraulic Report, Final 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. Similarly, the Conceptual TIR (Appendix H) is provided as a reference document and shall be verified and updated to comply with the requirements in this Section.

The Design-Builder also has the option to develop a Preliminary Hydraulic Report and TIR that do not follow the *Conceptual Level Hydraulic Reports* and *Conceptual Technical Information Reports* (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, grates, and ditches) within the Project limits that the Design-Builder physically impacts or hydraulically modifies shall be evaluated for compliance with the Mandatory Standards based on the proposed design condition. Design and construction of the new, replaced, or rehabilitated drainage conveyance systems shall be in accordance with the WSDOT *Hydraulic Manual*, unless otherwise specified by a City-owned facility.

The Design-Builder shall not construct drainage structures in traveled lanes. If roadways 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 the traveled lanes and shall repair the roadway. Pipe and surface drainage structures placed in the reinforcement zones of walls including reinforced earth, soil nail, tie-back-type walls, and similar designs shall be coordinated directly with and approved by the geotechnical

1 Engineer of Record (EOR) and the structural EOR. The Design-Builder shall
2 submit a design memorandum for Review and Comment indicating concurrence
3 from the EORs. This memo shall serve as the required documentation for
4 drainage conveyance systems located in a wall reinforcement zone.

5 The Design-Builder shall be responsible for designing the pedestrian bridge
6 conveyances and ensuring a positive drainage connection to WSDOT storm
7 drainage structure or daylight to a roadside ditch.

8 **2.14.4.3.1** *Replace or Rehabilitate*

9 The following culverts, cross drains, and conveyance structures have been
10 identified as having reached the end of serviceable life and shall require pipe
11 replacements or rehabilitation as part of the Work. The locations shown as
12 “DR#-#” refer to drawing numbers and structure numbers shown in Appendix H
13 Storm Drainage System and Culvert Inspection Data.

- 14 • DR1-13 to DR1-14 – Structural issues
- 15 • DR1-9 to DR1-10 – Structural issues
- 16 • DR4-5 to DR4-6 – Structural issues
- 17 • DR5-22 to DR5-23 – Multiple holes
- 18 • DR10-36 to DR10-37 – Structural issues

19 **2.14.4.3.2** *Spot Repairs*

20 Refer to the Appendix H Storm Drainage System and Culvert Inspection Data for
21 locations of the following storm drainage pipes and culverts that the
22 Design-Builder shall repair at a specific location or length along the pipe.

- 23 • DR1-15 to DR1-16 – Crack at 14 feet from DR1-15
- 24 • DR5-27 to DR5-28 – Deformation at 73 feet from DR5-27
- 25 • DR5-9 to DR5-8 – Fracture at 47 feet from DR5-8
- 26 • DR6-3 to DR6-4A – Crack at 17 feet from DR6-3
- 27 • DR6-4 to DR6-6 – Broken at 3 feet from DR6-6
- 28 • DR6-17 to DR6-16 – Roots at 17 feet from DR6-17
- 29 • DR6-33 to DR7-1 – Crack at 74 feet and 295 feet from DR7-1
- 30 • DR7-9 to DR7-8 – Fracture 133 feet from DR7-8
- 31 • DR7-11 to DR7-8 – Fractures at 240 and 250 feet from DR7-11
- 32 • DR7-11 to DR7-12 – Fracture 2 feet from DR7-12
- 33 • DR7-13 to DR7-16 – Roots at 310 feet from DR7-13
- 34 • DR7-14 to DR7-12 – Fracture at 118 feet from DR7-12
- 35 • DR9-12 to DR9-13 – Broken at 6 feet from DR9-13
- 36 • DR10-28 to DR10-8 – Guardrail post at 6 feet from DR 10-28
- 37 • DR10-43 to DR10-29 – Guardrail post at 58 feet from DR10-43

- DR11-4 to DR11-5 – Deformed at 48 feet from DR11-4
- DR12-3 to DR12-4 – Deformed at 83 feet from DR12-3

2.14.4.3.3 *Inspect and Evaluate*

Refer to the Appendix H Storm Drainage System and Culvert Inspection Data for the following storm drainage pipes and culverts that shall be cleaned and videoed to check and evaluate conditions to determine if replacement, rehabilitations or fixing is needed. Refer to Section 2.8, *Environmental*, for environmental requirements associated with this Work. The Design-Builder shall submit the findings in the analysis of the existing stormwater drainage systems. If the WSDOT Engineer accepts the assessment and proposes action, compensation will be in accordance with Section 1-04.4 of the *General Provisions*.

