

**BID DOCUMENT NO 2013-04**

**ATTACHMENT 1 – TECHNICAL SPECIFICATIONS AND DRAWINGS**

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## **TECHNICAL SPECIFICATIONS**

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**DIVISION 1 – GENERAL**

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## **SECTION 01010 – SUMMARY**

### PART 1 – GENERAL

#### 1.01 DESCRIPTION OF REQUIREMENTS

##### A. Governing Regulations

1. Perform Work in accordance with all applicable laws, codes, ordinances, and regulations. Work shall be completed in accordance with the following:
  - a) The Contract Documents
  - b) Applicable permits, laws, codes, ordinances, and regulations
  - c) The Washington State Department of Transportation (WSDOT) Standard Specifications for Road, Bridge and Municipal Construction (latest edition), the American Society for Testing and Materials (ASTM) Standards (latest edition), the American Water Works Association (AWWA) Standards (latest edition), and any other standards referenced in these Specifications
  - d) According to the manufacturer's recommendations
2. The Contractor shall have an approved set of the Contract Documents on site at all times. The Contractor shall also have a copy of applicable permits and licenses, and the WSDOT Standard Specifications for Road, Bridge and Municipal Construction (latest edition) on the site at all times.
3. Protection of natural resources: All Work should be carried out in a manner consistent with the goal of achieving proposed development with the least possible disturbance to vegetation, wildlife, steep slopes, wetlands, streams, and their buffers. No disturbance, including access or storage of materials, is to occur within designated wetlands or below ordinary high water, with the exception of those areas as shown in the drawings, which are permitted disturbances.

##### B. Contractor Responsibilities

1. Coordinate, furnish, and pay for all items, articles, materials, and operations listed, including all labor, materials, equipment, and incidentals required for their completion, except as noted in paragraph C below. The Contractor is responsible for all construction means and methods and for the general coordination of the Work of all trades.
2. Pay the required taxes.

3. Secure and pay for the following, as necessary for proper execution and completion of Work:
  - a) Work permits from local jurisdictions, not including regulatory permits that are obtained by the Contracting Agency
  - b) Foundation
  - c) Fees
  - d) Licenses
  - e) Bonds
4. Give required notices.
5. Enforce strict discipline and good order among employees and coordination of the Work by subcontractors.
6. Use new materials, except as noted or otherwise approved by the Contracting Officer.
7. Maintain required ingress and egress and other access as required by the Contracting Agency in accordance with governing Codes and Ordinances throughout the Work.
8. Comply with all requirements noted in approved permits. Advise the Contracting Officer of any conflicts between permit conditions and the Contract Documents.
9. The Contractor is, in general, the custodian of the site of the Project and it is his/her responsibility to provide access, storage, sanitation facilities , safety and environmental protection supplies, parking, and work space for all those engaged in the Work. The site shall be maintained in an orderly manner with debris and trash removed daily.
10. All materials, methods, and equipment shall comply with the requirements of applicable codes and the Contract Documents, including requirements of all incorporated standards. The Contractor shall furnish, as a part of the Contract, certification of code compliance if requested by the Contracting Agency, Sponsor, Contracting Officer, or Code Enforcing Agency.
11. Personal safety: Protect personnel, passers-by, occupants, or visitors to the site from harm and injury.
12. Construction: Protect existing and adjoining structures and site features where noted, including: vegetation, access points, utilities, and Work of any kind which is to remain from damage, defacement, or interruption of

service, except as may be specially directed or authorized. All streets and access roads shall be repaired according to municipal standards, if damaged, and left in a condition equal to or better than the original condition.

13. Existing utilities: Protect existing underground and overhead utilities from any damage or interruption of service and call for location markings before ground disturbance. If necessary, obtain permission from utility owners and relocate as required for completion of the Work.

C. Materials and Services Supplied by the Sponsor and/or Contracting Agency

1. The Sponsor or Contracting Agency may supply materials and/or services for the Work; these materials and supplies shall be identified on one or a combination of the following: the Drawings, Specifications, and Contract Documents.
2. The Contractor shall not be reimbursed for materials and/or services supplied by the Sponsor and/or Contracting Agency.
3. The Contractor shall coordinate with the Sponsor and/or Contracting Agency supplying materials and/or service, as necessary, to complete the Work.

1.02 WORK UNDER THIS CONTRACT

- A. The Work consists of furnishing all labor, equipment, and materials necessary for and performing all operations and improvements to the Project site in accordance with the Specifications and Drawings, and subject to the terms and conditions of the Contract Documents.

1.03 CONTRACT TIME AND WEATHER RELATED DELAYS

- A. Unless otherwise indicated in the Contract Forms, the following shall apply:
  1. The Work of this Contract shall commence immediately upon the receipt of Notice to Proceed, and shall be substantially complete within the Contract time defined in the General Conditions of the Contract. Completion of Final Punch List shall be achieved within the time period required in the Certificate of Substantial Completion.
  2. Contract time may be changed by Change Order only. Contract time shall be amended by Change Order to account for weather-related delays. Contract time extension and documented costs are the sole remedy in change orders resulting from weather-related delays.

1.04 LIQUIDATED DAMAGES

- A. See Contract Documents.

1.05 HAZARDOUS MATERIAL

- A. No toxic or hazardous chemicals or materials are expected to be encountered during scheduled construction activities. Should any Work activities by this Contract discover/disturb any hazardous material, the Contractor is directed to immediately cease Work activity in the area found to be potentially hazardous, notify the Contracting Officer, and await the Contracting Officer's direction.

1.06 CUTTING AND PATCHING

- A. General: The Contractor shall be responsible for all cutting and fitting or patching that may be required to complete the Work or to make several parts fit together properly. This includes executing cutting, fitting, and patching required to uncover Work; providing for installation of ill-timed Work; removing and replacing defective Work; removing and replacing Work not conforming to requirements of the Contract Documents; removing samples of Work as specified for testing; and installing specified Work in existing construction.

1.07 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification format: The Specifications are generally organized into Divisions and Sections using the 16-division format and Construction Specifications Institute's (CSI's) "MasterFormat" numbering system.
  - 1. Section identification: The Specifications use section numbers and titles to help with cross-referencing in the Contract Documents. Sections in the Contract Documents are in numeric sequence; however, unused Sections are not included. Consult the table of contents at the beginning of the Contract Documents to determine numbers and names of sections in the Contract Documents.
- B. Specification content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Abbreviated language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be

performed by the Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

## 1.08 DEFINITIONS

- A. Abandonment – Contractor failing to be present at job site for 7 calendar days without prior notice (not to be confused with abandoned utilities).
- B. Addenda – the written notices of modification of the Contract Drawings, Specifications, or other Contract Documents, which may be issued by the Sponsor to holders of Contract Documents prior to the opening of Proposals. The singular of Addenda is Addendum.
- C. Architect/Engineer – The person or firm designated as the Architect or Engineer.
- D. As approved – Unless otherwise qualified, shall be understood to be followed by the words “by the Contracting Officer”.
- E. As shown and As indicated – Unless otherwise qualified, shall be understood to be followed by the words “on the Drawings”.
- F. Authorized Representative – The individual(s) that the Sponsor or Contracting Officer designates to serve as its representative in dealings with the Contractor.
- G. Bridge – is used interchangeably with culvert.
- H. Contract Documents – The Contract as defined in paragraph 2 of the Contract Agreement (see Contract Forms in Part VI, Attachment 3, Section 1, pg. 1-1).
- I. Contracting Agency – The Agency that is a party to the Contract, Methow Salmon Recovery Foundation.
- J. Contracting Officer – The individual designated by the Sponsor to serve as its representative.
- K. Contractor – The entity that is awarded the Contract.
- L. Contractor’s Representative – The individual whom the Contractor designates in accordance with paragraph GC-18.2 in the Bid Documents, Part III.
- M. Culvert – is used interchangeably with bridge.
- N. Days – Unless otherwise specifically stated, will be understood to mean calendar days.
- O. Drawings – Refers to the official Drawings, profiles, cross sections, elevations, details, and other working drawings and supplementary drawings, or

reproductions thereof, which show the location, character, dimensions, and details of the Work to be performed. Drawings may either be bound in the same book as the balance of the Contract Documents or bound in separate sets, and are a part of the Contract Documents, regardless of the method of binding.

- P. Notice or The requirement to notify – As used in the Contract Documents or applicable State or Federal statutes, shall signify a written communication delivered in person or by certified or registered mail to the individual, or to a member of the firm, or to an officer of the corporation for whom it is intended. Certified or registered mail shall be addressed to the last business address known to him who gives the notice.
- Q. Observer – Individual(s) that the Sponsor designates as its observer(s) of the Work.
- R. Or equal – Shall be understood to indicate that the "equal" product is the same or better than the product named in function, performance, reliability, quality, and general configuration. Determination of equality in reference to the Project design requirements will be made by the Contracting Officer. Such "equal" products shall not be purchased or installed by the Contractor without the Contracting Officer's written approval.
- S. Plans – (see “Drawings”).
- T. Provide – Means to “furnish and install” as specified in the Specifications and as shown on the Drawings.
- U. Satisfactory – Satisfactory to the Sponsor or the Architect/Engineer.
- V. Specifications – The terms, provisions, and requirements contained herein. Where standard specifications, such as those of ASTM, AASHTO, etc., have been referred to, the applicable portions of such standard specifications shall become a part of these Contract Documents.
- W. Sponsor – Methow Salmon Recovery Foundation, also referred to as “MSRF”.
- X. Structure Design Engineer – a Washington State licensed engineer experienced in the design of bottomless culverts, bridges, or other approved structures from which the Contractor shall obtain sealed and signed construction drawings for the two proposed culverts, inclusive of headwalls, wingwalls, and foundations/footings, where applicable and described in the Specifications, herein.
- Y. Substantial Completion – Shall be that degree of completion of the Project or a defined portion of the Project, sufficient to provide the Contracting Officer, at his discretion, the full-time use of the Project or defined portion of the Project for the purposes for which it was intended. Notice of acceptance by the Contracting Officer shall not be deemed granted until provided to the Contractor in writing.

- Z. The Work – The entire undertaking, including all labor, materials, plant, tools, supplies, equipment, transportation, supervision, design, services, goods, and other things necessary, appropriate, or incidental to the carrying out and completion of all tasks described in the Contract Documents, in full conformity with the Contract Documents.

1.09 PROJECT TEAM

A. Lines of Communication:

1. The Contractor and the Contractor's Representative are to communicate directly with the Contracting Officer or the Contracting Officer's Representative unless authorized in writing to contact other listed Project personnel.

B. Contracting Agency:

1. Methow Salmon Recovery Foundation (MSRF)

**Office Address:**

Methow Salmon Recovery Foundation  
206 Glover Street  
Twisp, WA 98856  
Phone: (509) 966-2787  
Fax: (509) 422-1766

**Mailing Address:**

Methow Salmon Recovery Foundation  
P.O. Box 755  
Twisp, WA 98856

**Contracting Officer:**

Chris Johnson, MSRF  
Phone: (509) 422-0300  
Mobile: (509) 429-1232

**Contracting Officer's Representative:**

Brian Fisher, MSRF  
Phone: (509) 387-1716

C. Sponsor: (same as Contracting Agency)

D. Engineer:

**Office Address:**

United States Department of Interior  
Bureau of Reclamation  
Pacific Northwest Region  
1150 North Curtis Road, Suite 100  
Boise, ID 83706-1234  
Phone: (208) 378-5233

**Contact:** Rob Richardson

E. Engineer's Consultant:

**Office Address:**

Anchor QEA, LLC  
1605 Cornwall Avenue  
Bellingham, WA 98225  
Phone: (360) 733-4311

**Contact:** Tracy Drury, P.E.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

**END OF SECTION**



## **SECTION 01110 – SUMMARY OF WORK**

### PART 1 – GENERAL

#### 1.01 REQUIREMENT

- A. Construct and complete in accordance with the Contract Documents provisions, these Specifications, and the Drawings listed in Section 01111 – Drawings, Methow River Valley, WA; Upper Middle Methow Reach; WDFW Culvert Improvement Project.

#### 1.02 LOCATION

- A. All Work is on or adjacent to the floodplain of the Methow River, north of Twisp, Washington, in Township 34 North, Range 21 East, Section 30, Okanogan County. Channel improvement Work is mainly located between State Route 20 (SR-20) and Old Twisp Highway South. The South Culvert and North Culvert installations are located on Old Twisp Highway South approximately at mileposts 0.9 and 1.0, respectively. The downstream extent of the channel improvements is in the Methow River. A length of channel improvements is located upstream of the proposed north culvert on the east side of Old Twisp Highway South.

#### 1.03 INTENT

- A. The general intent of this Work is to enhance and improve conveyance of groundwater through existing wetlands to the Methow River for the benefit of fish habitat.
- B. The above Work is to be performed for Methow Salmon Recovery Foundation, hereafter referred to as the “Contracting Agency.” The Contracting Agency will appoint a Project staff member, hereafter referred to as “Contracting Officer,” who will have the responsibility to issue a Contract to construct the above Work and will administer the Contract Documents and funds for the Project.
- C. The United States Bureau of Reclamation, hereafter referred to as the “Engineer,” is the Contracting Agency’s representative who has designed the Project and provides oversight during construction. The Engineer makes recommendations to the Contracting Officer regarding whether all the Work is in compliance with the construction Specifications and Drawings. The Engineer also reviews all construction changes and makes recommendations to the Contracting Officer prior to the Contracting Officer’s approval of the changes.

#### 1.04 SEQUENCE OF WORK

- A. Contractor shall attend a pre-construction meeting prior to commencement of the construction. Meeting location, date, and time shall be determined by the Contracting Agency.

1. Contractor shall provide a list of equipment intended to be used for the various construction tasks. Disturbance limitations for the channel improvements may require the use of smaller equipment.
  2. Prior to mobilization, the Contractor shall gain approval from the Contracting Officer with regard to the type and size of equipment to be used in the channel improvements.
- B. Construction on the Project will start on or before *August 1, 2013*, and end by *October 31, 2013*.
- C. Staging may begin after award of the Contract.
- D. The Contractor shall complete all construction activities in the Methow River and its floodplain within ordinary high water in accordance to construction permits.
- E. In-stream work may occur between *July 1, 2013* and *August 31, 2013*.
- F. Installation of the two proposed culverts shall be done in a manner to minimize the length of time requiring a shutdown of Old Twisp Highway South. Okanogan County may limit the time allowed for shutdown of the roadway.
- G. A road closure period is proposed for June 14, 2013 through August 31, 2013.
- H. Substantial completion shall be accomplished no later than *October 31, 2013*. Substantial completion includes, but may not be limited to:
1. Installation of the culverts in Old Twisp Highway
  2. Pavement replacement required for culvert construction

#### 1.05 PRINCIPAL COMPONENTS OF WORK

- A. The major items of Work to be completed include the following:
1. Mobilization and demobilization
  2. Site preparation, including:
    - a) Establishing staging areas and Work access routes as indicated on the Drawings; includes limited clearing and grubbing and stripping.
    - b) Contractor to develop and implement elements of an approved Stormwater Pollution Prevention Plan (SWPPP), if required, or the Water Quality Management Plan.
    - c) Contractor to develop and implement an approved Traffic Control Plan, where applicable.

- d) Contractor to develop and implement elements of an approved Care of Water Plan in preparation for excavation required for various elements of the Work.
3. Diversion and control of water during construction (in accordance with the approved Care of Water Plan and other construction permit conditions).
4. Installing, maintaining during construction, and removing at construction completion temporary erosion and sediment control measures. Some measures will remain in-place after construction to stabilize stockpiled materials.
5. Excavation of the floodplain for completion of the channel improvements. Excavated materials will be segregated, stockpiled, and stabilized in approved staging areas for use in Work under other contracts.
6. Furnishing and installing a bottomless culvert (or other approved structure) within Old Twisp Highway South; culvert is approximately 14'x7'x36'. Work includes excavation of the roadway surface and roadway prism, potential subgrade improvements, installation of the culvert, and backfill and compaction of the culvert, roadway prism, and roadway surface. The roadway surface will be restored in accordance with local and/or state standards. Contractor is responsible for surveying required for road repair and as-built drawing development and geotechnical testing and analyses.
7. Furnishing and installing a bottomless culvert (or other approved structure) within Old Twisp Highway South; culvert is approximately 19'x4'x36'. Work includes excavation of the roadway surface and roadway prism, potential subgrade improvements, installation of the culvert, and backfill and compaction of the culvert, roadway prism, and roadway surface. The roadway surface will be restored in accordance with local and/or state standards. Contractor is responsible for surveying required for road repair and as-built drawing development and geotechnical testing and analyses.
8. Furnishing and placing seed to restore areas disturbed by construction activities.

#### 1.06 MINIMUM AREA

- A. Construction impacts will be confined to the clearing limits shown on the Drawings, unless otherwise approved by the Contracting Officer. All material stockpiles, equipment storage, employee parking, and other related construction support activities shall be confined to the limits shown on the Drawings.

1.07 MAINTAINING NORMAL FLOW OF WATER

- A. Work shall not impede the natural flow of water, except as indicated in the Specifications and Drawings, or as authorized by the approved Care of Water Plan and construction permit conditions.

1.08 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

1.09 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittals:
  - 1. RSN 01110-1, Traffic Control Plan
    - a) The Contractor shall develop and submit a Traffic Control Plan to the Contracting Officer for approval. Contractor shall submit the approved plan to the responsible agencies in accordance with local and/or state requirements. The Traffic Control Plan shall be submitted not less than 10 days prior to mobilization to allow review, comment, and possible plan modification by County Engineer or other appropriate party.
    - b) The Traffic Control Plan shall include a schedule for the closure and reopening of roadways or lane closures necessary for the Work.
    - c) The Traffic Control Plan shall include drawings or sketches that are scaled to show the full extent of elements in the Plan, including signage, position of flaggers, lane closure equipment, and other traffic control devices as necessary.
  - 2. RSN 01110-2, Safety Plan
    - a) The Contractor shall develop and maintain a safety program and submit a safety plan to the Contracting Officer not less than 10 days prior to mobilization. In addition to the normal safety procedures for the type of Work and equipment being used, the safety plan must address specific hazards of the site including heat exposure, cold exposure, water safety, poisonous snakes and insects, and other site-specific hazards. The safety plan shall include the location and contact information for the nearest emergency medical facility, law enforcement, and fire department, as well as method and frequency of safety training and site safety plan information transfer to employees.

3. RSN 01110-3, Progress Schedule
  - a) The Contractor shall develop a progress schedule, highlighting timelines of critical Work tasks and milestones and submit not more than 15 days after the Contract is executed. Schedule is subject to review, comment, and approval by Contracting Agency prior to Work commencing.
  