- DR1-2 to DR1-3
- DR1-3 to DR1-5
- DR1-5 to DR1-6
- DR1-3 to DR1-4
- DR2-3 to DR2-4
- DR4-18 to DR4-22
- DR4-21 to DR4-20
- DR4-7 to DR4-8
- DR4-9 to DR4-10
- DR4-11 to DR4-12
- DR4-12 to DR4-13
- DR4-14 to DR4-15
- DR4-16 to DR4-17
- DR4-19 to DR4-22
- DR4-22 to DR4-25
- DR4-25 to DR4-27
- DR4-22 to DR4-23
- DR4-22 to DR4-24
- DR5-1 to DR5-2
- DR5-3 to DR5-4
- DR5-5 to DR5-6
- DR5-9 to DR5-8
- DR5-11 to DR5-12
- DR5-13 to DR5-15
- DR5-14 to DR5-15
- DR5-15 to DR5-16

- 1 • DR5-17 to DR5-15
- 2 • DR5-24 to DR5-25
- 3 • DR5-25 to DR5-26
- 4 • DR5-29 to DR5-30
- 5 • DR6-10 to DR6-11
- 6 • DR6-11 to DR6-12
- 7 • DR6-25 to DR6-24A
- 8 • DR7-7 to DR7-10
- 9 • DR7-20 to DR7-21
- 10 • DR7-23 to DR7-24
- 11 • DR8-1 to DR8-2
- 12 • DR8-2 to DR8-4
- 13 • DR8-7 to DR8-8
- 14 • DR8-10 to DR8-11
- 15 • DR9-5 to DR9-4
- 16 • DR9-4 to DR9-6
- 17 • DR9-9 to DR9-10
- 18 • DR9-15 to DR9-16
- 19 • DR10-6 to DR10-4
- 20 • DR10-19 to DR10-18
- 21 • DR10-20 to DR10-21
- 22 • DR10-16A to DR10-17
- 23 • DR10-24 to DR10-25
- 24 • DR10-28 to DR10-8
- 25 • DR11-3 to DR4-23
- 26 • DR11-11 to DR11-12
- 27 • DR11-9 to DR11-10
- 28 • DR12-5 to DR12-6
- 29 • DR12-7 to DR12-8

30 Pipe rehabilitation shall be designed in accordance with a method identified in the
31 WSDOT *Hydraulics Manual*. The pipe repair material shall have a 50-year
32 manufacturer's warranty for structural capacity based on depth of cover. The
33 Design-Builder shall assume the host pipe does not contribute to the structural
34 capacity of the pipe repair. Pipe liners shall be extended for the full length of the
35 pipe. All voids outside of the liner along the length of the pipe shall be filled and
36 each end of the liner shall have a smooth transition to the end of the pipe, without
37 jagged edges. Cured in place pipe (CIPP) liners shall not be allowed. The Work
38 shall comply with the conditions of the permits. The Design-Builder shall prepare

1 an Environmental Compliance Plan to finish this work. The installation,
2 inspection, and testing shall follow the manufacturer's specifications and
3 methods, and the Standard Specifications (Appendix B). The final design shall
4 address changed conditions related to rehabilitation work, including, but not
5 limited to, inlet and outlet velocities, erosion protection, and compatibility with
6 connection to upstream and downstream drainage conveyance. When a new pipe
7 is specified in the RFC Drainage Plans, a pipe liner shall not be considered a new
8 pipe.

9 **2.14.4.3.4 Project Specific Storm Conveyance Design Requirements**

10 All conveyance system structures shall be located outside of the traveled way.
11 Existing drainage structures shall be removed and relocated if they fall within the
12 new traveled way. Horizontal adjustment to risers will be considered on a
13 case-by-case basis.

14 The fish passage concept for Stream 25 requires an equivalent hydrological basin
15 trade to protect North Creek from flow increases. The conceptual design
16 established through permitting process with the City of Bothell, USACE, WDFW,
17 and the Tribes that Watercourse 70 tributary area upstream of southbound I-405 is
18 a suitable basin. The Design-Builder shall construct a new conveyance system in
19 accordance with the Forward Compatible Plans (Appendix M) to implement this
20 basin trade, or equal, with completion coincident with the completion of the
21 Stream 25 barrier correction work.

22 If the final design proposes to use media filter drain BMPs upstream of a flow
23 control BMP, the Engineer of Record (EOR) shall demonstrate that the runoff
24 would be collected and conveyed to the flow control BMP properly for the full
25 range of storm design recurrences specified in the WSDOT *Highway Runoff*
26 *Manual*.

27 The back of the wall surface runoff collection system behind Wall 23.20R near
28 the I-405 ramp to eastbound SR 522 (I-405 MP 23.20 to MP 23.55) shall utilize a
29 12-inch-diameter perforated pipe in a gravel filled trench to minimize hillside
30 sand collection by the back of the wall drainage system. This system shall include
31 inlets at sags locations and clean-outs at 300-foot maximum spacing.

32 **2.14.4.4 Wall Drains**

33 Drainage shall be provided to all walls in accordance with the WSDOT
34 *Geotechnical Design Manual*. Wall drainage systems shall be designed for ease of
35 maintenance, shall not have elbows greater than 45 degrees, shall provide low-
36 clogging minimal maintenance type structures, and shall include removable clean-
37 out covers and ports. Retaining walls shall be designed to prevent surface water
38 from flowing down the face of the wall.

39 The internal wall drainage system (perforated pipe underdrain system) will be
40 connected directly to a stormwater drainage system structure (catch basin, inlet, or
41 manhole). If the Design-Builder is unable to directly connect to a structure, the
42 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 unless a larger drain is required by the Mandatory Standards.

Discharge of groundwater to the stormwater drainage system will increase flows that need to be quantified and incorporated into the hydraulic conveyance and capacity design as well as any applicable stormwater BMP designs of the stormwater drainage system. To determine the flow rate coming from the underdrain pipe that is discharging groundwater to surface water, the Design-Builder shall assume full flow conditions based on the diameter of the underdrain pipe. The Design-Builder may use a different flow rate from the underdrain pipe if recommended in a stamped geotechnical report.

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.

Underdrain systems shall not drain water from constructed stormwater treatment wetlands or other treatment BMPs unless specified in the design of the Mandatory Standards

Infiltration type BMPs shall not be used on top of walls.

2.14.4.5 Storm Sewer and Culverts Conveying Stormwater and Non-Fish Bearing Streams

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 remove structures that fall within the traveled way for the Project. The removed structure shall be replaced by pipe of equal size and material and maintain the continuous hydraulic connection.

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, impacts, or modifies existing culverts and storm sewers in any way.

In areas where the Work changes the fill cover or adds structural loading from walls or footings over existing culverts, the Design-Builder shall verify that the change in cover does not exceed the maximum or is less than the minimum allowable fill height limits for the culvert. If the limits are exceeded, the culvert shall be replaced or protected in place. If existing culvert material cannot be

1 verified, the Design-Builder shall assume that the culvert material is plain
2 concrete pipe for evaluation purposes.

3 Storm sewers operated and maintained by others (e.g., city and county storm drain
4 systems) shall be protected, kept separate from the Project stormwater drainage
5 system, and maintained at their existing capacity and function.

6 Protect in place the South Fork Perry Creek Culvert pipe crossing under
7 228th Street SE: work on this crossing is not permitted.

8 **2.14.4.6 Infiltration**

9 The design of infiltration type BMPs shall be in accordance with the WSDOT
10 *Highway Runoff Manual*. Any stormwater BMP that uses infiltration within a
11 floodplain requires a WSDOT *Highway Runoff Manual* deviation.