4. RSN 01110-4, Road Closure Plan
  - a) The Contractor shall develop and submit a road closure plan, highlighting timelines of critical Work tasks and milestones at least 21 days prior to start of construction to allow review, comment, and possible plan modification by County Engineer or other appropriate party.
  - b) An approved road closure plan will be published prior to the start of construction.
  - c) Proposed road closure period: see Part 1.04, above.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

**END OF SECTION**

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## **SECTION 01111 – DRAWINGS**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include all costs in prices offered in the schedule for other items not specifically identified but necessary to complete the Work.

#### 1.02 QUALITY ASSURANCE

- A. Inform the Contracting Officer of any discrepancies, errors, or omissions discovered on Drawings prior to the start of Work.

#### 1.03 PROJECT CONDITIONS

- A. Where there are minor differences, as determined by the Contracting Officer, between details and dimensions shown on the Drawings and details and dimensions of existing features at the job site, use details and dimensions of existing features at the job site.

#### 1.04 COPIES OF DRAWINGS

- A. One set of full-size Drawings, and up to ten (10) additional sets of half-size Drawings, except standard Drawings, will be furnished to the Contractor by the Contracting Officer for construction purposes, upon request by the Contractor.
- B. If construction drawings are updated, the Contracting Agency will release the updated Drawings to the Contractor as described herein.

#### 1.05 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

#### 1.06 LIST OF DRAWINGS

- A. Drawings listed in Table 01111A – List of Drawings, are made a part of these Specifications.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

Not used

**Table 01111A – List of Drawings**

<b>Sheet No.</b>	<b>Sheet Title</b>
1	Cover Sheet
2	General Notes & Estimated Quantities
3	Existing Conditions & Survey Control
4	Site Access, Staging, TESC, & Care of Water Plan
5	Proposed Conditions Plan
6	Proposed Channel Profiles
7	Proposed Alcove Channel A Sections
8	Proposed Channel B Sections
9	North Culvert Plan and Details
10	South Culvert Plan and Details
11	Additional Details

**END OF SECTION**



## **SECTION 01141 – USE OF SITE**

### PART 1 – GENERAL

#### 1.01 PROJECT CONDITIONS

- A. The staging areas and access routes, indicated on the Drawings, may be used for construction support activities. Additional or different areas are available for staging and/or access routes. The Contractor may request, in writing to the Contracting Officer, the use of alternate staging areas and/or access routes. The request may be approved, at the discretion of the Contracting Officer.
- B. If private land is used for construction facilities or other construction purposes, the Contractor shall make necessary arrangements and pay rental and other costs associated with use of private land. At the end of the project provide a copy of a release from the property owner that rents have been paid and lease conditions fulfilled.
- C. Use of public right-of-way may require permits from local and/or state agencies. It is the responsibility of the Contractor to acquire the necessary permits before the start of the Work.
- D. Location, construction, operation, maintenance, and removal of construction facilities on the designated staging areas and access routes will be subject to approval of the Contracting Officer.
- E. Housing for construction personnel will not be permitted on the Project site, unless otherwise approved by the Contracting Officer.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

Not used

**END OF SECTION**

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## **SECTION 01330 – SUBMITTALS**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in prices offered in the schedule for other items not specifically identified but necessary to complete the Work.

#### 1.02 DEFINITIONS

- A. Days: Calendar days.
- B. Required Submittal Number (RSN): RSN identifies items to be submitted together as a complete submittal.

#### 1.03 SUBMITTAL REQUIREMENTS

- A. In case of conflict between the requirements of this Section and requirements included elsewhere in these Specifications, requirements listed elsewhere shall take precedence.
- B. Professional Certifications:
  - 1. Sign and seal submittals requiring certification by a Washington State registered professional in accordance with Washington State codes and laws.
- C. Drawings and data:
  - 1. Prepare Drawings and data in written English and U.S. customary units.
  - 2. Label Drawings and data with the Bid Document Number, Project Title, and Bid Schedule item number(s).
  - 3. Mark items to be furnished on manufacturer's data for commercial products or equipment, such as catalog cut sheets. Identify manufacturer's name, type, model, size, and characteristics. Illustrate that the product or equipment meets the requirements of these Specifications.
  - 4. Drawings:
    - a) Minimum identification in title block:
      - 1) Bid Document Number and Project title.
      - 2) Contractor's or supplier's title and Drawing number.
    - b) Sizes: 22" x 34", 11" x 17", or 8.5" x 11"

- c) Draw to scale with neat lettering using drafting equipment or computer aided drafting equipment.
- d) Measurement units: U.S. customary units

#### 1.04 SUBMITTAL PROCEDURES

- A. Submit only checked submittals. Submittals without evidence of Contractor's approval will be returned for resubmission.
- B. Submit complete sets of required materials for each RSN as specified in "Submittals Required" column of Table 01330A – List of Submittals. A complete set includes all listed items for RSNs with multiple parts.
- C. Submit number of sets specified in "No. of sets to be set to:" column in Table 01330A – List of Submittals.
- D. Include the following information in transmittal letters:
  - 1. Bid Document Number and Project title.
  - 2. RSN for each attached submittal.
  - 3. Number of sets for each RSN.
  - 4. Identify submittal as initial or resubmittal.
- E. More than one RSN may be submitted under a transmittal letter.
- F. All submittals listed in the Specifications are required. Note:
  - 1. If a submittal is required for a product or material not proposed for use in this Contract by the Contractor, the Contractor shall submit a letter with the correct RSN and indicate that the product or material is not proposed for use in this Contract.

#### 1.05 REVIEW OF SUBMITTALS

- A. Time required:
  - 1. Time required to review submittals shall be 10 days.
  - 2. Time required for review of each submittal or resubmittal begins when the Contracting Officer receives complete sets of materials required for a particular RSN and extends through return mailing postmark date.
- B. Return of Submittals

1. One set of submittals required for approval will be returned approved, either not approved, or conditionally approved.
2. Revise and resubmit for approval submittals that are not approved. Show changes and revisions with revision date. Describe reasons for significant changes in transmittal letter. Submit additional information as requested for those submittals that are conditionally approved.
3. Resubmit returned submittals within 7 days after receiving comments, unless otherwise specified. Requirements for initial submittals apply to resubmittals.
4. Do not change designs without approval of the Contracting Officer after submittal drawings, documentation, and technical data have been approved.

1.06 TRANSMITTAL

- A. Send submittals required by Table 01330A – List of Submittals, to the Contracting Officer, Methow Salmon Recovery Foundation at:
  1. P.O. Box 755, Twisp, WA 98856 or
  2. Send digital transmittals via email to Brian Fisher at; [brian@methowsalmon.org](mailto:brian@methowsalmon.org)
- B. The Contracting Agency will retain one copy and disseminate the remaining submittal packages to the Engineer and the Engineer’s Consultant.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

3.01 GENERAL

- A. Maintain one approved set of submittals at the worksite and provide access to these submittals for the Contracting Officer, Contracting Agency, Engineer, interested Government Agencies, and Sponsor.

**Table 01330A – List of Submittals**

RSN	Submittal title	Type*	Submittals required	Submittal Due	No. of sets to be sent to Contracting Officer
01110-1	Traffic Control Plan	A	Traffic Control Plan	Not less than 10 days prior to mobilization	5

WDFW Culvert Improvement Project  
Methow River Sub-Basin, Columbia Snake River Salmon Recovery Program, Washington

<b>RSN</b>	<b>Submittal title</b>	<b>Type*</b>	<b>Submittals required</b>	<b>Submittal Due</b>	<b>No. of sets to be sent to Contracting Officer</b>
01110-2	Safety Plan	A	Safety Plan	Not less than 10 days prior to mobilization	5
01110-3	Progress Schedule	I	Progress Schedule	Not more than 15 days after Contract is executed	5
01110-4	Road Closure Plan	A	Road closure plan for approval and publication	At least 21 days prior to start of construction.	5
01335-1	Hazardous Materials	A	List of Hazardous Materials and Materials Safety Data Sheets	Not less than 10 days prior to delivering hazardous materials to the site	5
01563-1	Water Quality Management Plan	A	Water Quality Management Plan	Not less than 10 days prior to mobilization	5
01563-2	SWPPP	A	Stormwater Pollution Prevention Plan, if required	Not less than 10 days prior to mobilization	5
01563-3	Spill Containment Control Plan	A	Spill Containment Control Plan	Not less than 10 days prior to mobilization	5
01721-1	Surveying	A	Field Records	Not more than 10 days after completion of the Work	5
01781-1	As-built Drawings	A	Contractor's As-built Drawings	Not more than 14 days following substantial completion	5
02240-1	Care of Water Plan	A	Care of Water Plan	Not less than 10 days prior to mobilization	5
02730-1	Crushed Rock Surfacing	A	Source Information	Not less than 10 days prior to delivery of product	5
02840-1	Source QC Documentation	A	Manufacturer Certification of Compliance	Not less than 10 days prior to delivery of product	5
02930-1	Seeding	A	Seed Certification and Analysis	Not less than 14 days prior to delivery of product	5
03200-1	Reinforcement	A	Reinforcement Diagrams and Lists	Not less than 14 days prior to delivery of product	5
03300-1	Concrete	A	Concrete Mix Design	Not less than 14 days prior to delivery of product	5
03300-2	Concrete	I	Concrete Delivery Tickets	Same day as delivery	5

WDFW Culvert Improvement Project  
Methow River Sub-Basin, Columbia Snake River Salmon Recovery Program, Washington

<b>RSN</b>	<b>Submittal title</b>	<b>Type*</b>	<b>Submittals required</b>	<b>Submittal Due</b>	<b>No. of sets to be sent to Contracting Officer</b>
03300-3	Shop Drawings	A	Shop drawings and design calculations for cast-in-place concrete elements, to be sealed and signed by Structure Design Engineer	Not more than 14 days after notice of bid award	5
03410-1	Shop Drawings	A	Shop drawings and design calculations for cast-in-place concrete elements, to be sealed and signed by Structure Design Engineer	Not more than 14 days after notice of bid award	5
03410-2	QA Documentation	A	Certifications and qualifications	Not more than 14 days after notice of bid award	5
03410-3	Source QC Documentation	A	Testing results	Not more than 2 days after receiving results	5
05120-1	Shop Drawings	A	Shop drawings and design calculations for structural plate elements, to be sealed and signed by Structure Design Engineer	Not more than 14 days after notice of bid award	5
05140-1	Shop Drawings	A	Shop drawings and design calculations for structural plate elements, to be sealed and signed by Structure Design Engineer	Not more than 14 days after notice of bid award	5
05500-1	Shop Drawings Headwalls and Wingwalls	A	Shop and Fabrication Detail Drawings for Headwalls and Wingwalls, where applicable, to be sealed and signed by Structure Design Engineer	Not less than 14 days prior to fabrication	5

\* Type "A" indicates submittals for review and approval and "I" indicates submittals for information.

**END OF SECTION**

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## **SECTION 01335 – MATERIAL SAFETY DATA SHEETS**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in applicable prices offered in the schedule for items of Work for which hazardous materials are required.

#### 1.02 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittals:
  - 1. RSN 01335-1, Complete List of Hazardous Materials (LHM) and Material Safety Data Sheets (MSDS)
  - 2. RSN 01335-1, Updated LHM and MSDS
    - a) Submit updated copies of LHM and MSDS to Contracting Officer, not less than 10 days before delivering hazardous materials to job site.

#### 1.03 DELIVERY

- A. Do not deliver any hazardous material to job site that are not included on the original or previously updated LHM and MSDS before receipt of MSDS submission data by Contracting Officer.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

Not used

**END OF SECTION**

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## SECTION 01420 – REFERENCES

### PART 1 – GENERAL

#### 1.01 REFERENCES

- A. Referenced editions of standard specifications, codes, and manuals form a part of these Specifications to the extent they are referenced.
- B. These Specifications take precedence when conflicting requirements occur between these Specifications and a referenced standard.

#### 1.02 JOB SITE REFERENCES

- A. The Contractor shall maintain a copy of referenced standard Specifications, codes, and manuals required for Work in progress at the site or fabrication site.

#### 1.03 AVAILABILITY

- A. Industrial and Governmental Documents:
  - 1. Addresses for obtaining some industrial and governmental (other than Federal and Bureau of Reclamation specifications and standards) specifications, standards, and codes are listed in Table 01420A – Addresses for Specifications, Standards, and Codes.

**Table 01420A – Addresses for Specifications, Standards, and Codes**

Acronym	Name and Address	Telephone
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW, Suite 249 Washington, DC 20001 <a href="http://www.aashto.org">www.aashto.org</a>	(202) 624-5800 (800) 231-3475
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333 <a href="http://www.aci-int.org">www.aci-int.org</a>	(248) 848-3700
AISC	American Institute of Steel Construction One East Wacker Dr., Suite 3100 Chicago, IL 60601-2001 <a href="http://www.aisc.org">www.aisc.org</a>	(312) 670-2400
ASME	American Society of Mechanical Engineers 3 Park Ave. New York, NY 10016-5990 <a href="http://www.asme.org">www.asme.org</a>	(800) 843-2763

Acronym	Name and Address	Telephone
ASTM	ASTM International 100 Barr Harbor Dr. West Conshohocken, PA 19428-2959 <a href="http://www.astm.org">www.astm.org</a>	(601) 832-9585
AWS	American Welding Society 550 NW LeJeune Rd. Miami, FL 33126 <a href="http://www.amweld.org">www.amweld.org</a>	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association 6666 W. Quincy Ave. Denver, CO 80235 <a href="http://www.awwa.org">www.awwa.org</a>	(303) 794-7711
FS	Federal Specifications Unit General Services Administration Federal Supply Service FSS Acquisition Management Center Environmental Programs and Engineering Policy Division Washington, DC 20406 <a href="http://pub.fss.gsa.gov">http://pub.fss.gsa.gov</a>	(703) 305-5682
WSDOT	Washington State Department of Transportation Administrative and Engineering Publications P.O. Box 47304 Olympia WA 98504-7304 <a href="http://www.wsdot.wa.gov/">www.wsdot.wa.gov/</a>	(360) 705-7430
WWPA	Western Wood Products Association 522 SW 5th Ave., Suite 500 Portland, OR 97204-2122 <a href="http://www.wwpa.org">www.wwpa.org</a>	(503) 224-3930

**PART 2 – PRODUCTS**

Not used

**PART 3 – EXECUTION**

Not used

**END OF SECTION**

## **SECTION 01452 – QUALITY CONTROL TESTING FOR EARTHWORK AND CAST-IN-PLACE CONCRETE**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. The Contractor shall arrange and pay for quality-control testing for earthwork and cast-in-place concrete in accordance with these Specifications. Testing shall be performed by a qualified third party laboratory as described herein.

#### 1.02 PAYMENT

- A. Include in prices offered in the schedule for other items of Work.

#### 1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this Section:
1. ASTM C 31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
  2. ASTM C 39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
  3. ASTM C 42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
  4. ASTM C 143: Standard Test Method for Slump of Hydraulic Cement Concrete
  5. ASTM C 260: Standard Practice for Making and Curing Concrete Test Specimens in the Field
  6. ASTM C 1077: Laboratory Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
  7. ASTM C 1093: Accreditation of Testing Agencies for Unit Masonry
  8. ASTM D 422: Standard Test Method for Particle-Size Analysis of Soils.
  9. ASTM D 1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb/ft<sup>2</sup>)
  10. ASTM D 2216: Standard Test Method for Laboratory Determination of Water (Moisture) Control for Soil and Rock by Mass

11. ASTM D 2487: Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
12. ASTM D 2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
13. ASTM D 2922: Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)
14. ASTM D 3017: Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
15. ASTM D 3740: Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
16. ASTM D 4318: Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
17. ASTM D 4718: Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversized Particles.

#### 1.04 QUALIFICATIONS

- A. Testing laboratory and equipment: Employ an ASTM-certified independent laboratory operated under supervision of a Washington State registered professional engineer to perform sampling and testing.
  1. Testing is to be performed under the supervision of a Washington State registered professional engineer and reports are to bear the seal of the Registered Professional Engineer.
  2. Testing laboratory organization:
    - a) Testing concrete and concrete aggregates: Meet requirements of ASTM C 1077
    - b) Testing soil and rock: Meet requirements of ASTM D 3740
  3. Calibrate measuring devices, laboratory equipment, and instruments and established intervals.

#### 1.05 TESTING REQUIREMENTS AND MINIMUM FREQUENCY

- A. The Contractor will contract with an independent testing laboratory to perform sampling, testing, and reporting, as shown in Table 01452A – Materials Testing Requirements and Frequency – Earthwork and Table 01452B – Materials Testing Requirements and Frequency – Concrete

**Table 01452A – Materials Testing Requirements and Frequency – Earthwork**

<b>Procedure</b>	<b>Test Standard</b>	<b>Standard Title</b>	<b>Standard Requirement</b>	<b>Minimum Frequency Of Testing</b>
Soil Classification	ASTM D 2487	Classification of Soils for Engineering Purposes	Unified Soil Classification System	Once per source for import material, borrow material, or re-use of native materials.
Gradation	ASTM D 422	Particle-Size Analysis of Soils	As listed in the Specifications	Once per source for import material, borrow material, or re-use of native materials.
Atterberg Limits	ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils	As listed in the Specifications	Once per source for import material, borrow material, or re-use of native materials.
Moisture Content	ASTM D 2216	Laboratory Determination of Water (Moisture Content of Soil and Rock by Mass)	+/- 2% of optimum	Once per source for import material, borrow material, or re-use of native materials.
Laboratory Maximum Density	ASTM D 1557	Laboratory Compaction Characteristics of Soil Using Modified Effort	As listed in Specifications	Once per source for import material, borrow material, or re-use of native materials.
Nuclear Method – In-place Density	ASTM D 2922	Density of Soil and Rock in Place by Nuclear Methods (Shallow Depth) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)	As listed in Specifications	Once per layer of backfill, where compaction density is required

**Table 01452B – Materials Testing Requirements and Frequency - Concrete**

<b>Procedure</b>	<b>Test Standard</b>	<b>Standard Title</b>	<b>Standard Requirement</b>	<b>Minimum Frequency of Testing</b>
Fresh Concrete	ASTM C 31	Making and Curing Concrete Test Specimens in the Field	As listed in Specifications	Unless otherwise specified, once per concrete pour
	ASTM C 143	Slump of Hydraulic Cement Concrete		
	ASTM C 260	Air Content of Freshly Mixed Concrete by Pressure Method		
Compressive Strength, Cylinders	ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens	90% exceed specified compressive strength at 28 days	Unless otherwise specified, once per concrete pour

<b>Procedure</b>	<b>Test Standard</b>	<b>Standard Title</b>	<b>Standard Requirement</b>	<b>Minimum Frequency of Testing</b>
Compressive Strength, Cylinders	ASTM C 42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	Average strength of cores exceeds 85% of the design 28-day compressive strength and no core is less than 75% of the design 28-day compressive strength	Unless otherwise specified, once per concrete pour

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

3.01 FIELD QUALITY ASSURANCE

- A. Tests performed by the Contractor will be used to verify that Work performed by the Contractor conforms to the Contract Documents requirements.

**END OF SECTION**



## **SECTION 01510 – TEMPORARY UTILITIES**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in prices offered in the schedule for other items of Work.

#### 1.02 TEMPORARY ELECTRICITY

- A. Electric power is not available at the site.
- B. Provide generators, transmission lines, distribution circuits, transformers, and other electrical equipment and facilities required for obtaining power and distributing power to points of use.
- C. Remove temporary equipment and facilities upon completion of Work under this Contract.
- D. Refueling of generators shall be done in spill control areas outside of the ordinary high water line with appropriate spill prevention and containment measures, as designated by the Contracting Officer.

#### 1.03 TEMPORARY WATER

- A. Arrange for and provide water required for construction purposes.
- B. Use water that meets specified requirements for water used in concrete, grouting, and other permanent Work.
- C. Convey water to points of use.
- D. Remove temporary equipment and facilities upon completion of Work under this Contract.

#### 1.04 TEMPORARY SANITATION FACILITIES

- A. Provide temporary sanitation facilities (i.e., “port-a-potties”) for use by the construction crew.
- B. Provide for maintenance of temporary sanitation facilities for duration of construction activities.
- C. Provide for removal of temporary sanitation facilities once construction activities are completed.

### PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

**END OF SECTION**

## **SECTION 01550 – VEHICULAR ACCESS AND PARKING**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in prices offered in the schedule for other items of Work.

#### 1.02 REGULATORY REQUIREMENTS

- A. Meet jurisdictional conditions for use of existing roadways and haul routes, including seasonal or other limitations or restrictions, payment of excess size and weight fees, and posting of bonds conditioned upon repair of damage.
- B. Comply with applicable local regulations for haul routes over public highways, roads, or bridges.

#### 1.03 SITE CONDITIONS

- A. Right-of-Ways for access to Work from existing roads will be established by the Contracting Officer.
  - 1. Use only established roadways, parking areas, and haul routes, or temporary roadways, parking areas, or haul routes constructed by the Contractor when and as authorized by the Contracting Officer.
  - 2. Unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of Work.

### PART 2 – PRODUCTS

#### 2.01 MATERIALS

- A. Materials to maintain and repair existing roadways, parking areas, and haul routes: In accordance with requirements of jurisdictional authority.
- B. Materials to construct, maintain, and repair temporary roadways, parking areas, and haul routes: As approved by the Contracting Officer.

### PART 3 – EXECUTION

#### 3.01 EXAMINATION

- A. Investigate condition of available public or private roads for clearances, restrictions, bridge-load limits, bond requirements, and other limitations that affect or may affect access and transportation operations to and from the job site.

### 3.02 ESTABLISHED ROADWAYS AND PARKING AREAS

- A. Established roadways and parking areas are available for the Contractor's use subject to existing restrictions and approval of the Contracting Officer.
- B. Designated areas of existing parking facilities may be used by construction personnel. Temporary parking areas shall meet the following requirements:
  - 1. Arrange for temporary parking areas to accommodate use of construction personnel.
  - 2. Provide additional off-site parking when site space is not adequate.
  - 3. Locate as approved by the Contracting Officer.

### 3.03 HAUL ROUTES

- A. Perform Work on rights-of-way established by the Contracting Officer as necessary to construct and maintain any roads, bridges, or drainage structures required for establishment and use of haul routes for construction operations.
- B. Use existing available public highways, roads, or bridges as haul routes subject to applicable local regulations.
- C. Minimize interference with or congestion of local traffic.

### 3.04 MAINTENANCE

- A. Maintain roadways, driveways, parking areas, and haul routes in a sound, reasonably serviceable condition.
- B. Maintain roadways, driveways, and parking areas until completion and acceptance of all Work under this Contract.
- C. Maintain surfacing of gravel-surfaced roads and parking areas in a serviceable condition until completion and acceptance of all Work under this Contract.
- D. Snow removal for convenience of the Contractor or to facilitate Work operations of the Contractor is considered normal required maintenance.

### 3.05 REPAIR

- A. Promptly repair ruts, broken pavement, potholes, low areas with standing water, and other deficiencies to maintain roadway and driveway surfacing and drainage in original or specified condition.

3.06 REMOVAL

- A. Remove materials used to construct temporary roadways, parking areas, and haul routes prior to Contract completion and stabilize the soil.

**END OF SECTION**

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## **SECTION 01562 – ENVIRONMENTAL CONTROLS**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in the prices offered in the schedule for other items of Work, except as specified.
- B. Costs for damages and Work stoppage resulting from insufficient environmental controls are the sole responsibility of the Contractor.

#### 1.02 REGULATORY REQUIREMENTS

- A. Comply with Federal, State, and local laws and regulations.
- B. Conform to most stringent requirement in cases of conflict between the Specifications and regulatory requirements.
- C. The Contractor shall be responsible for damages resulting from dust originating from Contractor operations.
- D. The Contracting Officer may stop any construction activity in violation of Federal, State, or local laws and all additional expenses resulting from Work stoppage will be the sole responsibility of the Contractor.

#### 1.03 DUST CONTROL

- A. Provide environmentally compatible dust control and abatement during construction.
- B. Prevent, control, and abate dust pollution on rights-of-way provided by the Contracting Officer or elsewhere during performance of Work.
- C. Provide labor, equipment, and materials, and use efficient methods wherever and whenever required to prevent dust nuisance or damage to persons, property, or activities, including, but not limited to, crops, orchards, cultivated fields, wildlife habitats, dwellings and residences, agricultural activities, recreational activities, traffic, and similar conditions.

#### 1.04 AIR POLLUTION CONTROL

- A. Utilize reasonably available methods and devices to prevent, control, and otherwise minimize atmospheric emissions or discharges of air contaminants.
- B. Do not operate equipment and vehicles that show excessive exhaust gas emissions until corrective repairs or adjustments reduce such emissions to acceptable levels.

1.05 LIGHT CONTROL

- A. Direct stationary floodlights to shine downward at an angle less than horizontal.
- B. Shield floodlights so that floodlights will not be a nuisance to surrounding areas.
- C. Direct lighting so that residences are not in direct beam of light.
- D. Correct lighting control problems when they occur as approved by the Contracting Officer.

1.06 NOISE

- A. Follow the most stringent of noise restrictions in permits, or state or local regulations.
  - 1. Do not exceed 80 decibels (daytime), as measured at noise-sensitive areas such as residences and schools during the hours of 7:00 a.m. to 7:00 p.m. Do not exceed noise levels of 65 decibels (nighttime) during the hours of 7:00 p.m. to 7:00 a.m.
  - 2. Only construction activities approved by Contracting Officer will be allowed during hours of 7:00 p.m. to 7:00 a.m.
  - 3. Provide specialty mufflers for continuously running generators, pumps, and other stationary equipment to meet the decibel requirements above.
  - 4. Compression brakes are not allowed.
  - 5. Perform operations producing high intensity impact noise only weekdays during the hours of 7:00 a.m. to 7:00 p.m.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

Not used

**END OF SECTION**



## **SECTION 01563 – WATER POLLUTION CONTROL**

### PART 1 – GENERAL

#### 1.01 REFERENCES

- A. Section 01562 – Environmental Controls
- B. Section 02240 – Diversion and Care of Water

#### 1.02 PAYMENT

- A. Include in the lump-sum price offered in the schedule for Site Preparation. Costs shall include development and implementation of a Water Quality Management Plan or, if required, a Stormwater Pollution Prevention Plan to meet all requirements and conditions of construction permits.

#### 1.03 SUBMITTALS

- A. Submit in accordance with Section 01330 – Submittals:
  - 1. RSN 01563-1, Water Quality Management Plan:
    - a) Water Quality Management Plan shall be developed and submitted only if a SWPPP is not required (see below).
    - b) Detailed Water Quality Management Plan for construction activities in the vicinity of any stream, flowing or dry watercourse, lake, wetland, reservoir, or underground water source.
      - 1) Name of person who will be responsible for implementing and carrying out plan.
      - 2) Relationship of methods and descriptions herein to conditions of required permits specified in article titled "Contractor Responsibilities."
      - 3) Precautions that will be taken to avoid discharge or accidental spills of pollutants into a river, stream, watercourse, or lake.
      - 4) Demonstrated compliance with State and local waste disposal, sanitary sewer, or septic regulations. Methods for preventing or controlling runoff and erosion for construction sites, both during and after construction, including:
        - a. Access and haul roads
        - b. Stockpile, borrow, and waste areas
        - c. Construction plant and equipment yards

- d. All excavated surfaces
  - e. Buffer zones
  - f. Other impacted areas
- 5) Information on vegetative practices, structural control, silt fences, straw dikes, sediment and operator controls, stormwater controls, and solid waste controls. Address stormwater controls for appropriate stormwater management measures including velocity dissipaters. Address solid waste controls for building materials and offsite tracking of sediment.
2. RSN 01563-2, Stormwater Pollution Prevention Plan (SWPPP):
- a) Stormwater Pollution Prevention Plan shall be developed and submitted only if required by the State.
  - b) A SWPPP, if the Work requires coverage under the State of Washington Department of Ecology Construction Stormwater General Permit.
    - 1) The Construction Stormwater General Permit can be viewed online at:  
<http://www.ecy.wa.gov/programs/wq/stormwater/construction/permitdocs/cswgpppermit120110.pdf>
3. RSN 01563-3, Spill Containment Control Plan
- a) Spill Containment Control Plan shall be developed and submitted by the Contractor to the Contracting Officer.
  - b) The Spill Containment Control Plan shall include the following:
    - 1) Measures to reduce/recycle hazardous and non-hazardous wastes
    - 2) Spill notification procedures
    - 3) Specific cleanup and disposal instructions for different products
    - 4) Quick response and cleanup measures
    - 5) Methods of disposal of spilled materials
    - 6) Employee training on spill containment

#### 1.04 REGULATORY REQUIREMENTS

A. Laws, regulations, and permits:

1. Perform construction operations in such a manner to comply, and ensure subcontractors comply, with:
  - a) Applicable Federal, State, and local laws, orders, regulations, and Water Quality Standards concerning control and abatement of water pollution.
  - b) Terms and conditions of applicable permits issued by permit issuing authority. If conflict occurs between Federal, State, and local laws, regulations, and requirements, the most stringent shall apply.

B. Contractor violations:

1. If noncompliance occurs, report noncompliance to the Contracting Officer immediately (orally), with specific information submitted in writing within 2 calendar days.
2. Nonconformance with applicable Federal, State, or local laws, orders, regulations, or Water Quality Standards may result in the Contracting Officer stopping all site activity until compliance is ensured.
3. The Contractor shall not be entitled to any extension of time, claim for damage, or additional compensation by reason of such a Work stoppage.
4. Corrective measures required to bring activities into compliance shall be at the Contractor's expense.

#### 1.05 REQUIRED PERMITS

- A. The Contracting Officer, or others, will apply for all necessary environmental permits. A copy of the permits will be provided to the Contractor. The Contractor shall become familiar with permit conditions prior to starting Work and comply with all permit conditions through completion of Work. Any penalties related to violation of permit conditions shall be the sole responsibility of the Contractor.

#### 1.06 DEFINITIONS

- A. Dewatering: Removal and control of groundwater from pores or other open spaces in soil or rock formations to allow construction activities to proceed as intended, and includes relief of groundwater pressure.
- B. Unwatering:

1. Control and removal of ponding, seeping, or flowing surface water except as otherwise provided, emerging subsurface water from excavated surfaces, and from precipitation within and adjacent to excavations and construction zones using channels, ditches, gravel drains, gravel blankets, pipes, sumps, pumps, and discharge lines.
2. Includes a controlled discharge of effluent waters.

#### 1.07 CONTRACTOR RESPONSIBILITIES

##### A. Monitoring:

1. Conduct monitoring in order to meet the requirements of the permits, which may include:
  - a) Sampling
  - b) Site inspections
  - c) Required laboratory tests to determine effluent characteristics

##### B. Reporting results:

1. Report all required monitoring results to appropriate agencies.

##### C. Recordkeeping:

1. Retain records and data required by permits for the specified time period.

#### PART 2 – PRODUCTS

Not used

#### PART 3 – EXECUTION

##### 3.01 POLLUTION CONTROLS

A. Control pollutants by use of sediment and erosion controls, wastewater and stormwater management controls, construction site management practices, and other controls including State and local control requirements.

##### B. Sediment and erosion controls:

1. Establish methods for controlling sediment and erosion that address vegetative practices, structural control, silt fences, straw dikes, sediment controls, and operator controls as appropriate.

2. Institute stormwater management measures as required, including velocity dissipaters, and solid waste controls that address controls for building materials and off-site tracking of sediment.
- C. Wastewater and stormwater management controls:
1. Pollution prevention measures:
    - a) Use methods of dewatering, unwatering, excavating, or stockpiling earth and rock materials, which include prevention measures to control silting and erosion, and which will intercept and settle any runoff of sediment-laden waters.
    - b) Prevent wastewater from general construction activities such as drainwater collection, aggregate processing, concrete batching, drilling, grouting, or other construction operations, from entering flowing or dry watercourses without the use of approved turbidity control methods.
    - c) Divert stormwater runoff from upslope areas away from disturbed areas.
  2. Turbidity prevention measures:
    - a) Use methods for prevention of excess turbidity, which include, but are not restricted to, intercepting ditches, settling ponds, gravel filter entrapment dikes, flocculating processes, recirculation, combinations thereof, or methods that are not harmful to aquatic life.
    - b) Wastewaters discharged into surface waters shall contain the least concentration of settleable material possible.
    - c) If monitoring or inspection shows that the erosion controls are ineffective, mobilize Work crews immediately to make repairs, install replacements, or install additional controls as necessary.
    - d) Remove and properly dispose of sediment from erosion controls once it has reached one-third of the exposed height of the control.
- D. Construction site management:
1. Contractor construction operations:
    - a) Perform construction activities by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris, or other pollutants or wastes into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water

sources. Such pollutants and wastes include, but are not restricted to refuse, garbage, cement, sanitary waste, industrial waste, hazardous materials, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

2. Stockpiled or deposited materials:
  - a) Do not stockpile or deposit excavated materials or other construction materials near or on stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff, or can, in any way, encroach upon the watercourse.
3. Oil/fuel storage tanks management:
  - a) Storage tank placement: Place oil or other petroleum product (hereinafter referred to collectively as oil) storage tanks or containers at least 20 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, and any other water source in a discharge area.
  - b) Storage area dikes: Construct storage area dikes at least 12 inches high or graded and sloped to permit safe containment of leaks and spills equal to the capacity located in each area plus a sufficient amount of freeboard to contain the 25-year rainstorm.
  - c) Diked area barriers: Provide diked areas with an impermeable barrier at least 50 mils thick. Provide areas used for refueling operations with an impermeable liner at least 50 mils thick buried under 2 to 4 inches of soil.
  - d) Underground tank prohibitions: Do not use underground storage tanks.
  - e) Provide a petroleum product spill clean-up kit in oil storage areas for use by workers in event of a spill. Report all spills immediately to Contracting Officer.

**END OF SECTION**

## **SECTION 01569 – LANDSCAPE PROTECTION AND RESTORATION**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in prices offered in the schedule for other items of Work.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

#### 3.01 PRESERVATION AND PROTECTION

- A. Preserve natural landscape, and preserve and protect existing vegetation not required or otherwise authorized to be removed.
- B. Conduct operations to prevent unnecessary destruction, scarring, or defacing of natural surroundings in the vicinity of the Work.
- C. Move crews and equipment within the rights-of-way and over routes provided for access to the Work in a manner to prevent damage to grazing land, crops, or property.
- D. Minimize, to the greatest extent practicable, clearings and cuts through vegetation. Irregularly shape authorized clearings and cuts to soften undesirable aesthetic impacts.
- E. Do not use trees for anchorages except in emergency cases or as approved by the Contracting Officer. For such use, wrap the trunk with a sufficient thickness of approved protective material before any rope, cable, or wire is placed.
- F. Use safety ropes where tree climbing is necessary; do not use climbing spurs.

#### 3.02 REPAIR OR TREATMENT

- A. The Contractor is responsible for injuries to vegetation caused by Contractor operations, personnel, or equipment.
- B. Repair or treat injured vegetation without delay and as recommended by and under direction of an experienced horticulturist or licensed tree surgeon approved by the Contracting Officer.
- C. Restore construction roads to original contours and make impassable to vehicular traffic when no longer required.

- D. Scarify and re-grade, after completion of Work, land used for construction purposes and not required for completed installation so that surfaces blend with natural terrain and are in a condition that will facilitate re-vegetation, provide proper drainage, and prevent erosion.

### 3.03 REPLACEMENT

- A. Remove and properly dispose of trees or shrubs not required or otherwise authorized to be removed that, in the opinion of the Contracting Officer, are damaged or injured beyond saving by Contractor operations, personnel, or equipment.
- B. Replace removed tree or shrub with tree or shrub approved by the Contracting Officer.

**END OF SECTION**



## **SECTION 01600 – PRODUCT REQUIREMENTS**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. When a separate item that includes furnishing of a material is provided in the offered schedule, include cost of furnishing, hauling, storing, and handling in the price offered in the schedule for the item.
- B. When a separate item is not provided in the schedule for furnishing a material, include cost of furnishing, hauling, storing, and handling in the price offered in the schedule for Work for which the material is required.

#### 1.02 DEFINITIONS

- A. Essential characteristics: As used in these Specifications, the term "essential characteristics" is synonymous with the term "salient characteristics."
- B. Salient characteristics: Those qualities of an item that are essential to ensure that the intended use of the item can be satisfactorily realized.

#### 1.03 DELIVERY, STORAGE, AND HANDLING

- A. Transport and handle manufactured products in accordance with manufacturer's instructions.
- B. Store and protect manufactured products in accordance with manufacturer's instructions. Obtain these instructions from the manufacturer before delivery of materials to job site. Maintain a copy of these instructions at job site.
- C. Protect materials subject to adverse effects from moisture, sunlight, ultraviolet light, or weather during storage at job site.
- D. Store curing compounds, sealants, adhesives, paints, coatings, sealers, joint compounds, grouts, and similar products at the temperature and environmental conditions recommended by manufacturer.

#### 1.04 MAINTENANCE

- A. Extra materials:
  - 1. Furnish additional maintenance materials specified as “extra materials” in the Specifications. Provide maintenance material identical to installed material and provide from the same manufacture’s production lot as installed material.

2. Package extra materials for storage and label with complete product information on packaging.
3. Deliver extra materials to the job site and place in storage as directed by the Contracting Officer.