12 Soil and groundwater investigations and Site suitability reviews were performed
13 to help verify the assumption used in the *Conceptual Level Hydraulic Report*
14 (Appendix H). Details of these soil investigations, including locations, borehole
15 and test pit logs, piezometer data, and test results, are included in the
16 *Geotechnical Data Report* (Appendix G). After Notice to Proceed, the
17 Design-Builder shall assume responsibility and continue reading and recording
18 data from the piezometers for design purposes.

19 If infiltration BMPs are used, the Design-Builder shall perform supplemental
20 infiltration capacity investigations in accordance with Chapter 4 of the WSDOT
21 *Highway Runoff Manual* to meet the requirements of the Mandatory Standards.
22 The Design-Builder's infiltration type BMP designs shall be based on the
23 recommendations of the Design-Builder's Geotechnical Group Manager.

24 **2.14.4.7 Runoff Treatment and Flow Control**

25 Permanent highway flow control and runoff treatment BMPs shall be designed in
26 accordance with the WSDOT *Highway Runoff Manual*, the permit requirements,
27 and this Section. If the Design-Builder proposes the use of emerging technologies,
28 proprietary (vendor-supplied) stormwater BMPs, or proprietary flow control
29 devices, the Design-Builder shall obtain the required approvals in accordance
30 with Chapter 5 of the WSDOT *Highway Runoff Manual*. Appropriate
31 documentation shall be submitted to the WSDOT Engineer for Review and
32 Comment and coordination with Region Maintenance. All comments shall be
33 resolved prior to incorporating the emerging technology, proprietary stormwater
34 BMP, or proprietary flow control device into the Project design.

35 The conceptual design meets the WSDOT *Highway Runoff Manual* stormwater
36 retrofit requirements as documented in the *Conceptual Level Hydraulic Report*
37 (Appendix H). The Design-Builder shall provide runoff treatment according to the
38 environmental commitments. The Design-Builder shall also update the Retrofit
39 Cost Effectiveness Feasibility (RCEF) analysis to demonstrate that the stormwater
40 costs for the final design meet or exceed 20 percent of the no-retrofit stormwater
41 costs as required by the WSDOT *Highway Runoff Manual*. Transferring funds to
42 other stormwater retrofit projects is not an option. The backup calculations

1 provided in the RCEF must clearly demonstrate how the costs were calculated and
2 shall be updated with each Hydraulic Report submittal, from Preliminary through
3 Final submittals.

4 The Design Builder shall comply with Local Agency Mandatory Standards
5 applicable to the improvement for local street improvements outside of or through
6 WSDOT limited Access. All Local Agency runoff treatment and flow control
7 BMPs required for the project shall be designed in accordance with the Local
8 Agency's Mandatory Standards and agreements listed in this Section.

9 If the use of emerging technologies and proprietary (vendor-supplied) runoff
10 treatment BMPs are considered for treatment of City of Bothell runoff, they shall
11 be evaluated in accordance with Section 6.7 of the *2016 King County Surface*
12 *Water Design Manual*. Appropriate documentation shall be submitted to the
13 WSDOT Engineer and the City of Bothell for Review and Comment. All
14 comments shall be resolved prior to incorporating emerging technology or
15 proprietary runoff treatment BMPs into the Project design.

16 The Design-Builder shall not use galvanized products on the stormwater drainage
17 system including pipes, grates, control structures, ladder rungs, debris cages on
18 top of overflow structures, and other hydraulic structures. Aluminum pipe or pipe
19 arch shall be protected from corrosion in accordance with the Mandatory
20 Standards.

21 When compost is used in stormwater BMPs, the Design-Builder shall follow the
22 compost type specified in the *WSDOT Highway Runoff Manual*.

23 The Design-Builder shall notify the WSDOT Engineer 5 Calendar Days prior to
24 beginning construction of each compost-amended biofiltration swale BMP.
25 Compost-amended biofiltration swale BMPs shall be constructed in accordance
26 with the RFC Drainage Plan with particular attention to the decompaction of
27 underlying soils, As Built flat bottom width of the finished surface (top of
28 compost), and thickness of compost. The construction inspection shall include the
29 documentation method and timing of decompaction, and measurement of the
30 bottom width taken at 50-foot intervals along the length of the installation. The
31 depth of compost As Built shall be measured at the middle point and at each edge
32 of the flat bottom area on 50-foot intervals along the length of the installation to
33 verify that a minimum of a 3-inch thickness has been achieved. The
34 Design-Builder shall ensure that the BMP performance retains the design sheet
35 flow widths for the duration of the warranty period. Repair all tracking and rutting
36 once compost has been placed. If runoff is allowed to flow in the BMP prior to
37 grass establishment, the Design- Builder shall install temporary erosion control
38 measures to prevent erosion of the compost layer.