## PART 2 – PRODUCTS

### 2.01 MATERIALS

- A. Provide materials required for completion of Work.
- B. Provide type and quality described in these Specifications. Make a diligent effort to procure specified materials from any and all sources.
- C. Furnish new materials conforming to referenced standard unless otherwise specified.
- D. For materials not covered by Federal or other specifications, furnish materials of standard commercial quality.
- E. If materials to be used deviate from or are not covered by recognized specifications and standards, submit, for approval, justification for and exact nature of the deviation, and complete specifications for materials proposed for use.
- F. Make parts accurately to standard gauge where possible.
- G. Permanently mark fasteners with a symbol identifying the manufacturer and with symbol(s) indicating grade, class, type, and other identifying marks in accordance with reference or applicable standard.

### 2.02 SUBSTITUTIONS

- A. If materials required by these Specifications become unavailable, because of Government priorities or other causes, substitute materials may be used.
- B. Obtain written approval to use substitute materials from the Contracting Officer. State in the request for substitution the amount of the adjustment, if any, to be made in favor of the Contracting Officer.
- C. The Contracting Officer's determination as to whether substitution will be permitted, and as to what substitute materials may be used, shall be final and conclusive.
- D. If approved substitute materials are of less value to the Contracting Officer or involve less cost to the Contractor than specified material, a Contract Documents adjustment will be made in favor of the Contracting Officer. Where the amount

involved or the importance of substitution warrants, a deductive modification to the Contract Documents will be issued.

- E. No payments in excess of prices bid in the schedule will be made because of substitution of one material for another or because of use of one alternate material in place of another.

### 2.03 WORKMANSHIP

- A. Accurately manufacture and fabricate materials in accordance with best modern practice and requirements of these Specifications, notwithstanding minor errors or omissions therein.
- B. Use liberal factors of safety and adequate shock-absorbing features in designs, especially for parts subjected to variable stress or shock, including alternating or vibrating stress or shock.
- C. Include provisions that prevent components from loosening for shock-absorbing features and parts subject to vibration.

### 2.04 SOURCE QUALITY ASSURANCE

- A. Materials will be subject to inspection at any one or more of the following locations, as determined by the Contracting Officer:
  - 1. At place of production or manufacture
  - 2. At shipping point
  - 3. At job site
- B. To provide for inspection, provide at time of issuance, copies of purchase orders, including drawings and other pertinent information, covering material on which inspection will be made as advised by the Contracting Officer, or provide other evidence if such purchase orders are issued verbally or by letter.
- C. Inspection of materials at any location specified above or waiving of inspection shall not be construed as being conclusive as to whether materials and equipment conform to Contract Documents requirements nor shall the Contractor be relieved thereby of the responsibility for furnishing materials meeting the requirements of these Specifications.
- D. Acceptance of materials will be made only at the job site.

PART 3 – EXECUTION

3.01 FIELD QUALITY CONTROL

- A. Final inspection and acceptance of materials will be made only at the job site after installation and testing.

**END OF SECTION**

## **SECTION 01721 – SURVEYING**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. The Drawings reflect data available at the time of design and may not include all utilities, surface features, structures, and other Project site specific information. Portions of Work under this contract occurs in a natural riverine environment; as such, the final location and elevation of Work items may differ from that shown on the Drawings and is subject to the discretion of the Engineer and/or Contracting Officer.
- B. Contracting Agency shall host a Site visit for bidders prior to bid due date. Contracting Agency shall stake Project elements and Work items at their approximate location prior to the Site visit.
- C. It is the Contractor's responsibility to take the necessary measures to avoid damage to existing site elements and to provide protection for and not interrupt utilities that may be present and not accounted for in the Drawings.
- D. The Contractor is responsible for surveying necessary to complete the Work. Primary survey control is included on the Drawings. Design survey control will be provided to the Contractor by the Contracting Officer prior to construction for the individual Work items.
- E. The location and finish elevation of the Work shall be measured and recorded on the Drawings by the Contractor in support of developing a construction set of as-built drawings, upon completion of the Project. Refer to Section 01781 – Project Closeout.

#### 1.02 DEFINITIONS

- A. Primary survey control: existing features and horizontal control points in the vicinity of the Project established under previous work.
- B. Design survey control: proposed position (horizontal and/or vertical) of Work items.

#### 1.03 PAYMENT

- A. Include in the lump-sum prices offered in the schedule where survey is required to construct/install elements and Work items to the grades and elevations indicated on the Drawings and as described in the Specifications.
- B. Primary survey control is included on the Drawings. The Contracting Agency will provide the necessary design survey control for construction of the Work items.

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittals:
  - 1. RSN 01721-1, Field Records within 10 days of completion of the Work.

#### 1.05 SURVEY CONTROL AND EXISTING FEATURES

- A. The Contracting Agency shall provide design survey control to be used for establishing Work lines and grades. The design survey control shall be provided in electronic format to the Contractor for use in establishing Work lines and grades. The Engineer and/or the Contracting Officer reserve the right to modify the location and position of Work items, based on field conditions during Construction.
- B. Primary survey control are included on the Drawings.
- C. Preserve and maintain primary survey control points until otherwise authorized. The Contracting Officer may re-establish damaged or destroyed primary survey control points and back-charge the re-establishment cost to the Contractor.

#### 1.06 QUALITY ASSURANCE

- A. Provide experienced construction surveyors under supervision and direction of an engineer or surveyor with minimum of 2 years of experience in charge of construction surveys for construction similar in nature to that required by this Contract.
- B. Survey equipment shall include modern electronic equipment and software capable of accuracies required herein.

### PART 2 – PRODUCTS

#### 2.01 SURVEYING MATERIALS AND EQUIPMENT

- A. Provide materials and equipment required for surveying work, including but not limited to instruments, stakes, spikes, steel pins, templates, platforms, and tools. Except as required to be incorporated in work or left in place, surveying materials and equipment will remain property of the Contractor.

### PART 3 – EXECUTION

#### 3.01 LAYOUT OF WORK SURVEYS

- A. Establish lines and grades for Work layout from the primary survey control shown on the Drawings.
- B. Establish measurements required for Work execution to specified tolerances.

- C. Provide stakes, markers, and other survey controls necessary to control, check, and guide construction.
- D. Electronic surveys shall use a combination of points, lines, and breaklines. Use breaklines for distinct surface features, slope breaks, road and pavement edges, edge-of-water, structures, and utilities.

### 3.02 SURVEYS AND COMPUTATIONS

- A. Survey and computation methods, level of detail, documentation, and presentation shall be clear and understandable, shall produce accuracy as described herein, and are subject to checks and final approval by the Contracting Officer.

### 3.03 SURVEY REQUIREMENTS

- A. Alignment staking: At each change in slope and horizontal angle point.
- B. Work items: Stake out Work items before and during construction.

### 3.04 CONSTRUCTION STAKING

- A. The Contractor shall install construction staking sufficient to complete the Work to the location and elevation as indicated in the design survey control and as modified by the Engineer and/or Contracting Officer, as shown on the Drawings, and as described in the Specifications. This includes placement of stable stakes or other marks that can be readily back-checked to primary survey control for accuracy with the use of standard surveying equipment.
- B. The Contractor is responsible for establishing and maintaining stable temporary benchmarks for use in completion of the Work throughout the Contract.
- C. Final elevations shall be placed under the direction of the Engineer and/or the Contracting Officer at locations as shown on the drawings or as modified by the Engineer and/or the Contracting Officer.

### 3.05 ACCURACY

- A. Degree of accuracy:
  - 1. Horizontal alignment: Within 1.0 foot at Work item locations, or as directed by the Contracting Officer.
  - 2. Existing structure and/or original ground: Within 0.1 foot, horizontally and vertically.
  - 3. Vertical elevation and profile: Within 0.5 feet for Work item elevations.

3.06 FIELD RECORDS

- A. Record original field notes, computations, and other surveying data in field books.
- B. Record survey data in accordance with recognized professional surveying standards.
  - 1. Notes or data not in accordance with standard formats will be rejected.
  - 2. Illegible notes or data or erasures on any page of a field book will be sufficient cause for rejection of part or all of field book.
  - 3. Corrections by ruling or lining out errors will be permitted.
  - 4. Copied notes or data will not be permitted.
  - 5. Rejection of part or all of a field book may necessitate resurveying.
- C. Notes may be collected on an electronic data collection device with prior approval of the Contracting Officer.
  - 1. Submit notes on compact disk in approved format.
  - 2. Submit paper copies of notes.
- D. All information shall be submitted to the Contracting Agency within 10 days of completion of the Work.
- E. All information shall be made available by the Contractor for immediate review by the Contracting Officer and/or the Engineer during the course of the Project.

**END OF SECTION**



## **SECTION 01725 – PROTECTION OF EXISTING INSTALLATIONS**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in prices offered in the schedule for other items of Work, except as specified.
- B. Costs for repair of installations damaged by the Contractor's operations are the Contractor's expense.

#### 1.02 PROJECT CONDITIONS

- A. Drawings included in these Specifications show existing features and equipment but may not show all equipment and materials existing at the job site.
- B. The Contractor shall contact the Utility Location Request Center (One Call Center) at 1-800-424-5555 for utility locations not less than 2 business days before the scheduled date for demolition, earthwork, or trenching that may impact existing utilities.
- C. The Contractor shall obtain the location of buried conduit, pipe, cable, ground mat, and other buried items before performing excavation.
- D. Note the location and extent of overhead utilities. Caution should be taken when working near overhead utilities. The Contractor shall be responsible for the safety of his/her employees and equipment when working near overhead utilities.
- E. The Contractor shall coordinate with adjacent private property owners to locate private irrigation pipe and other installations prior to excavation. The Contractor shall protect existing irrigation installations from damage.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

#### 3.01 REPAIR

- A. Repair, at the Contractor's expense, damage to existing installations due to the Contractor's operations or the Contractor's failure to provide proper protection. At the Contracting Officer's option, damage may be repaired by the Contracting Officer, and the Contractor will be back-charged the repair costs.
- B. All areas disturbed by construction shall be returned to the original ground topography before construction ends, unless otherwise shown on the Drawings.

- C. If disturbance of private irrigation pipe or installations is required to complete the Work, the Contractor shall replace or repair the existing pipe or installation. The Contractor shall coordinate replacement, repair, relocation, or removal of existing installations with the private property owner and the Contracting Officer.

### 3.02 PROTECTION

- A. Provide protection for personnel and existing facilities from harm due to the Contractor's operations. Protection shall be subject to approval of the Contracting Officer.
- B. Arrange protective installations to permit operation of existing equipment and facilities while Work is in progress.

### 3.03 REMOVAL OF PROTECTIVE INSTALLATIONS

- A. Remove protective installations after purpose has been served. Materials furnished by the Contractor to provide protection remain property of the Contractor.

**END OF SECTION**

## **SECTION 01740 – CLEANING**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in prices offered in the schedule for other items of Work.

#### 1.02 REFERENCES

- A. Code of Federal Regulations (CFR)
  - 1. 40 CFR 261.3: Definition of Hazardous Waste
  - 2. 49 CFR 171-179: Transportation – Hazardous Waste Regulations

#### 1.03 DEFINITION

- A. Hazardous waste: Defined as hazardous by 40 CFR 261.3 or by other Federal, State, or local laws or regulations.

#### 1.04 REGULATORY REQUIREMENTS

- A. Comply with Federal, State, and local laws and regulations.
- B. Conform to most stringent requirement in cases of conflict between the Specifications and regulatory requirements.

#### 1.05 PROJECT CONDITIONS

- A. Report waste materials discovered at job site to the Contracting Officer.
  - 1. If waste is hazardous, the Contracting Officer may order delays in time of performance or changes in Work, or both.
  - 2. If such delays or changes are ordered, an equitable adjustment will be made in the Contract in accordance with applicable clauses of the Contract.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

#### 3.01 TESTS

- A. Test unknown waste materials found at the job site that may be hazardous.

3.02 PROGRESS CLEANING

- A. Keep Work and storage areas free from accumulations of waste materials and rubbish.

3.03 FINAL CLEANUP

- A. Remove temporary plant facilities, temporary buildings, concrete footings and slabs, rubbish, unused materials, concrete forms, and other similar waste materials that are not part of permanent Work.

3.04 NONHAZARDOUS WASTE DISPOSAL

- A. Combustible waste materials: Dispose by removal from job site. If permitted by local regulatory agencies, landowner, and Contracting Officer, combustible materials can be burned on site.
- B. Noncombustible waste materials: Dispose by removal from job site.
- C. Disposal by removal:
  - 1. Dispose of waste materials at a permitted landfill. Make arrangements with Contracting Officer for use of landfill and pay required fees.
- D. Disposal by burning: not allowed

3.05 HAZARDOUS WASTE DISPOSAL

- A. Recycle hazardous waste whenever possible.
- B. Dispose of waste materials known or found to be hazardous at permitted treatment or disposal facilities.
- C. Transport hazardous waste in accordance with 49 CFR 171-179.

**END OF SECTION**

## **SECTION 01781 – PROJECT CLOSEOUT**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. Prior to commencing demobilization, the Contractor shall review all construction elements with the Contracting Officer, who will give approval of the final site review.
- B. Final site review approval is contingent on the successful completion of: construction of design elements, cleaning of the site, removal of all construction access routes and staging areas, restoration of areas disturbed by construction activities, and other tasks as outlined in these Specifications and on the Drawings.

#### 1.02 PAYMENT

- A. Include in prices offered in the schedule for other items of Work.

#### 1.03 REGULATORY REQUIREMENTS

- A. Comply with Federal, State, and local laws and regulations.
- B. Comply with all construction and Project permits, as applicable.
- C. Conform to most stringent requirement in cases of conflict between the Specifications and regulatory requirements

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittals
  - 1. RSN 01781-1, As-built Drawings

#### 1.05 AS-BUILT DOCUMENTS

- A. As-built Drawings:
  - 1. Maintain two sets of full-size prints of Contract Drawings at the job site.
    - a) Mark and dimension to show variations between actual construction and that indicated or specified in the Contract Documents.
    - b) Include buried or concealed construction and utilities.
    - c) Include existing items, topographic features, and utility lines revealed during construction that differ from those shown on the Contract Documents.

- d) Where choice of materials or methods is permitted in the Specifications, or where variations in scope or character of Work from that of the original Contract Documents are authorized, mark Drawings to define construction actually provided.
2. Use standard drafting practice to represent changes and include supplementary notes, legends, and details necessary to clearly portray as-built construction.
3. Mark As-built Drawings in the following colors
  - a) Red – Additions to original Drawings.
  - b) Green – Deletions to original Drawings.
  - c) Blue – Notations necessary for explanation of As-built Drawings.
4. The Drawings shall be available for the Contracting Officer's review at all times.
5. Upon completion of the Work, sign the marked prints as certified correct.
6. As-built drawings will be filed with the County by the Contracting Agency no more than 30 days following completion of the Project.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

- A. Final site review shall not commence until the Contractor has satisfactorily completed the construction of all of the design elements as described in these Specifications and as shown on the Drawings or as directed by the Contracting Officer.
- B. Once final site review is approved by the Contracting Officer, the Contractor may commence demobilization activities.

**END OF SECTION**

**DIVISION 2 – SITE WORK**

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## **SECTION 02100 – MOBILIZATION AND DEMOBILIZATION**

### PART 1 – GENERAL

#### 1.01 SCOPE

- A. The Work shall consist of mobilizing equipment and supplies and securing bonds and permits necessary to do the Work as stated in the Contract Documents and/or agreement and demobilization of excess materials and equipment from the work site.

#### 1.02 PAYMENT

- A. Mobilization/Demobilization:
  - a) Payment: Lump-sum price offered in the schedule.

#### 1.03 FORCES AND EQUIPMENT

- A. Mobilization may include costs for transporting personnel, equipment, operating supplies to the site, establishment of necessary facilities for the Contractor's operation and any permits, insurance, and/or bonds required to do the Work.
- B. Demobilization may include the removal of equipment and facilities that were necessary to do the Work.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

Not used

**END OF SECTION**

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## **SECTION 02200 – DEMOLITION**

### PART 1 – GENERAL

#### 1.01 REQUIREMENT

- A. Demolish the existing roadway pavement within the limits shown on the Drawings in preparation for excavation of Old Twisp Highway South for installation of the two proposed culverts.
- B. Demolition Work includes:
  - 1. Sawcut existing pavement to the limits shown on the Drawings.
  - 2. Remove and dispose of the asphalt concrete pavement in an approved disposal facility. This includes an underlying geomembrane, if present.
  - 3. Removal and stockpiling of existing gravel surfacing.
  - 4. Removal and stockpiling of existing road ballast.

#### 1.02 PAYMENT

- A. Include in the lump-sum price offered in the schedule for Installation of the North Culvert
- B. Include in the lump-sum price offered in the schedule for Installation of the South Culvert

#### 1.03 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

#### 1.04 PROJECT CONDITIONS

- A. The Contractor shall contact the Utility Location Request Center (One Call Center) at 1-800-424-5555 for utility locations not less than 2 business days before the scheduled date for demolition, earthwork, or trenching that may impact existing utilities.
- B. Cease Work immediately if demolition operations come into contact with underground utilities and contact the Contracting Officer. Do not resume Work until directed by owner of the utility.
- C. Coordinate performance of demolition Work that will be noisy, malodorous, or create dust with the Contracting Officer to avoid environmental damage or health concerns.

- D. Repair or replace existing materials to remain in place if damaged during demolition to the satisfaction of the Contracting Officer.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

3.01 PREPARATION

- A. Protect existing materials that are shown on the Drawings, are identified by utility locating, or designated by the Contracting Officer to remain or to be removed for future installation by others.
- B. Verify the location of existing utilities and protect as necessary prior to the start of demolition.

3.02 REPAIR

- A. Repair surfaces exposed by demolition operations to provide uniform appearance with surrounding surfaces.

3.03 DISPOSAL

- A. Dispose of removed materials in accordance with Section 01740 – Cleaning.

**END OF SECTION**

## **SECTION 02232 – CLEARING AND GRUBBING**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in the lump-sum price offered in the schedule for Site Preparation.

#### 1.02 DEFINITIONS

- A. Vegetation: Trees, shrubs, brush, stumps, exposed roots, down timber, branches, grass, weeds, and rubbish.

#### 1.03 PROJECT CONDITIONS

- A. Preserve and protect vegetation designated for preservation within the clearing limits and vegetation outside the clearing limits, as shown on the Drawings, as indicated by the Contracting Officer, and in accordance with Section 01569 – Landscape Protection and Restoration.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

#### 3.01 CLEARING

- A. Locate and clearly mark the clearing limits and landscape to be preserved.
- B. Clear rights-of-way to be occupied by permanent construction and required for access to the Work.
- C. Clear adjacent to cut and fill sections a minimum distance of 1 foot outside of slope lines. Do not clear beyond the clearing limits shown on the Drawings.
- D. Remove vegetation and other debris as determined by the Contracting Officer.

#### 3.02 GRUBBING

- A. Remove stumps, roots, and vegetation to a minimum of 12 inches below final excavation lines and grades, or until organic matter is removed.
- B. Perform grubbing in advance of trenching, excavation, and grading Work.

#### 3.03 DISPOSAL OF CLEARED MATERIAL

- A. Dispose of vegetative material and non-vegetative material in accordance with Section 01740 – Cleaning.

**END OF SECTION**

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## **SECTION 02236 – STRIPPING**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Include in the lump-sum price offered in the schedule for Site Preparation

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

#### 3.01 STRIPPING

- A. Where present, strip topsoil from areas to be excavated.
- B. Remove topsoil as directed by the Contracting Officer.

#### 3.02 USE OF TOPSOIL

- A. Do not use topsoil removed by stripping for backfill or constructing embankments.
- B. Segregate and stockpile topsoil for use in other portions of the Work.
- C. Spread remaining topsoil over disturbed construction areas upon completion as directed by the Contracting Officer.

#### 3.03 STOCKPILE

- A. Transport and stockpile topsoil as necessary prior to final hauling and placing.
- B. Do not compact topsoil in stockpile.
- C. Protect stockpile from contamination and erosion.

**END OF SECTION**

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## **SECTION 02240 – DIVERSION AND CARE OF WATER**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. No geologic or groundwater information is available at the site. The Contractor shall make his/her own investigations and shall determine the extent and difficulty of removal of water from excavations. Surface water is expected to be encountered in portions of the proposed channel improvements.
- B. In-water Work is required for portions of this Contract. The Contractor shall take all necessary precautions for the safety and protection of the construction team, the Public, and the environment.
- C. Fish rescue and recovery may be required under this Contract, where fish populations may become detained upstream of the diversion necessary for the proposed culvert installations. The Contractor shall coordinate Work with the Contracting Agency and its authorized agents and representatives to allow for the timely and proper rescue and recovery efforts of fish within the confines of the Work.
- D. Fish rescue and recovery will be completed by the Contracting Agency and/or its authorized agents and representatives.
- E. Should the diversion be removed or breached, fish rescue and recovery must be repeated.

#### 1.02 REFERENCES

- A. Section 01562 – Environmental Controls
- B. Section 01563 – Water Pollution Control

#### 1.03 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

#### 1.04 PAYMENT

- A. Include in applicable prices offered in the schedule for items of Work related to new channel excavation, installation of new culverts (and appurtenances), and diversion of water.

- B. Also include Work coordinated for fish rescue and recovery, by others. Work includes placement of approved fish exclusion measures including, but not limited to:
  - 1. Temporary Fish-exclusion fence.
  - 2. Contractor's time to coordinate efforts during fish rescue and recovery, to be done by Others. Time not to exceed two days.

#### 1.05 REQUIREMENT

- A. Furnish, install, maintain, and operate all necessary pumping and other equipment for removal of water from the various parts of the Work, and for maintaining the footprint elevations and other parts of the Work free from water as required for constructing each part of the Work. All water control shall meet the appropriate construction permit conditions and requirements.

#### 1.06 DEFINITION

- A. Dewatering: Removal and control of groundwater from pores or other open spaces in soil or rock formations to allow construction activities to proceed as intended, and includes relief of groundwater pressure.
- B. Unwatering:
  - 1. Control and removal of ponding, seeping, or flowing surface water except as otherwise provided, emerging subsurface water from excavated surfaces, and from precipitation within and adjacent to excavations and construction zones using channels, ditches, gravel drains, gravel blankets, pipes, sumps, pumps, and discharge lines.
  - 2. Includes a controlled discharge of effluent waters.

#### 1.07 SUBMITTALS

- A. Submit in accordance with Section 01330 – Submittals:
  - 1. RSN 02240-1, Care of Water Plan:
    - a) Detailed Care of Water Plan for Work related to diverting groundwater and surface water in support of construction activities that will or may encounter and impact groundwater and surface water.
      - 1) Name of person who will be responsible for implementing and carrying out plan.

- 2) Relationship of methods and descriptions herein to conditions of required permits specified in article titled "Contractor Responsibilities."
- 3) Detailed sketches or drawings indicating the specific location(s) for the diversion of surface waters and management of groundwater and surface water during excavation and, where applicable, backfill.
- 4) Description of methods to manage diversion of surface waters and groundwater, including methods of discharge for dewatering activities.
- 5) Care of Water Plan shall be coordinated with the Water Quality Management Plan and, if required, the Stormwater Pollution Prevention Plan.
- 6) Identify portions of the Care of Water Plan that require coordination with others to complete fish rescue and recovery.

## PART 2 – PRODUCTS

Not used

## PART 3 – EXECUTION

### 3.01 DEWATERING

- A. Provide, maintain, and operate necessary pumps and other equipment for removal of water from excavations and trenches for structures and culverts that are to be constructed.
- B. Accomplish dewatering and unwatering, as needed, by use of motor or engine-driven pumps with adequate lift capacity, discharge piping, hoses and piping, valves, and intakes.
- C. If a generator is to be used to operate pumping equipment, generator shall be placed above the high-water line within an approved spill protection area.
- D. Provide dewatering facilities capable of operating in freezing temperatures if freezing weather conditions occur.
- E. Monitor and control discharge in accordance with Section 01563 – Water Pollution Control and the permits required under that Section.

3.02 DEWATERING BELOW GROUNDWATER LEVEL

- A. Where excavation and trenching extends below the groundwater level, dewater the portion below the groundwater level in advance of excavation or as otherwise directed by the Contracting Officer.
- B. Dewater to prevent loss of fines from the footprint elevations, maintain the stability of the excavation, and allow construction Work to be performed in the dry.

3.03 SEEPAGE CONTROL

- A. Before excavating to final grade for structures, bring the water level to an elevation at least 1 foot below the required subgrade elevation or as otherwise directed by the Contracting Officer.
- B. Maintain this water level until structures have been placed, structures have been completed, and backfill has been placed or as otherwise directed by the Contracting Officer.
- C. After backfill has been placed, with approval of the Contracting Officer, allow groundwater to rise to natural levels.
- D. Control pumping and dewatering operations so that the groundwater level rises slowly and uniformly along the entire length of culverts and around each structure element.

**END OF SECTION**

## **SECTION 02260 – EXCAVATION SUPPORT AND PROTECTION**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. Section includes requirements for excavation support and protection for trenches and open excavations greater than 4 feet in depth.

#### 1.02 PAYMENT

- A. Include cost for excavation support and protection in applicable prices offered in the schedule for items of Work requiring excavation support and protection.

#### 1.03 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
  - 1. Occupational Safety and Health Act (OSHA):
    - a) Construction Industry Standards
    - b) Occupational Safety and Health Standards
  - 2. Washington Industrial Safety and Health Act (WISHA)
  - 3. Chapter 296-155, Part N, WAC – Washington Safety Standards for Construction Work; Excavation, Trenching, and Shoring

#### 1.04 REQUIREMENTS

- A. The Contractor shall be responsible for planning, designing, installing, maintaining, and removing support and protection for excavations and trenches in accordance with Chapter 296-155, Part N, WAC and applicable OSHA and WISHA requirements.
- B. Excavation support systems shall be designed and installed to protect surrounding property and structures. Excavation support systems shall also be designed so that installation and removal of the support systems does not disturb soil adjacent to or below the required excavation or trench section. Excavation and trenching shall be to the lines shown on the Drawings and as specified in Section 02317 – Trenching, Backfilling, and Compaction, and Section 02318 – Earthwork for Structures.
- C. Excavation support systems shall be designed to meet water control requirements, as specified in Section 02240 – Diversion and Care of Water.

PART 2 – PRODUCTS

Not used

PART 3 – EXECUTION

3.01 GENERAL

- A. Construct the excavation to the lines and grades shown on the Drawings and as specified in Section 02318 – Earthwork for Structures. Install and remove support systems in such a manner as not to disturb soil adjacent to the trench or below the trench or excavation.
- B. Unless otherwise indicated, remove all sheeting, shoring, and bracing after placement and compaction of backfill.

**END OF SECTION**

## **SECTION 02300 – EARTHWORK**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. This Section includes the following:
  - 1. General excavating and backfilling.
  - 2. Excavation and management of excavated materials for the channel improvements; suitable excavation materials to be re-used as backfill in other elements of Work, unless otherwise directed by the Contracting Officer.

#### 1.02 PAYMENT

- A. Include costs for earthwork in applicable prices offered in the schedule for items of Work requiring earthwork; not to be confused with Work described in Section 02318 – Earthwork for Structures.
- B. Include costs for earthwork in the schedule for Channel Improvements.

#### 1.03 REFERENCES

- A. Section 01562 – Environmental Controls
- B. Section 01563 – Water Pollution Control
- C. Section 01725 – Protection of Existing Installations
- D. Section 01740 – Cleaning
- E. Section 01781 – Project Closeout
- F. Section 02232 – Clearing and Grubbing
- G. Section 02236 – Stripping
- H. Section 02240 – Diversion and Care of Water
- I. Section 02260 – Excavation Support and Protection
- J. Section 02318 – Earthwork for Structures
- K. Section 02324 – Disposal of Excavated Materials

#### 1.04 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
- B. Borrow: Satisfactory soil and rock imported from off-site for use as fill or backfill.
- C. Excavation: Removal of material encountered above subgrade elevations.
- D. Fill: Soil or rock materials used to raise existing grades.
- E. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

#### 1.05 PROJECT CONDITIONS

- A. This Contract involves working within natural systems such as floodplains and water courses. Limited information is available on the conditions of these natural systems.

### PART 2 – PRODUCTS

#### 2.01 SOIL AND ROCK MATERIALS

- A. Provide borrow soil and rock materials when sufficient satisfactory soil and rock materials, as approved by the Contracting Officer and/or Engineer, are not available from excavations.
- B. Backfill and Fill: Satisfactory soil and rock materials, as approved by the Contracting Officer and/or the Engineer.

### PART 3 – EXECUTION

#### 3.01 PREPARATION

- A. Protect existing installations that are to remain from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other hazards created by earthwork operations. Provide protective insulating materials for existing installations that are to remain as necessary. See also Section 01725 – Protection of Existing Installations.
- B. Provide measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and waterbodies, in accordance with the approved Care of Water Plan and other requirements included in the construction permits.



- C. Prevent surface water and groundwater from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

### 3.02 CLEARING AND GRADING AND STRIPPING

- A. Clear and grub areas to be excavated in accordance with Section 02232 – Clearing and Grubbing.
- B. Strip areas to remove topsoil prior to structure excavation, in accordance with Section 02236 – Stripping.

### 3.03 CHANNEL IMPROVEMENTS

- A. Excavate Alcove Channel A and Channel B as indicated on the Drawings and as described in the Specifications herein or as directed by the Contracting Officer.
- B. Materials removed from the floodplain shall be re-used as backfill for other elements of Work.

### 3.04 EXCAVATION

- A. Excavate to sub-grade elevations (where applicable) regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
- B. Excavate to the elevations, lines, grades, and dimensions as indicated on the Drawings.
- C. Reconstruct sub grades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.
- D. Stockpile excavated materials, without intermixing, in shaped, graded, and drained stockpiles.
  - 1. Stockpile suitable rock separately from soils; rock shall be segregated according to size in no more than three size ranges. Suitable rock includes hard, intact rock that does not deteriorate during handling.
  - 2. Stockpile soils separately from rock.
  - 3. Stockpile debris and unsuitable rock separately from other stockpiled materials.
  - 4. Stockpiled materials shall be located above the ordinary high water line, away from edge of excavations, and outside drip line of trees.

5. Cover stockpiles that are not to be reused for extended periods to reduce erosion and sediment transport in accordance with applicable permits and regulations.

### 3.05 BACKFILLS AND FILLS

#### A. Fill:

1. Place fill material in layers to required elevations.

#### B. Compaction:

1. Place backfill and fill materials in layers not more than 12 inches in loose depth and compact using the bucket of an excavator or by the travel of heavy equipment over the backfill area, as approved by the Contracting Officer and/or Engineer.

#### C. Grading:

1. Uniformly grade areas to a smooth surface free from irregular surface changes.
2. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated on the Drawings.

### 3.06 FIELD QUALITY CONTROL

- A. Finish grading shall be approved by the Contracting Officer and/or the Engineer.

### 3.07 PROTECTION AND DISPOSAL

- A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.
- C. Disposal: Refer to Section 02324 – Disposal of Excavated Materials.

**END OF SECTION**

## **SECTION 02318 – EARTHWORK FOR STRUCTURES**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. Section includes requirements for excavation, placement, and compaction of backfill material for installation of reinforced concrete or metal plate structures.

#### 1.02 PAYMENT

- A. Include costs for earthwork in the prices offered for other items of Work requiring structural excavation, backfill, and material disposal. Work includes:
  - 1. Excavation, placement of backfill, and compaction of backfill for installation of the bottomless culverts.
  - 2. Distribution and disposal of excess excavated materials.

#### 1.03 REQUIREMENTS

- A. The Contractor shall ensure that imported materials are approved by the Contracting Officer before hauling to the site. The Contractor shall ensure that native soils excavated on site are approved by the Contracting Officer before being used as backfill. The Contracting Agency reserves the right to reject materials that, in the opinion of the Contracting Officer, are determined to be substandard for any reason. In the event material is hauled to the site without prior approval and is determined by the Contracting Officer to be unacceptable, all materials shall be removed from the site at no additional cost to the Contracting Agency.

#### 1.04 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
  - 1. ASTM D 422: Standard Test Method for Particle-Size Analysis of Soils.
  - 2. ASTM D 1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb/ft<sup>2</sup>).
  - 3. ASTM D 2922: Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods.
  - 4. WSDOT: Standard Specifications for Road, Bridge and Municipal Construction (latest edition); M 41-10

## 1.05 DEFINITIONS

- A. Additional excavation: Excavation performed for the convenience, fault, or operation of the Contractor beyond specified or directed excavation lines.
- B. Bridge – is used interchangeably with culvert.
- C. Culvert – is used interchangeably with bridge.
- D. Footprint elevation: The design elevation for the bottom of a proposed structure.
- E. Overexcavation: Excavation beyond specified lines as directed by the Contracting Officer to remove unsuitable foundation material.
- F. Optimum Moisture Content: Shall be determined in accordance with ASTM D 1557 to determine maximum dry density for relative compaction. Determine field moisture content on basis of fraction passing 3/4-inch sieve.
- G. Relative Compaction: The ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined by ASTM D 1557. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by the Contracting Officer.

## PART 2 – PRODUCTS

### 2.01 EXCAVATED MATERIALS

- A. The Contractor's operations in excavations shall be such that excavations will yield as much suitable material for use in permanent construction required under these Specifications as practicable.
- B. Place excavated materials that are too wet for immediate compaction temporarily in stockpiles until moisture content is reduced sufficiently to permit them to be placed in embankments.
- C. Segregate excavated materials; segregations shall be based on variation of substrate size, shape, and gradation as indicated in the Drawings and described in the Specification, or at the discretion of the Contracting Officer.

### 2.02 MATERIAL FOR BACKFILL

- A. General:
  - 1. Type and amount of material used for backfill, and the manner of placing material shall be subject to approval by the Contracting Officer.
  - 2. Use suitable material from required excavations for backfill where possible. If sufficient suitable material is not available from on-site excavations, obtain additional material from commercial borrow sources

as approved by the Contracting Officer. The Contracting Agency makes no guarantee that the specified backfill materials are available from materials obtained from excavations for structures.

3. Do not place backfill material when either the material or the surfaces on which it is to be placed are frozen.
4. Do not use material removed in stripping or high in organic matter for backfill material. Stockpile instead for use as topsoil.

B. Erosion Protection Layer:

1. To be placed at the depth and extent as indicated on the Drawings.
2. Shall be imported material.
3. Shall follow Section 9-13.4 from the WSDOT Standard Specifications (see References) for the following modified gradation (not included in the WSDOT Standard Specifications):

Approximate Size, inches	Percent Passing (smaller)
20	100
18	40-60
4	10 max.

4. The Contracting Officer shall approve the source of material prior to placement as backfill.

C. Habitat Substrate Layer:

1. To be placed at the depth and extent as indicated on the Drawings.
2. Shall be preferentially sourced from onsite materials generated during excavation of the following:
  - a) Proposed channel improvements, as indicated on the Drawings
  - b) Proposed culvert installations, as indicated on the Drawings
  - c) Proposed borrow areas, as indicated on the Drawings
3. Imported material may be used if sufficient quantities of native material are unavailable.
4. Shall meet the specifications for Streambed Sediment as described in Section 9-03.11(1) from the WSDOT Standard Specifications (see References).

5. The Contracting Officer shall approve the source of material prior to placement as backfill.
- D. Backfill for concrete structures:
1. Unless otherwise specified by these specifications, the Drawings, or the approved Shop Drawings, backfill for reinforced concrete structures shall meet the requirements of Section 6-11.3(5) of the WSDOT Standard Specifications (see References).
- E. Backfill for metal plate structures:
1. Unless otherwise specified by these specifications, the Drawings, or the approved Shop Drawings, backfill for metal plate structures shall meet the requirements of Section 7-03.3(3) of the WSDOT Standard Specifications (see References).

### PART 3 – EXECUTION

#### 3.01 STRIPPING

- A. Strip areas to remove topsoil prior to structure excavation, in accordance with Section 02236 – Stripping.

#### 3.02 EXCAVATION, GENERAL

- A. Excavate foundations to elevations shown on the Drawings or established by the Contracting Officer.
- B. The Contracting Officer reserves the right, during progress of Work, to vary slopes, grades, and dimensions of excavations from those specified in the Drawings.
- C. The Contracting Agency does not represent that excavation performed under these Specifications can be made to or maintained at paylines shown on the Drawings or described in these Specifications.
- D. Perform excavation for structures above the high water line in the dry. Dewater excavations for structures above the high water line in accordance with Section 02240 – Diversion and Care of Water.
- E. Do not excavate in frozen materials without written approval.
- F. Where excavating in backfill and embankment placed under these Specifications, excavate in accordance with applicable provisions for excavation.
- G. Blasting: Not allowed.

- H. Take precautions to preserve material below and beyond established lines of excavation in the soundest possible condition.
  - 1. Damage to Work due to the Contractor's operations shall be repaired by and at the expense of the Contractor.
  - 2. Material beyond required or prescribed excavation lines that is loosened by the Contractor's operations shall be removed by and at the expense of the Contractor.

### 3.03 PREPARATION OF STRUCTURE FOUNDATIONS

- A. Prepare foundations at structure sites by methods that will provide firm foundations for features. Finish bottom and side slopes of excavation, upon or against which the structure is to be placed, to prescribed dimensions. Moisten and tamp prepared surfaces with suitable tools to form firm foundations upon or against which to place the feature.
- B. Where unsuitable material is encountered in the foundation for a feature, the Contracting Officer will direct performance of additional excavation to remove unsuitable material.