39 Construction timing for permanent stormwater BMPs shall be coordinated with
40 the various other construction activities, including but not limited to landscaping,
41 barrier installation; Intelligent Transportation Systems, illumination, signals, and
42 Toll Infrastructure; and electrical conduit installation. Once installed, the
43 Design-Builder shall not drive equipment over or cause sedimentation in the area
44 of the permanent stormwater BMP.

Open pond BMPs shall not be used where the facility discharges to the Sammamish River.

Wall surfaces within drainage facilities shall be designed to be aesthetically compatible or located at low visibility locations.

Stormwater vaults and open-top vaults shall be watertight and shall conform to the requirements for detention vaults in the WSDOT *Bridge Design Manual*, and Category 1 Ecology-Approved BMPs Not in the HRM (Appendix H).

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 designs for maintenance access, pipe slope, drain systems, and other provisions for maintenance to WSDOT for Review and Comment.

The Design-Builder shall provide sediment storage in catch basins at the base of the retaining wall collecting runoff from the hillside east of the northbound I-405 ramp to eastbound SR 522 (I-405 MP 23.20 to MP 23.55) based on the following criterion:

1. $SA \geq FS \times Q_{10}/V$, where

SA = wetpool surface area within the catch basin;

Q₁₀ = the 10-year flow rate from MGSFlood using a 15- minute time step;

FS = 1.3; and

V = the settling velocity of 0.0262 feet per second.

2. Design Wetpool Volume (cf) \geq 60 seconds x Q₁₀ flow rate (cfs)

3. An additional 12-inch depth for sediment storage shall be provided below the design wetpool volume.

2.14.4.8 Analysis of the Existing Stormwater Drainage System

For any part of the existing stormwater drainage system that is hydrologically impacted or physically 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 mile downstream of each discharge location from WSDOT ROW in accordance with the WSDOT

1 *Hydraulics Manual*. The Design-Builder shall provide a capacity
2 analysis with backup calculations showing the downstream conveyance
3 has adequate capacity to convey the Project's flows in the post-
4 development condition. When the downstream conveyance system is
5 under capacity, the Design-Builder shall upsize the conveyance system
6 to meet the requirements in the WSDOT *Hydraulics Manual* or
7 otherwise mitigate the increased flow at no additional cost to WSDOT.
8 Where the downstream conveyance system is outside WSDOT Right of
9 Way, the design and documentation of downstream improvements shall
10 comply with the Local Agency Mandatory Standards noted in this
11 Section.

- 12 • Provide a sizing analysis of all impacted or modified existing
13 stormwater BMPs that show the appropriate pre-developed and post-
14 developed conditions to ensure at a minimum that the same amount of
15 area has the same or better level of runoff treatment, flow control, or
16 both in accordance with the WSDOT *Highway Runoff Manual*. The
17 Design-Builder shall also highlight any increases in flows from existing
18 stormwater BMPs as a result from the Project and provide solutions to
19 protect against downstream erosion.
- 20 • Document each design analysis in the Intermediate Hydraulic Report
21 and Final Hydraulic Report. Work associated with downstream
22 conveyance improvements outside WSDOT Right-of-Way shall be
23 documented in the TIR for the Local Agency.

24 The Project's impacts or modifications to the existing stormwater conveyance
25 systems, runoff treatment, and detention of roadway runoff shall not increase the
26 potential for flooding upstream or downstream of the Project.

27 The Project's impacts or modifications to the existing stormwater drainage system
28 shall not decrease the amount and level of runoff treatment and flow control
29 provided by existing stormwater BMPs.

30 The Design-Builder shall submit the analysis of the existing stormwater drainage
31 system prior to submittal of the intermediate drainage design packages to support
32 WSDOT review of the final design.

33 **2.14.4.9 Outfalls and Discharge Locations**

34 All outfalls and discharge locations shall be protected from erosion. Appropriate
35 erosion control measures shall be designed in accordance with the Mandatory
36 Standards.

37 **2.14.4.10 Maintenance Access**

38 The Design-Builder shall provide maintenance access to all new stormwater
39 BMPs, culverts conveying stormwater and non-fish bearing streams, and storm
40 sewer structures. Catch basins, inlets, and manholes on storm sewer systems shall
41 be located at the outer edges of shoulders, in medians, or gore areas. Manholes,
42 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 area is designated for maintenance purposes, the area shall be a minimum of 15 feet wide and at least 80 feet minimum in length.

Where new BMPs are proposed within Local Agency-owned and maintained facilities, the Design-Builder shall follow the Local Agency Mandatory Standards.

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/ vault	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, 20-foot 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 and 6-inch minimum thickness of crushed surfacing base course. 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.

Maintenance access manholes to flow control detention vaults shall be positioned in accordance with WSDOT *Highway Runoff Manual*. Valves and pipe installed inside the vault shall not conflict with use of the ladder. Ladders to the vault shall comply with Chapter 296-876 WAC, Safety Standards for Ladders, Portable and Fixed, and shall be structurally designed to meet the 50-year life requirement.

Refer to Category 1 Ecology-Approved BMPs Not in the HRM (Appendix H) for supplemental information and additional requirements addressing specific compartments, floor slope, access, and other detailing of vaults.

WSDOT stormwater BMPs built or modified by the project shall have signage per the Standard Plans.

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 in accordance with Section 2.15, *Roadside Restoration*.

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 vacuor 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.

Inspection, maintenance, and reporting shall include the following:

- Annual inspection and maintenance of roadway stormwater BMPs for managing highway runoff
- Annual cleaning using vacuor trucks and other means to clean catch basins, conveyance systems, culverts, and stormwater BMPs such as ponds
- Proper handling and disposal of solids and liquids removed from catch basins and stormwater BMPs
- Reporting results, which requires organizing and coordinating with the WSDOT Engineer on large volumes of data on an annual basis

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. Where the standard details result in a gap of more than 3 inches, the Design-Builder shall provide details showing how the offset distance will be minimized and runoff collection addressed for WSDOT Review and Comment.

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 per the 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.

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. The Design-Builder shall submit a risk assessment as required by WSDOT *Hydraulic Manual*.

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. Where it is required that an existing manhole be abandoned, the Structure shall be broken down to a depth of at least 4 feet below the revised surface elevation, all connections plugged, and the manhole filled with sand and compacted to 90 percent density as specified in Section 2.03.3(14)C. The Structure floor shall also be broken at 10-foot spacing in each direction to assure that the abandoned vault will not be watertight prior to being filled. Debris resulting from breaking the upper part of the manhole may be mixed with the sand, subject to the approval of the Engineer. 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.

The following drainage structures shall be filled and abandoned unless otherwise required to be removed:

- I-405 MP 23.48 - Vortechs 16000 vault (NB I-405 to EB SR 522)
- I-405 MP 26.45 - Vault NW12 (I-405 Median)

The following drainage structures shall be removed:

- I-405 MP 23.75 - Vault NW06 (WB SR 522 ramp to NB I-405)

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 this Section and include this in the Intermediate Hydraulic Report and Final 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*; the *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 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 the Preliminary Hydraulic Report and TIR, Intermediate Hydraulic Report and TIR, Final Hydraulic Report and TIR, 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, Threshold Discharge Areas, 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.
- Zero Rise certification in the floodplain (pre- versus post-project backwater using HECRAS at locations where there are grading and structure modifications within the FEMA-mapped floodplains.

- Verify no net loss of floodplain volume for the Final Design and to confirm final constructed condition based on As Built survey.