### 3.04 OVER EXCAVATION

- A. If foundation material is excavated beyond lines required to receive the structure, fill over excavation with suitable materials and compact in accordance with Part 3.08 of this Section.
- B. If foundation material is disturbed or loosened during excavation or otherwise, compact foundation in place or remove and replace it with suitable material and compact in accordance with Part 3.08 of this Section.

### 3.05 SITE EXCAVATION

- A. Excavate for structures as shown on the Drawings or as directed in the field by the Contracting Officer.

### 3.06 DISPOSAL OF EXCAVATED MATERIALS

- A. Refer to Section 02324 – Disposal of Excavated Materials, in addition to the following.
- B. Excess material from excavations for structures constructed above the high water line shall be disposed of at a suitable location off-site, as required by the Contracting Officer, or utilized in areas of the site to be filled. The Contracting Officer shall approve the method and location of disposal prior to excavation.

- C. Dispose of excavated materials that are unsuitable for, or are in excess of, embankment, backfill, or other earthwork requirements, as directed by the Contracting Officer.

### 3.07 PLACING BACKFILL

- A. Place backfill to the lines and grades shown on the Drawings, or as directed by the Contracting Officer.
- B. Place backfill in the dry for structures above the high water line. Dewater excavations for structures above the high water line in accordance with Section 02240 – Diversion and Care of Water prior to placing backfilling.
- C. Unless otherwise specified, place structural fill (pipe zone backfill) for reinforced concrete and metal plate structures to the depth and lines indicated on the Drawings. Place structural fill in 6-inch lifts, maximum, and compact to 90% of maximum dry density as determined by ASTM D 1557.
- D. Unless otherwise specified, place final backfill in excavations for structures within existing roadways to the depth and lines indicated on the Drawings. Place backfill in 6-inch lifts, maximum, and compact to 95% of maximum dry density as determined by ASTM D 1557.
- E. Unless otherwise specified, where backfill is to be placed behind or against cast-in-place concrete structures, compaction of backfill against structures shall not be allowed until the concrete has reached its 7-day strength.
- F. Where applicable and at the discretion of the Contracting Officer, topsoil shall be replaced to match the grades and lines of the existing bank on either side of the excavation. Topsoil backfill should remain loose.

### 3.08 COMPACTION

- A. The Contractor shall compact structural fill and backfill by means of an appropriately sized static, vibratory, or impact type compactor suited to the soil and physical restrictions of the area to be compacted. Although the Contractor is responsible for the selection of the method of compaction, selection of an inappropriate method shall not relieve the Contractor of the responsibility to achieve the specified result. Jetting, sluicing, or water settling will not be permitted.
- B. Topsoil shall not be compacted.
- C. The Contractor will perform compaction testing, as needed, to ensure compliance with the compaction requirements of the Specifications. The Contractor shall obtain and pay for the services of an independent soils testing laboratory to conduct on-site density tests during material placement. The frequency of compaction testing shall be as determined by the Contracting Officer.



3.09 PROTECTION

- A. To provide adequate protection for compacted backfill around a structure, the Contracting Officer reserves the right to direct the Contractor to place a sufficient amount of backfill or embankment material over compacted backfill within 72 hours after completion of compacting backfill.

**END OF SECTION**

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## **SECTION 02324 – DISPOSAL OF EXCAVATED MATERIALS**

### PART 1 – GENERAL

#### 1.01 PAYMENT

- A. Included cost of disposal of excavated materials in prices offered in the schedule for items requiring excavation.

### PART 2 – PRODUCTS

Not used

### PART 3 – EXECUTION

#### 3.01 MATERIAL PLACEMENT

- A. Use suitable material from required excavations, or as much thereof as may be required, for backfill or other required earthwork. Temporary potential stockpile locations and procedures for stockpiling shall be subject to approval of the Contracting Officer.

#### 3.02 DISPOSAL OF EXCAVATED MATERIALS

- A. The location of off-site disposal shall be approved by the Contracting Officer prior to excavation and disposal of material.
- B. Dispose of material from required excavations not suitable for or required for backfill, embankment, and topsoil by removal from the site or waste on site as directed by the Contracting Officer.
- C. Waste areas for excavated materials shall be as directed by the Contracting Officer.
- D. Do not waste material by dumping from the top of slope.
- E. Grade waste banks to reasonably even and uniform surfaces that blend with the natural terrain.
  - 1. Minimum slope: 2%.
  - 2. Maximum slope: 4 horizontal to 1 vertical (4H:1V).
- F. Cover waste banks with topsoil in accordance with Section 02236 – Stripping.
- G. Seed surface of waste banks in accordance with Section 02930 – Seeding.

**END OF SECTION**

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## **SECTION 02710 – ASPHALT PAVING**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. Section includes requirements for installation of asphalt paving for patching and repair of roadway crossings at Old Twisp Highway South for the installation of two culverts.

#### 1.02 PAYMENT

- A. Include in the lump-sum price offered in the schedule for North Culvert Installation for Work related to replacement of the asphalt pavement. Costs shall include furnishing, placing, compacting, and sealing asphalt paving for patching and repair of roadway to match existing conditions.
- B. Include in the lump-sum price offered in the schedule for South Culvert Installation for Work related to replacement of the asphalt pavement. Costs shall include furnishing, placing, compacting, and sealing asphalt paving for patching and repair of roadway to match existing conditions.

#### 1.03 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
- B. Okanogan County Road and Street Standards and Guidelines for Developments
- C. WSDOT: Standard Specifications for Road, Bridge and Municipal Construction (latest edition); M 41-10

#### 1.04 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

### PART 2 – PRODUCTS

#### 2.01 ASPHALT CONCRETE PAVING

- A. Asphalt material used for asphalt concrete paving shall meet the requirements of the Okanogan County Road and Street Standards and Guidelines for Developments, or Section 9-02 of the WSDOT Standard Specifications (see References), as required by the approved right-of-way permit.
- B. Aggregates for asphalt concrete paving shall meet the requirements of the Okanogan County Road and Street Standards and Guidelines for Developments,

or Section 9-03.8 of the WSDOT Standard Specifications (see References), as required by the approved right-of-way permit.

**PART 3 – EXECUTION**

**3.01 INSTALLATION OF ASPHALT CONCRETE PAVEMENT**

- A. Install asphalt concrete paving in accordance with the approved right-of-way permit and/or requirements for Hot Mix Asphalt, outlined in Section 5-04 of the WSDOT Standard Specifications (see References).

**END OF SECTION**

## **SECTION 02730 – CRUSHED ROCK SURFACING**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. Section includes requirements for installation of crushed rock surfacing for patching and repair of the two roadway crossings at Old Twisp Highway South for the installation of the culverts and for road widening as necessary for installation of the guardrails near the two culvert installations.

#### 1.02 PAYMENT

- A. Include in the lump-sum price offered in the schedule for North Culvert Installation for Work related to replacement of the roadway shoulder and surfacing underlying the asphalt pavement as shown on the Drawings and in accordance with applicable County and/or State standards. Costs shall include furnishing, placing, grading, and compacting for repair of roadway to match existing conditions.
- B. Include in the lump-sum price offered in the schedule for South Culvert Installation for Work related to replacement of the roadway shoulder and surfacing underlying the asphalt pavement as shown on the Drawings and in accordance with applicable County and/or State standards. Costs shall include furnishing, placing, grading, and compacting for repair of roadway to match existing conditions.
- C. Crushed Rock Surfacing
  - 1. Measurement: Crushed rock surfacing for resurfacing of roadway crossings will be measured per ton of crushed rock surfacing placed.
  - 2. Payment: Unit price per ton offered in the schedule shall include cost of furnishing, placing, compacting, and sealing asphalt pavement for patching and repair of roadway crossings.

#### 1.03 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
  - 1. Okanogan County Road and Street Standards and Guidelines for Developments
  - 2. WSDOT: Standard Specifications for Road, Bridge and Municipal Construction (latest edition); M 41-10

1.04 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

1.05 SUBMITTALS

- A. Submit in accordance with Section 01330 – Submittals:
  - 1. RSN 02730-1, Crushed Rock Surfacing Source Information: At least 10 days prior to delivery of crushed rock surfacing, notify the Contracting Officer in writing of intended source and provide information satisfactory to the Contracting Officer that the material meets the requirements of the Contract. Provide the Contracting Officer free access to the source.

PART 2 – PRODUCTS

2.01 CRUSHED ROCK SURFACING

- A. Crushed rock surfacing shall be hard, dense, and durable and shall meet the requirements of Appendix A of the Okanogan County Road and Street Standards and Guidelines for Developments, or Section 9-03.9(3) of the WSDOT Standard Specifications (see References), as required by the approved right-of-way permit.

PART 3 – EXECUTION

3.01 PLACEMENT AND SPREADING

- A. Crushed rock surfacing shall be dumped and smoothed by moving rocks into position in such a manner as to ensure the material when in place is stable and without tendency to slide.
- B. Place and spread in accordance with the requirements for the “Road Mix Method” outlined in Section 4-04.3(4) of the WSDOT Standard Specifications (see References).

**END OF SECTION**



## **SECTION 02840 – TRAFFIC GUARDRAILS**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. Section includes requirements for installation of traffic guardrails within public right-of-way along Old Twisp Highway South near the culvert installations.

#### 1.02 PAYMENT

- A. Include in the lump-sum price offered in the schedule for North Culvert Installation for Work related to installation of guardrails as indicated on the Drawings. Costs shall include furnishing all materials, supplies, labor, and equipment necessary for the proper installation of guardrails.
- B. Include in the lump-sum price offered in the schedule for South Culvert Installation for Work related to installation of guardrails as indicated on the Drawings. Costs shall include furnishing all materials, supplies, labor, and equipment necessary for the proper installation of guardrails.

#### 1.03 REFERENCES

- A. The following is a list of standards that may be referenced in this Section:
  - 1. Okanogan County Road and Street Standards and Guidelines for Developments
  - 2. WSDOT: Standard Specifications for Road, Bridge and Municipal Construction (latest edition); M 41-10
  - 3. WSDOT: Standard Plans (latest edition); M 21-01

#### 1.04 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

#### 1.05 SUBMITTALS

- A. Submit in accordance with Section 01330 – Submittals:
  - 1. RSN 02840-1, Manufacturer Certification of Compliance: At least 10 days prior to delivery of guardrail materials, submit to the Contracting Officer certification(s) of compliance from the Manufacturer(s) for the various guardrail materials stating that the materials meet the requirements as specified; the certificate(s) shall also include manufacturer contact

information, inspector name, and date(s) of manufacture of the various materials.

## PART 2 – PRODUCTS

### 2.01 BEAM GUARDRAIL

- A. Beam Guardrail shall meet the requirements of Section 9-16.3 of the WSDOT Standard Specifications (see References).

### 2.02 RAIL ELEMENT

- A. Rail element shall meet the requirements of Section 9-16.3(1) of the WSDOT Standard Specifications (see References).

### 2.03 POSTS AND BLOCKS

- A. Posts and blocks shall meet the requirements of Section 9-16.3(2) of the WSDOT Standard Specifications (see References).

### 2.04 GALVANIZING

- A. Galvanizing shall meet the requirements of Section 9-16.3(3) of the WSDOT Standard Specifications (see References).

### 2.05 HARDWARE

- A. Hardware shall meet the requirements of Section 9-16.3(4) of the WSDOT Standard Specifications (see References).

### 2.06 ANCHORS

- A. Anchors shall meet the requirements of Section 9-16.3(5) of the WSDOT Standard Specifications (see References).

## PART 3 – EXECUTION

### 3.01 INSTALLATION OF GUARDRAILS

- A. Install guardrails as indicated on the Drawings and in accordance with Section 8-11.3 of the WSDOT Standard Specifications (see References).
- B. Installation of the guardrails spanning the culverts shall follow WSDOT Standard Plan C-20.40-03. See Figures at the end of this document.
- C. Installation requires snow load post washers and snow load rail washers.

- D. Installation does not require that the terminals have an offset at the end from the edge of shoulder.
- E. Installation requires a road embankment slope of 2H:1V or flatter.

**END OF SECTION**

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## **SECTION 02930 – SEEDING**

### PART 1 – GENERAL

#### 1.01 DESCRIPTION

- A. Furnish all materials, equipment, and labor necessary for preparation, seeding, mulching, and protection for seeded areas in accordance with the Specifications and Drawings, and subject to the terms and conditions of the Contract. Work includes:
1. Seed, tackifier, soil supplements, and mulch.
  2. Drill seed or hydro-seed, and apply soil supplements, mulch or hydro-mulch, and tackify areas designated on the Drawings to be seeded as directed by the Contracting Officer.

#### 1.02 PAYMENT

- A. Include in the lump-sum prices in the Schedule for items requiring Seeding. Include cost of preparation for and furnishing and placing seed, mulch, tackifier, soil supplements, and other materials required for seeding as specified herein.

#### 1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittals:
1. RSN 02930-1, Seed Certifications: Showing origin of seed mixture and pure live seed content.
  2. RSN 02930-1, Seed Analysis: Showing percent purity and percent germination is a minimum of 85%, and noxious weed content does not exceed 0.5%, by weight.

#### 1.04 QUALITY ASSURANCE

- A. Seed shall be furnished in containers that show the following information: seed name, lot number, net weight, percentage of purity, germination, weed seed, and inert material. Seed that has become wet, moldy, or otherwise damaged will not be accepted. Seed shall conform to the requirements of the Washington State Seed Law and, when applicable, the Federal Seed Act and shall be "certified" grade or better.

#### 1.05 FIELD QUALITY CONTROL

- A. Inspections: The Contractor shall request a provisional inspection upon completion of the Work. Upon approved completion of the punchlist, the Contracting Officer will make provisional acceptance of the Work in writing.

1.06 GUARANTEE AND REPLACEMENT

- A. Seeding is guaranteed as specified in the Specifications. Seeded areas must have a relatively uniform germination with no bare spots over 10 square feet at the time of provisional acceptance. All areas larger than 10 square feet failing to germinate shall be reseeded at no extra cost. The Contractor shall reseed at the original rate.

PART 2 – PRODUCTS

2.01 SEED

- A. Seed shall be packed in clean, sound containers of uniform weight. Upon request, the Contractor shall furnish to the Contracting Officer duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed-testing laboratory. Seed that has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.
- B. Seed shall be locally propagated plants. When possible, seed shall be gathered from areas adjacent to Project site.
- C. Seed shall be weed free as shown on official seed analysis certification. Weed restrictions:
  - 1. Prohibited noxious weeds: None
  - 2. Restricted noxious weeds: 0.5% maximum, by weight
- D. Seed Mixture:
  - 1. Shall be native grasses
  - 2. Purity: 85% minimum
  - 3. Germination:
    - a) 85% minimum
    - b) Germination less than 1 year old at time of seeding
  - 4. Uniform mixture, as shown in Table 02930A – Seed Mixture, or as required by Contracting Agency

**Table 02930A – Seed Mixture**

Name	Pure Live Seed (Percent by Weight)
Mountain Brome	30
Bluebunch Wheatgrass	40
Great Basin Wildrye	10
Blue Wildrye	20
TOTAL	100

## 2.02 HYDROMULCH

- A. Mulch shall have the following essential characteristics:
1. Wood cellulose fiber.
  2. No germination or growth inhibiting factors.
  3. Dyed appropriate color to allow visual metering of application.
  4. Evenly dispersed and suspended when agitated in water.
  5. Forms blotter-like ground cover that readily absorbs water and allows infiltration into underlying soil.
  6. Provide a soil-binding agent (tackifier) free of germination or growth inhibiting factors.

## PART 3 – EXECUTION

### 3.01 SITE PREPARATION

- A. Remove weeds, trash, rocks larger than 6-inch diameter, and other debris that will interfere with seeding or maintenance operations.
- B. Fill or smooth topsoil to remove rills, gullies, and depressions. Protect topsoil surfaces from erosion and washouts. Repair damaged surfaces as required.
- C. Discontinue site preparation for seeding Work when soil moisture conditions are not suitable for site preparation, as determined by the Contracting Officer.
- D. Notify the Contracting Officer no less than 48 hours in advance of any seeding operation. Following the Contracting Officer’s approval, seeding of the approved areas shall begin immediately.

### 3.02 SEEDING SCHEDULE

- A. The time period for seeding shall be October 1 to November 15. No seeding shall be done before or after these dates without the Contracting Officer's written approval. No seeding shall take place on weekends or legal holidays.
- B. Do not seed or fertilize when the ambient temperature is below 38° F without approval from the Contracting Officer. Do not seed, fertilize, or mulch when the ground is snow-covered or frozen. Do not seed, fertilize, or mulch when wind velocities prevent uniform application of materials.

### 3.03 SEEDING

- A. Seed shall be applied by hand. Mulch shall be applied with approved hydraulic equipment. Both shall be applied separately in one application event. The Contractor shall apply materials at the following rates:
  - 1. Seed: 60 pounds per acre
  - 2. Mulch with Tackifier: 1,200 to 1,500 pounds per acre
- B. The Contractor shall give the Contracting Agency and the Contracting Officer 48 hours notice prior to seeding operation. Equipment shall utilize water as carrying agent, utilizing continuous built-in agitation system.
- C. Equipment with a gear pump is not acceptable.
- D. The Contractor shall pump a continuous, non-fluctuating supply of homogenous slurry to provide a uniform distribution of mulch material over designated areas.

### 3.04 MAINTENANCE

- A. The Contractor shall be responsible for the application of seeding as described in this Section until seed germination has occurred.
- B. The Contractor shall be responsible for reseeding areas larger than 10 square feet that do not germinate, at no additional cost to the Contracting Agency. Reseeded areas must germinate or further mitigation is necessary and is the responsibility of the Contractor.
- C. Once the seeding has germinated and is accepted and approved by the Contracting Officer, maintenance of the seeding application shall be done by others.

### 3.05 PHYSICAL COMPLETION

- A. Inspection to determine physical completion of germinated seeded areas will be made by the Contracting Officer upon Contractor's notification of completion.



- B. The Contractor may request a specific inspection date provided that the request is made at least 5 working days before requested inspection date.

**END OF SECTION**

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**DIVISION 3 – CONCRETE**

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## **SECTION 03200 – CONCRETE REINFORCEMENT**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. The Work includes the requirements for manufacture, detailing, cutting, bending, transporting, and placing of all concrete reinforcement and associated items for elements indicated on the Drawings.
- B. This Section shall not supercede concrete reinforcement described in other Sections, herein.

#### 1.02 PAYMENT

- A. Include in prices offered in the schedule for items requiring reinforced cast-in-place concrete in accordance with Section 3300 – Cast-In-Place Concrete.

#### 1.03 REFERENCES

- A. Section 03300 – Cast-in-Place Concrete
- B. Section 03410 – Plant-Precast Reinforced Concrete
- C. Section 03410 – Precast Reinforced Concrete
- D. American Concrete Institute (ACI):
  - 1. ACI 318/318R: Building Code Requirements for Structural Concrete and Commentary
  - 2. ACI SP-66: Detailing Manual
- E. ASTM International (ASTM):
  - 1. ASTM A185: Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
  - 2. ASTM A497: Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
  - 3. ASTM A615: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
  - 4. ASTM A706: Deformed and Plain Bars for Concrete Reinforcement
  - 5. ASTM A767: Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

- F. Concrete Reinforcing Steel Institute (CRSI):
  - 1. Placing Reinforcing Bars
  - 2. Manual of Standard Practice
- G. International Conference of Building Officials (ICBO): ICBO Research Report

#### 1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittals:
  - 1. RSN 03200-1, Reinforcement Diagrams and Lists:
    - a) Supplemental bar-placing diagrams, bar lists, and bar-bending diagrams required for reinforcement fabrication and placement.
    - b) Prepare bar-placing diagrams, bar lists, and bar-bending diagrams in accordance with the Drawings.

#### 1.05 REQUIREMENTS

- A. Protect reinforcement before, during, and after installation.
- B. Store in a manner to prevent fouling with dirt, grease, and other bond-breaking coatings.
- C. Use all necessary precautions to maintain identification after the bundles are broken

### PART 2 – PRODUCTS

#### 2.01 REINFORCEMENT

- A. Deformed Billet-Steel Reinforcing Bars Includes stirrups, ties, and spirals:
  - 1. ASTM A615, Grade 60
- B. Tie wire:
  - 1. 16-gauge double annealed wire. Provide galvanized tie wire for exposed concrete.

## PART 3 – EXECUTION

### 3.01 PREPARATION

- A. Notify the Contracting Officer when reinforcing is ready for inspection, and allow sufficient time for inspection prior to placing concrete. Clean reinforcing bars of loose mill scale, oil, earth, and other contaminants.

### 3.02 INSTALLATION

#### A. Fabrication:

1. Fabricate steel bar reinforcement to shapes and dimensions as shown and placed as indicated on the Drawings.
2. Form bars in accordance with the requirements of ACI 318. Make bends cold around pin with diameter at least 6 times bar dimension; heating of reinforcement will be permitted only if entire operation is approved. No bending of reinforcement after partial embedment in concrete will be permitted.
3. Obtain approval of all splices not indicated on the Drawings. In general, avoid splices at points of maximum stress. Saw, shear, or flame-cut bar ends; straighten ends of sheared bars; chip and wire brush ends of flame-cut bars. Wire brush splice area to remove burrs, paint, oil, and other foreign matter before splicing. Splice overlap shall be at least 16 times the diameter of the bars.

#### B. Placement:

1. Accurately position bars in accordance with the Drawings and approved bar placement diagrams. Secure the bars against displacement.
2. Lap reinforcement as indicated on the Drawings or as directed by the Contracting Officer. Extend reinforcement through, and lap beyond, construction joints.
3. Bundle or space bars, instead of field bending where construction access through reinforcing is necessary.
4. Place reinforcement with a clear distance of 1 inch, minimum, between reinforcement and anchor bolts, form ties, or other embedded metalwork, unless otherwise shown on the Drawings.

#### C. Tolerances:

1. Maintain concrete cover over reinforcement within 1/2-inch of specified cover where specified cover is greater than 2-1/2 inches.

2. Maintain concrete cover over reinforcement within 1/2-inch of specified cover where specified cover is less than 2-1/2 inches.
3. Maintain spacing of reinforcing bars within 1 inch of required spacing.

D. Tying Reinforcing Bars:

1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
2. Bend tie wire away from concrete surface to provide clearance of 1 inch from surface of concrete to tie wire.

**END OF SECTION**



## **SECTION 03300 – CAST-IN-PLACE CONCRETE**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. The Contractor may elect to construct cast-in-place reinforced concrete elements for the culvert installations, which involve:
  - 1. Bottomless culverts or other approved structure(s)
  - 2. Culvert footings or foundations
  - 3. Culvert headwalls, where applicable
  - 4. Culvert wingwalls, where applicable
- B. Should the Contractor elect to construct cast-in-place reinforced concrete elements, as described in item A above, the Contractor shall acquire sealed and signed structural construction drawings for those elements, developed by a licensed Washington State registered professional engineer (Structure Design Engineer) in accordance with Washington State regulations. The sealed and signed structural construction drawings shall be submitted as Shop Drawings.
- C. Construction of these elements is subject to limitations on road closure periods. If these elements cannot be completed within the allowed road closure period, the Contractor will need to mitigate for an extended road closure, which may include construction of a temporary road to bypass the construction of these elements.
- D. The elements shall be designed to meet the culvert design parameters shown in the Drawings and as described in the Specifications.
- E. The following (and associated) Specifications may be supplemented, at the discretion of the Contracting Officer and Engineer, depending on the design of the elements by the Structure Design Engineer. Supplemental specifications shall meet or exceed the Specifications herein.
- F. The Work shall consist of developing approved designs, furnishing materials for and installation of cast-in-place reinforced concrete structures for items indicated on the Drawings.

#### 1.02 ALTERNATIVES

- A. As described in 1.01, above, the proposed culverts and appurtenances may be constructed of cast-in-place reinforced concrete. Alternative methods of construction are:
  - 1. Plant-precast reinforced concrete; Section 03410

2. Corrugated galvanized steel structural plate; Section 05120
3. Aluminum structural plate; Section 05140

#### 1.03 PAYMENT

- A. Include in prices offered in the schedule for items requiring construction of cast-in-place reinforced concrete. Costs shall include labor, equipment, tools, and materials for excavation, placement of backfill, placement of reinforcement, construction and strip-down of formwork, placement of concrete, and installation of other materials associated with the cast-in-place reinforced concrete elements shown on the Drawings for installation of the culverts in Old Twisp Highway South.
- B. The costs associated with road closure mitigation are incidental to the Work.
- C. The costs associated with development of structural construction drawings, design calculations, and supplemental specifications for cast-in-place reinforced concrete elements are incidental to the Work.

#### 1.04 REFERENCES

- A. American Concrete Institute (ACI):
  1. ACI 301: Standard Specification for Structural Concrete
  2. ACI 309R: Guide for Consolidation of Concrete
  3. ACI 318/318R: Building Code Requirements for Structural Concrete
- B. ASTM International (ASTM):
  1. ASTM A615: Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
  2. ASTM C31: Making and Curing Concrete Test Specimens in the Field
  3. ASTM C33: Concrete Aggregates
  4. ASTM C39: Compressive Strength of Cylindrical Concrete Specimens
  5. ASTM C94: Ready-Mixed Concrete
  6. ASTM C114: Chemical Analysis of Hydraulic Cement
  7. ASTM C127: Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

8. ASTM C128: Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
  9. ASTM C138: Density, Yield and Air Content (Gravimetric) of Concrete
  10. ASTM C143: Slump of Hydraulic Concrete
  11. ASTM C150: Portland Cement
  12. ASTM C172: Sampling Freshly Mixed Concrete
  13. ASTM C183: Sampling and the Amount of Testing of Hydraulic Cement.
  14. ASTM C192: Curing Concrete Test Specimens in the Laboratory
  15. ASTM C231: Air Content of Freshly Mixed Concrete by the Pressure Method
  16. ASTM C260: Air-Entraining Admixtures for Concrete
  17. ASTM C311: Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
  18. ASTM C494: Chemical Admixtures for Concrete
  19. ASTM C617: Capping Cylindrical Concrete Specimens
  20. ASTM C311: Coal Fly Ash and Raw or Calcined Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
  21. ASTM C1017: Chemical Admixtures for use in Producing Flowing Concrete
  22. ASTM D1751: Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- C. U.S. Bureau of Reclamation (USBR)
1. USBR M-47 Standard Specification for Repair of Concrete, August 1996

## 1.05 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Cementitious Materials: Portland cement, or Portland cement plus pozzolan, or blended hydraulic cement.
- C. Culvert – is used interchangeably with bridge.

D. MDO: medium density overlay (a type of plywood panel).

#### 1.06 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 03300-1, Concrete Mix Design
2. RSN 03300-2, Concrete delivery tickets
3. RSN 03300-3, Shop Drawings
  - a) The Contractor shall submit, for approval, two copies of the design computations and four sets of the shop drawings; all shall be signed and sealed by a Washington State registered professional engineer (Structure Design Engineer).
  - b) The shop drawings shall include all details, dimensions and quantities necessary to construct the cast-in-place concrete elements such as culverts, wingwalls, headwalls and foundations in accordance with the design. This includes, but is not limited to, the following information:
    - 1) Structure clear span and rise.
    - 2) Bridge unit details showing all concrete dimensions, elevations and reinforcing steel requirements.
    - 3) Wingwall details showing all concrete dimensions, reinforcing steel and anchorage details.
    - 4) Wingwall plan, elevation, and cross-section views shall be provided.
    - 5) Headwall details showing all concrete dimensions, reinforcing steel and anchorage details.
    - 6) Headwall plan, elevations, and cross-section views shall be provided.
    - 7) Foundation details showing all concrete dimensions, elevations and reinforcing steel with bar size, length and spacing indicated.
    - 8) Footing plan and section views shall be provided.
    - 9) The actual soil bearing pressure shall be noted on the footing detail sheets.

## 1.07 REQUIREMENTS

- A. The Contractor will be responsible for performing the necessary excavations, placing and compacting structural backfill, and furnishing and placing cast-in-place concrete, rebar, and other appurtenant materials as required to complete each of the reinforced concrete elements shown on the Drawings, inclusive of the Shop Drawings.

## 1.08 QUALITY ASSURANCE

- A. The Contractor shall test cast-in-place concrete to ensure that it meets the requirements of these Specifications, as follows:
  - 1. The Contractor shall obtain and pay for the services of an independent testing laboratory to perform the following concrete testing:
    - a) Fresh concrete shall be sampled and tested in accordance with ASTM C31, ASTM C143, and ASTM C260. Sampling and testing shall be performed from concrete delivered by the first truckload. Concrete shall not be placed until slump, temperature, and entrained air tests indicate that is within acceptable limits. Concrete shall be sampled and tested at least once every 50 cubic yards (CY). A minimum of two cylinders shall be cast for strength testing for each class of concrete used.
    - b) Cured concrete cylinders shall be tested in accordance with ASTM C39.
  - 2. The Contractor shall provide suitable samples of concrete for testing.
- B. Concrete testing performed by the Contractor shall not relieve the Contractor of his/her obligation to furnish, place, and finish cast-in-place concrete as required in these Contract Documents.
- C. The Contractor shall submit the batch ticket with each batch of concrete to the Contracting Officer at the job site during batch delivery in accordance with ASTM C 94.
- D. The Contractor shall submit the results of the laboratory testing to the Contracting Officer within 2 days of receiving the results.

## PART 2 – PRODUCTS

### 2.01 CEMENTITIOUS MATERIALS

- A. Cementitious material options:
  - 1. Specified Portland Cement only

2. Specified Portland Cement with 20% plus or minus 5%, by weight, specified pozzolan

B. Portland Cement:

1. ASTM C150, Type II
2. Meet the equivalent alkalis requirements of ASTM C150 – Table 2
3. Meet false-set requirements of ASTM C150 – Table 4

C. Pozzolan:

1. ASTM C618, Class F
2. Sulfur trioxide for Class F, maximum: 4%
3. Loss on ignition, maximum: 2.5%
4. Use pozzolan tested for effectiveness in controlling alkali-silica reaction under optimal physical requirements in Table 2 of ASTM C618. Use low-alkali cement for test.
5. Do not decrease sulfate resistance of concrete by use of pozzolan.
  - a) Demonstrate pozzolan will have an “R” factor less than 2.5.
    - 1)  $R=(C-5)/F$
    - 2) C: Calcium oxide content of pozzolan in percent determined in accordance with ASTM C114.
    - 3) F: Ferric oxide content of pozzolan in percent determined in accordance with ASTM C114.

## 2.02 WATER

- A. Clean and potable containing less than 500 parts per million (ppm) of chlorides

## 2.03 AGGREGATE MATERIALS

- A. Fine Aggregate: ASTM C33
- B. Course Aggregate: ASTM C33, Size No. 57 or 67

## 2.04 ADMIXTURES

- A. Admixtures: All admixtures shall be supplied by one manufacturer and approved by the Contracting Officer.
  1. Air-Entraining Admixture: Conform to ASTM C260.

2. Chemical Admixtures:
  - a) ASTM C494, Type A, D, F, or G
  - b) ASTM C494, Type C and E, provided they do not contain chlorides
  - c) ASTM C1017, Type I or II

## 2.05 CONCRETE MIX

- A. Design and adjust concrete mix in accordance with ACI 318.
  1. Adjust during Work as indicated by the results of concrete testing.
- B. Net water/cementitious materials ratio: 0.47 maximum, by weight
- C. Slump:
  1. 2 to 4 inches at placement
  2. Use slump appropriate for placing conditions when ASTM C1017, Type I or II admixtures are used in concrete
- D. Compressive Strength
  1. At 28 days: no less than 4,000 pounds per square inch
  2. Determine compressive strength in accordance with ASTM C31 and ASTM C39 for 6 by 12-inch cast cylinders. Acceptance criteria:
    - a) 90% of test cylinders exceed specified compressive strength at 28 days
    - b) Average compressive strength of any six consecutive test cylinders exceeds specified compressive strength at 28 days
- E. Air Entrainment: 4 to 6% air by volume of concrete at placement

## 2.06 NON-SHRINK GROUT

- A. Premixed and packaged, non-metallic, tested to comply with ASTM C827 for volume change, ASTM C187 and C143 for workability, and ASTM C39 for compressive strength. The use of powdered aluminum will not be permitted without written permission of the Contracting Officer.

## 2.07 CONSTRUCTION JOINTS

- A. Waterstop: Bentonite/butyl-rubber based water stop with 75% sodium bentonite content

## 2.08 EXPANSION JOINTS

- A. Joint Filler: Closed-cell round PE foam rod compatible with sealant
- B. Joint Sealant: Single-component pourable polyurethane; ASTM C920, Type S, Grade P, Class 25, use T, with minimum durometer hardness of 35

## PART 3 – EXECUTION

### 3.01 FORMWORK

- A. Form Materials:
  - 1. For Footings: Fabricate forms of MDO plywood, metal, or plastic as judged best suited for shapes. Construct with a minimum of joints, sufficiently tight to prevent leakage.
  - 2. For Walls and Exposed Concrete: Fabricate forms of MDO Plywood. The plywood shall be exterior type without splits or knotholes and sanded smooth. The face grain of the plywood shall run perpendicular to the studs or joists. All joints in surfaces of forms used on exposed concrete surfaces shall be vertical or horizontal. Where possible, use form material with a basic modular size of 4 feet by 8 feet.
  - 3. Forms shall be of such quality and treated so that deterioration or discoloration of formed concrete surfaces due to chemical action, contamination, or uneven absorption of water from concrete is prevented.
  - 4. Inserts/Sleeves: As shown on Drawings.
  - 5. Form Treatments: Line, coat, or treat forms with a suitable bond-breaker to ensure their timely removal with minimum damage to the concrete. Bond-breaker material shall be non-coloring and shall not leave a film on the concrete surface that will prohibit the subsequent finishing activities required to attain the desired appearance.
- B. Erect forms to conform accurately to the shapes, dimensions, locations, and profiles indicated; fit joints between adjacent assembled panels and components tightly. Construct forms sufficiently tight to prevent loss of mortar from concrete. Inspect all contact surfaces prior to concrete placement; verify that surfaces are clean, smooth, and free from foreign matter or imperfections affecting appearance of finished concrete.



- C. Camber: Design and erect formwork for anticipated deflection due to weight and pressure of fresh concrete. Provide positive means for adjustment of shores and struts to take up settlement during placement.
- D. Maintain forms rigidly in position until concrete has hardened sufficiently to prevent damage by form removal. Prying against face of concrete will not be permitted. Where mechanical means are necessary to release forms, use wood wedges only and then only as approved by the Contracting Officer.
- E. Provide a 3/4-inch chamfer on all exposed outside corners of concrete structures.

### 3.02 PREPARATION

- A. Inspection:
  - 1. Verify that all items to be embedded in concrete are in place, properly oriented, located, and secured.
  - 2. Verify that concrete may be placed to the lines and elevations indicated on the Drawings with all required clearances for reinforcement.
- B. General:
  - 1. Thoroughly clean all areas in which concrete is to be placed. Remove standing water, mud, and debris from foundation surfaces to be covered by concrete.
  - 2. Ensure that outdoor foundations are free from frost and ice.
  - 3. Clean, roughen, and dry existing concrete and construction joints to be covered with fresh concrete. Remove laitance, loose or defective concrete, coatings, sand, curing compound and other foreign materials.
  - 4. Clean all transporting and handling equipment of all hardened concrete.
- C. Notification: Notify the Contracting Officer at least 48 hours in advance of concrete pour.

### 3.03 PLACING CONCRETE

- A. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- B. Do not use aluminum pipes and chutes for placing or pumping concrete.
- C. Do not use concrete that has become so stiff that it cannot be properly placed.
- D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes

of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

- E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 20 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
  2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- F. Cold Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete Work from physical damage or reduced strength that could be caused by frost, freezing action, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below, 40° F (4° C), uniformly heat water and aggregates before mixing, to obtain a concrete mixture temperature of not less than 50° F (10° C) and not more than 80° F (27° C), at point of placement.
1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
  2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90° Fahrenheit (32° C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and sub-grade just before placing concrete. Keep sub-grade moisture uniform without puddles or dry areas.
4. Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to the Contracting Officer.

### 3.04 FINISHING

- A. Finish concrete surfaces in accordance with the procedure specified for each type of surface.
- B. Formed Surfaces:
  1. Finish F1:
    - a) Applies to formed surfaces to be covered by fill material, grout, or concrete, and construction joint surfaces.
    - b) Protect form tie rod ends on surfaces in contact with fill material from moisture where they will be below the water table or waterline. Recess tie rod ends and fill recess with dry pack or other material approved by the Contracting Officer.
    - c) Cut off tie rod ends flush with formed surface form on surfaces in contact with concrete or fill material and above the maximum water table or waterline elevation.
  2. Finish F2:
    - a) Applies to formed surfaces not permanently covered by fill material, grout, or concrete and not required to receive finish F3 and to contraction joint and expansion joint surfaces.
  3. Finish F3:
    - a) Applies to formed surfaces that may be exposed to public view.
    - b) The surface shall be ground smooth to remove all fins, protrusions, rock pockets, and tie holes, and shall be repaired by dry-packing. All depressions shall be filled with a one-to-one sand cement grout and sack- or carpet-rubbed with a one-to-one sand/cement dry mix.