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 WSDOT elements of the Project. The Preliminary Hydraulic Report shall describe the Project's WSDOT *Highway Runoff Manual* Minimum Requirements, any applicable stormwater retrofit requirements, 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 intent is to provide an overall documentation of the stormwater design approach and allow WSDOT to verify that the permit requirements are met. When combined with the more detailed design and plan information submitted for construction package submittals, the Preliminary Hydraulic Report and following package submittals complete the required Hydraulic Report outline content. 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 a Preliminary TIR, including the overall flow control, runoff treatment, and stormwater drainage system concepts for the Local Agency elements of the Project. The Preliminary TIR shall be submitted prior to the first intermediate drainage design package including local street improvements. The Design-Builder's schedule shall allow 30 Calendar Days for the WSDOT Engineer and City's Review and Comment.

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 calculations, 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.

An Intermediate Hydraulic Report and TIR 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 Intermediate Hydraulic Report and Intermediate TIR for the Project shall be stamped and signed by the Drainage Design Lead Engineer. The Intermediate Hydraulic Report shall be in accordance

1 with the WSDOT *Hydraulics Manual* and WSDOT *Highway Runoff Manual*. The
2 Local Agency elements of the Intermediate TIR shall comply with the Mandatory
3 Standards for the Local Agency. The Intermediate Hydraulic Report and TIR shall
4 be submitted with the Intermediate Drainage Design Plans to the WSDOT
5 Engineer within 30 Calendar Days of the submittal date of the last intermediate
6 drainage design package. The Intermediate Hydraulic Report shall follow the
7 guidance, outline, and format as shown in Section 1-3 of the WSDOT *Hydraulics*
8 *Manual*. The Design-Builder's schedule shall allow 30 Calendar Days for the
9 WSDOT Engineer's Review and Comment for the Intermediate Hydraulic Report
10 and TIR.

11 After all stormwater and drainage related construction is complete, a Final
12 Hydraulic Report and TIR for the Project shall be prepared by, or under the direct
13 supervision of, the Drainage Design Lead Engineer to reflect the Project's final
14 hydraulic design as it was at the completion of the drainage construction. The
15 Final Hydraulic Report and TIR shall incorporate drainage related changes during
16 construction that were not captured during the intermediate drainage design
17 packages. The Final Hydraulic Report and TIR shall incorporate the final As Built
18 documentation including the updated report text, records of decision, associated
19 design criteria, drainage maps, Drainage Plans, calculations, and details in
20 accordance with Chapter 1 of the WSDOT *Hydraulics Manual*. The
21 Design-Builder's schedule shall allow 30 Calendar Days for the WSDOT
22 Engineer's Review and Comment for the Final Hydraulic Report.

23 Before submitting the Final Hydraulic Report and TIR to the WSDOT Engineer,
24 the Drainage Design Lead Engineer shall field verify As Built conditions of the
25 stormwater drainage system to make sure they match the As Built Plans and to
26 verify the stormwater drainage system meets the intended design function. The
27 Design-Builder shall coordinate with the WSDOT Engineer to invite the WSDOT
28 Region Hydraulics Engineer, WSDOT Region Maintenance representative, and
29 the Local Agency Surface Water Management and Maintenance representatives to
30 all drainage As Built verification meetings. The list of drainage items field
31 verified to meet As Built conditions shall be signed by the Drainage Design Lead
32 Engineer and included in the Final Hydraulic Report.

33 The Design-Builder shall submit the Final Hydraulic Report and TIR to complete
34 the reviews, address all comments, and issue the As Built record copy within
35 30 Calendar Days after Substantial Completion. The final submittal shall include
36 the Final Hydraulic Report and TIR in searchable PDF format, complete with all
37 associated drawing files (MicroStation format), electronic versions of
38 spreadsheets, calculations, documents (Microsoft Word format), and
39 hydrologic/hydraulic models.

40 The Final Hydraulic Report shall include the Drainage Design Lead Engineer's
41 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 Design-Builder shall evaluate the floodplain storage volume changes arising from grading and new structures below elevations shown in the FEMA Flood Insurance Studies and on the Flood Insurance Rate Maps (FIRMs). The As Built conditions shall meet or exceed pre-project floodplain volume and demonstrate that there is zero rise in the 100-year floodplain elevation measured to the one hundredth of a foot.

The preliminary and final submittals shall include the Specialty Floodplain Report in searchable PDF format, complete with all associated electronic versions of spreadsheets, calculations, and hydrologic/hydraulic models.

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 Final 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 and Manuals

The Design-Builder shall prepare a stormwater BMP maintenance plan for each new or modified stormwater BMP using the BMP maintenance plan template in Appendix H. 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.

The Design-Builder shall prepare a *Drainage Maintenance Manual* that describes the "what" and "when" maintenance procedures and maintenance requirements for all Project stormwater BMPs. The *Drainage Maintenance Manual* shall include individual BMP Maintenance Plans for each flow control and runoff treatment BMP that describes the As Built facilities, location of the facilities and maintenance procedures. Each separate BMP Maintenance Plan shall include:

- A vicinity map showing the location of the BMP using SR and MPs, stations and offsets, longitude, and latitude.

- A Site Information sheet that documents the facility type, agency responsible for maintenance, the design and construction job number, the title of the Hydraulic Report, plan preparation date, BMP description, space to include a feature number, and any remarks of special design features such as pond liners, maintenance valves, load limitations, venting requirements or any other special features.
- An enlarged aerial photograph shall be included showing the BMP and its vicinity.
- An established control point, survey benchmark within 100 feet of the BMP. The survey benchmark shall have the same vertical and horizontal data as included in the contract plans to the nearest hundredth of a foot.
- Guideposts showing the type of BMP in the field per the WSDOT *Highway Runoff Manual* (in accordance with Section 5-4.3.7).
- Maintenance frequency as dictated in the WSDOT *Highway Runoff Manual* or NPDES permit.
- Maintenance procedures for the BMP. On the plan sheets, highlight the areas that need to be maintained, and describe the maintenance activity that need to be done in each highlighted area.
- Include a description of the BMP used and how it functions, special maintenance procedures, as well as a complete set of as constructed drawings showing design details for each element of the feature. The complete set of drawings shall include all the plan sheets, cross-sections, and detail sheets for the BMP.
- Include landscaping plans for any runoff treatment facilities that include specific plants for their function.

The Design-Builder shall include a tabulation of quantities for new stormwater BMPs, including, but not limited to, manholes, catch basins, linear feet of storm drain pipe, stormwater BMP, acres of pond site, and linear feet fencing, complete with the WSDOT BMP sticker number that appears on the BMP sediment depth markers and signing for linear BMPs.

The Design-Builder shall coordinate with the WSDOT Engineer and submit the *Drainage Maintenance Manual* for Review and Comment. After incorporating the WSDOT Engineer's review comments, the Design-Builder shall provide an electronic version in searchable PDF format of the *Final Drainage Maintenance Manual* reflecting the As Built condition, complete with As Built drawings.

2.14.6.10 Existing Stormwater Drainage Conveyance Systems Report

The Design-Builder shall submit an Existing Stormwater Drainage Conveyance Systems Report, in accordance with this Section, with any Intermediate Drainage Design Package for WSDOT Review and Comment.

2.14.6.11 List of Submittals

Project submittals include, at a minimum, the following:

- | | |
|----|---|
| 1 | • Existing Stormwater Drainage Conveyance Systems Report |
| 2 | • Analysis of the Existing Stormwater Drainage System |
| 3 | • Design Plans |
| 4 | • Design Calculations |
| 5 | • TESC Narrative and Plans |
| 6 | • Risk assessment for Maintenance of Traffic (MOT) gutter flows |
| 7 | • Preliminary Hydraulic Report and TIR |
| 8 | • Intermediate Drainage Design Packages |
| 9 | • Intermediate Hydraulic Report and TIR |
| 10 | • Shop drawings |
| 11 | • Stormwater and Hydraulic Design Revisions During Construction |
| 12 | • Final Hydraulic Report and TIR |
| 13 | • Stormwater BMP Maintenance Plans of WSDOT facilities |
| 14 | • Certification of Zero Rise in the Floodplain |
| 15 | • Certification of No Net Decrease of Floodplain Volume |
| 16 | • <i>Drainage Maintenance Manual</i> for WSDOT Facilities |
| 17 | • <i>Drainage Maintenance Manual</i> for City of Bothell Facilities |

18 **2.14.6.12 Miscellaneous Submittals**

19 This Section intentionally omitted.

20 **End of Section**