- c) The surface plane dimension shall be within a tolerance of plus or minus 1/4-inch of design dimensions, and the surface shall be free of irregularities greater than 3/16-inch in 10 feet in any direction.

C. Unformed Surfaces:

1. Finish U1 (screeded finish):
  - a) Applies to unformed surfaces to be covered by fill material, grout, or concrete.
  - b) Use as first stage of finish U2 and U3.
  - c) Level and screed concrete to produce even uniform surfaces.
2. Finish U2 (floated finish):
  - a) Applies to unformed surfaces not permanently covered by fill material, grout, or concrete and not required to receive finish U3.
  - b) Use as second stage of finish U3.
  - c) Use hand- or power-driven equipment.
  - d) The surface shall be rodded across the top of the forms or screeds and smoothed with a wood float to remove irregularities greater than 3/8 inch in depth or variations from a grade of more than 1/2-inch in 10 feet.
  - e) Begin floating as soon as screeded surface has sufficiently stiffened and before bleed water forms.
3. Finish U3 (troweled finish):
  - a) Applies to unformed surfaces that will be exposed to public view.
  - b) The surface shall be rodded across the screeds and smoothed with a light steel trowel to produce a smooth impervious surface, free of trowel marks. The general surface shall have no irregularities greater than 3/16-inch in depth or variations in grade of more than 3/8-inch in 10 feet.
  - c) The slab shall be edged or patterned with a 2-inch-wide edging tool having a 3/4-inch corner radius.
  - d) Begin steel troweling after bleed water has disappeared and floated surface has sufficiently hardened to prevent an excess of fine material from being drawn to the surface.

- e) Trowel with firm pressure to flatten sandy texture of floated surface.

### 3.05 JOINTS AND EDGES

#### A. Construction Joints:

1. Construction joints are joints that are purposely placed in concrete to facilitate construction, reduce initial shrinkage stresses and cracks, allow time for installation of embedded metalwork, or allow for subsequent placing of other concrete.
2. Concrete bond is required at construction joints regardless of whether or not reinforcement is continuous across the joint.
3. Locate joints where shown on the Drawings or approved by the Contracting Officer. Relocation, addition, or elimination of joints will be subject to approval by the Contracting Officer.
4. Roughen surface of concrete at joints and remove laitance to obtain bond before placing next lift; if use of keys is impractical due to congestion or inaccessibility or if it is inadvisable to disturb surface before it has hardened, use only wet sandblast method for preparing surface.
5. Dampen hardened concrete of joints between footings and walls, joints in unexposed walls, and all others not specifically mentioned herein and roughen by air water cutting. Dampen hardened concrete joints in exposed Work and roughen by air/water cutting.
6. Install waterstop at construction joints for structures designed to hold or convey water in accordance with the manufacturer's instructions.
7. Thoroughly cover joint surfaces with neat cement mortar of similar proportions to mortar in concrete; apply mortar as thick as practicable on vertical surfaces and a minimum of 1/2-inch-thick on horizontal surfaces; place next lift before mortar has reached its initial set.
8. For bonding new concrete to existing concrete, use a bonding agent. For grouting dowels and reinforcing bars use specified adhesives in accordance with manufacturer's instructions.

#### B. Expansion Joints:

1. Provide pre-molded 3/8-inch joint filler for expansion joints in concrete sheetpile wall and other fixed objects, unless otherwise indicated.
2. Locate expansion joints as noted on Drawings.

3. Extend joint fillers full width and depth of joint and not less than 1/2-inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect top edge of joint filler during concrete placement with a metal or plastic temporary strip. Remove protection after concrete has been placed on both sides of joint before sealant is applied.
4. Fillers and Sealants: Install polyurethane sealant in a continuous, smooth joint, wiping excess sealant from adjacent concrete.
5. Provide expansion joints not more than 30 feet apart in footings. Run no reinforcement or other metal trim continuous through joints, unless otherwise indicated.

### 3.06 STRIPPING

- A. Strip forms within 24 hours of placement, unless required to maintain minimum concrete temperature in accordance with Paragraph 3.08 B.

### 3.07 PROTECTION

- A. Protect concrete from damage until final Project acceptance.
- B. Maintain concrete at a temperature of 50° F (10° C) or greater for 72 hours, minimum, after placement. Vent heater and prevent concrete from drying where artificial heat is employed.

### 3.08 REPAIR

- A. Repair concrete in accordance with USBR M-47.
- B. Repair or replace concrete where directed by the Contracting Officer.

### 3.09 SUBSOIL DRAINAGE

- A. Subsoil drainage shall be as indicated on the Drawings, or as otherwise directed by the Structure Design Engineer.

## **END OF SECTION**

## **SECTION 03410 – PLANT-PRECAST REINFORCED CONCRETE**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. This specification covers the design, manufacturing and installation of plant-precast reinforced concrete culverts and appurtenances, which may be used for the culvert installations indicated on the Drawings.
- B. The Contractor may elect to install plant-precast reinforced concrete elements for the culvert installations, which involve:
  - 1. Bottomless culverts or other approved structures.
  - 2. Culvert footings or foundations.
  - 3. Culvert headwalls, where applicable.
  - 4. Culvert wingwalls, where applicable.
- C. Should the Contractor elect to install plant-precast reinforced concrete elements, as described in item A above, the Contractor shall acquire sealed and signed structural construction drawings (Shop Drawings) for those elements, developed by a licensed Washington State registered professional engineer (Structure Design Engineer) in accordance with Washington State regulations.
- D. Construction of these elements is subject to limitations on road closure periods. If these elements cannot be completed within the allowed road closure period, the Contractor will need to mitigate for an extended road closure, which may include construction of a temporary road to bypass the construction of these elements.
- E. The elements shall be designed to meet the culvert design parameters shown in the Drawings and as described in the Specifications.
- F. The following (and associated) Specifications may be supplemented, at the discretion of the Contracting Officer and Engineer, depending on the design of the elements by the Structure Design Engineer. Supplemental specifications shall meet or exceed the Specifications herein.
- G. The Work shall consist of developing approved designs, furnishing materials for and installation of cast-in-place reinforced concrete structures for items indicated on the Drawings.

## 1.02 ALTERNATIVES

- A. As described in 1.01, above, the proposed culverts and appurtenances may be constructed of plant-precast reinforced concrete. Alternative methods of construction are:
  - 1. Cast-in-place reinforced concrete; Section 03300
  - 2. Corrugated galvanized steel structural plate; Section 05120
  - 3. Aluminum structural plate; Section 05140

## 1.03 PAYMENT

- A. Include in lump-sum prices offered in the schedule for Installation of the North Culvert, as applicable.
- B. Include in lump-sum prices offered in the schedule for Installation of the South Culvert, as applicable.
- C. Costs shall include labor, equipment, tools, and materials for excavation, installation of plant-precast reinforced concrete elements, placement of backfill, compaction of backfill, and installation of other materials associated with the plant-precast-reinforced concrete elements shown on the Drawings for installation of the culverts in Old Twisp Highway South.
- D. The costs associated with road closure mitigation are incidental to the Work.
- E. The costs associated with development of structural construction drawings (Shop Drawings), design calculations, and supplemental specifications for plant-precast reinforced concrete elements are incidental to the Work.

## 1.04 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. AASHTO M111: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 2. AASHTO A154: Standard Specification for Air-Entraining Admixtures for Concrete
  - 3. AASHTO M270: Standard Specification for Structural Steel for Bridges
  - 4. AASHTO M292: Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both



5. AASHTO T99: Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop
- B. American Iron and Steel Institute (AISI)
- C. ASTM International (ASTM)
1. ASTM A123: Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
  2. ASTM A185: Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
  3. ASTM A307: Standard Specification for Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength
  4. ASTM A194: Standard Specification for Carbon and Alloy Steel Nuts and Bolts for High Pressure or High Temperature Service, or Both
  5. ASTM A497: Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
  6. ASTM A615: Standard Specification for Deformed and Plain Steel Bars for Concrete Reinforcement
  7. ASTM A709: Standard Specification for Structural Steel for Bridges
  8. ASTM B695: Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
  9. ASTM C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
  10. ASTM C33: Standard Specification for Concrete Aggregates
  11. ASTM C39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
  12. ASTM C42: Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
  13. ASTM C150: Standard Specification for Portland Cement
  14. ASTM C173: Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
  15. ASTM C231: Standard Specification for Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

16. ASTM C309: Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
  17. ASTM C497: Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile
- D. National Precast Concrete Association (NPCA)
1. Quality Control Manual
- E. Washington State Department of Transportation (WSDOT)
1. WSDOT: Standard Specifications for Road, Bridge and Municipal Construction (latest edition); M 41-10
- F. U.S. Bureau of Reclamation (USBR)
1. USBR M-47 Standard Specification for Repair of Concrete, August 1996

#### 1.05 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

#### 1.06 SYSTEM DESCRIPTION

- A. Proprietary Disclosure:
1. This Section generally refers to a pre-approved manufacturer, CONTECH®, although similar products from other pre-approved manufacturers are acceptable.
  2. Additional products by other manufacturers may be approved, at the discretion of the Contracting Agency and/or the Engineer.
  3. Other plant-precast reinforced concrete manufacturers shall meet, at a minimum, specifications included in Section 6.02 from the WSDOT Standard Specifications (see References).
- B. Type
1. This Work shall consist of furnishing and constructing a precast reinforced concrete three-sided culvert (or other approved structure) and appurtenances in accordance with these Specifications and in reasonably close conformity with the lines, grades, design and dimensions shown on

the Drawings and/or as established by the Structure Design Engineer and shown on the Shop Drawings.

2. In situations where two or more Specifications apply to this Work, the most stringent requirements shall govern.

C. Designation

1. Precast reinforced concrete bridge units manufactured in accordance with this specification shall be designated by span and rise.
2. Precast reinforced concrete wingwalls and headwalls manufactured in accordance with this specification shall be designated by length, height, and deflection angle.

D. Specifications

1. The precast elements are designed in accordance with the "Standard Specifications for Highway Bridges" 17th Edition, adopted by the American Association of State Highway and Transportation Officials, 2002.
2. A minimum of 1 foot of cover above the crown of the bridge units is required in the installed condition, unless noted otherwise on the Shop Drawings and designed accordingly.

E. Alternate Structures

1. Alternate structures may be considered, provided that Shop Drawings and calculations signed and sealed by a Washington State registered professional engineer (Structure Design Engineer) are submitted to the Engineer within 14 business days following bid award for review and approval. Refer to part 1.05, above.
2. Proposed alternates must submit at least two (2) independently verified full scale load tests that confirm the design methodology of the proposed three sided structure(s).
3. The proposed alternate, upon satisfactory confirmation of design methodology, may be considered an acceptable alternate.

## 1.07 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 03410-1, Shop Drawings
  - a) The Contractor shall submit, for approval, two copies of the design computations and four sets of the Shop Drawings; all shall be

signed and sealed by a Washington State registered professional engineer (Structure Design Engineer).

- b) The Shop Drawings shall include all details, dimensions and quantities necessary to construct the precast bridge units, wingwalls, headwalls and foundations in accordance with the design. This includes, but is not limited to, the following information:
  - 1) Structure clear span and rise.
  - 2) Bridge unit details showing all concrete dimensions, elevations and reinforcing steel requirements.
  - 3) Wingwall details showing all concrete dimensions, reinforcing steel and anchorage details.
  - 4) Wingwall plan, elevation, and cross-section views shall be provided.
  - 5) Headwall details showing all concrete dimensions, reinforcing steel and anchorage details.
  - 6) Headwall plan, elevations, and cross-section views shall be provided.
  - 7) Foundation details showing all concrete dimensions, elevations and reinforcing steel with bar size, length and spacing indicated.
  - 8) Footing plan and section views shall be provided.
  - 9) The actual soil bearing pressure shall be noted on the footing detail sheets.
- 2. RSN 03410-2, QA Documentation, see Part 1.07, below.
- 3. RSN 03410-3, Source QC Documentation, see Part 2.04, below.

## 1.08 QUALITY ASSURANCE

- A. The Precaster shall demonstrate adherence to the standards set forth in the National Precast Concrete Association (NPCA) Quality Control Manual and the Precaster shall meet either Section 4.7.1 or 4.7.2.
- B. Precaster Certification: The Precaster shall be certified by the Precast/Prestressed Concrete Institute Plant Certification Program or the NPCA Plant Certification

Program prior to and during production of the products covered by this specification.

C. Precaster Qualifications:

1. The Precaster shall have been in the business of producing precast concrete products similar to those specified for a minimum of three years.
2. The Precaster shall maintain a permanent quality control department or retain an independent testing agency on a continuing basis; the agency shall issue a report, certified by a licensed engineer, detailing the ability of the Precaster to produce quality products consistent with industry standards.

D. Verification of Certification and Qualifications

1. The Precaster shall provide documentation demonstrating compliance with this section to the product manufacturer and/or the Structure Design Engineer at regular intervals or upon request.

## 1.09 DELIVERY, STORAGE, AND HANDLING

A. Delivery

1. Precast concrete elements must not be shipped until the concrete has attained the specified design compressive strength, or as directed by the Structure Design Engineer.
2. Precast concrete elements may be unloaded and placed on the ground at the site until installed. Store elements using timber supports as appropriate.

B. Storage

1. Precast concrete bridge elements shall be lifted and stored in “as-cast” position.
2. Precast concrete headwall and wingwall units are cast, stored, and shipped in a flat position.
3. The precast elements shall be stored in such a manner to prevent cracking or damage. Store elements using timber supports as appropriate. The units shall not be moved until the concrete compressive strength has reached a minimum of 2500 psi, and they shall not be stored in an upright position.

C. Handling

1. Handling devices shall be permitted in each precast element for the purpose of handling and setting.
2. Spreader beams may be required for the lifting of precast concrete bridge elements to preclude damage from bending or torsion forces.

## PART 2 – PRODUCTS

### 2.01 MATERIALS

- A. The following material requirements shall apply, unless otherwise approved by the Structure Design Engineer and incorporated into the design of the precast products.
- B. Concrete:
  1. The concrete for the precast elements shall be air-entrained when installed in areas subject to freeze-thaw conditions, composed of Portland cement, fine and coarse aggregates, admixtures and water.
  2. Air-entrained concrete shall contain  $6 \pm 2$  percent air. The air-entraining admixture shall conform to AASHTO M154.
  3. The minimum concrete compressive strength shall be as shown on the Shop Drawings.
  4. Portland Cement:
    - a) Shall conform to the requirements of ASTM Specifications C150-Type I, Type II, or Type III cement.
  5. Coarse Aggregate:
    - a) Shall consist of stone having a maximum size of 1 inch. Aggregate shall meet requirements for ASTM C33.
  6. Water Reducing Admixture:
    - a) The manufacturer may submit, for approval by the Structure Design Engineer, a water-reducing admixture for the purpose of increasing workability and reducing the water requirement for the concrete.
  7. Calcium Chloride:
    - a) The addition to the mix of calcium chloride or admixtures containing calcium chloride will not be permitted.

8. Mixture:

- a) The aggregates, cement and water shall be proportioned and mixed in a batch mixer to produce a homogeneous concrete meeting the strength requirements of this specification.
- b) The proportion of Portland cement in the mixture shall not be less than 564 pounds (approximately 6 sacks) per cubic yard of concrete.

C. Steel Reinforcement:

1. The minimum steel yield strength shall be 60,000 psi, unless otherwise noted on the Shop Drawings.
2. All reinforcing steel for the precast elements shall be fabricated and placed in accordance with the detailed Shop Drawings submitted by the manufacturer.
3. Reinforcement shall consist of welded wire fabric conforming to ASTM Specification A 185 or A 497, or deformed billet steel bars conforming to ASTM Specification A 615, Grade 60.
4. Longitudinal distribution reinforcement may consist of welded wire fabric or deformed billet-steel bars.

D. Steel Hardware

1. Bolts and threaded rods for wingwall connections shall conform to ASTM A 307. Nuts shall conform to AASHTO M292 (ASTM A194) Grade 2H. All bolts, threaded rods and nuts used in wingwall connections shall be mechanically zinc coated in accordance with ASTM B695 Class 50.
2. Structural Steel for wingwall connection plates and plate washers shall conform to AASHTO M 270 (ASTM A 709) Grade 36 and shall be hot dip galvanized as per AASHTO M111 (ASTM A123).
3. Inserts for wingwalls shall be 1" diameter Two-Bolt Preset Wingwall Anchors as manufactured by Dayton/Richmond Concrete Accessories, Miamisburg, Ohio, (800) 745-3700.
4. Ferrule Loop Inserts shall be F-64 Ferrule Loop Inserts as manufactured by Dayton/Richmond Concrete Accessories, Miamisburg, Ohio, (800) 745-3700.
5. Hook Bolts used in attached headwall connections shall be ASTM A307.

6. Inserts for detached headwall connections shall be AISI Type 304 stainless steel, F-58 Expanded Coil inserts as manufactured by Dayton/Richmond Concrete Accessories, Miamisburg, Ohio, (800) 745-3700.
7. Coil rods and nuts used in headwall connections shall be AISI Type 304 stainless steel.
8. Washers used in headwall connections shall be either AISI Type 304 stainless steel plate washers or AASHTO M270 (ASTM A709) Grade 36 plate washers hot dip galvanized as per AASHTO M111 (ASTM A123).
9. Reinforcing bar splices shall be made using the Dowel Bar Splicer System as manufactured by Dayton/Richmond Concrete Accessories, Miamisburg, Ohio, (800) 745-3700, and shall consist of the Dowel Bar Splicer (DB-SAE) and Dowel-In (DI).

## 2.02 MANUFACTURE OF PRECAST ELEMENTS:

### A. General:

1. Subject to the provisions of Part 2.03, herein, the precast element dimension and reinforcement details shall be as prescribed in the plan and Shop Drawings provided by the manufacturer.

### B. Forms:

1. The forms used in manufacture shall be sufficiently rigid and accurate to maintain the required precast element dimensions within the permissible variations given in Part 2.03, herein. All casting surfaces shall be of a smooth material.

### C. Placement of Reinforcement

#### 1. Placement of Reinforcement in Precast Bridge Units:

- a) The cover of concrete over the outside circumferential reinforcement shall be 2 inches minimum.
- b) The cover of concrete over the inside circumferential reinforcement shall be 1 1/2 inches minimum, unless otherwise noted on the Shop Drawings.
- c) The clear distance of the end circumferential wires shall not be less than one inch nor more than two inches from the ends of each section.



- d) Reinforcement shall be assembled utilizing single or multiple layers of welded wire fabric (not to exceed 3 layers), supplemented with a single layer of deformed billet-steel bars, when necessary.
- e) Welded wire fabric shall be composed of circumferential and longitudinal wires meeting the spacing requirements of the specifications, herein, and shall contain sufficient longitudinal wires extending through the bridge unit to maintain the shape and position of the reinforcement.
- f) Longitudinal distribution reinforcement may be welded wire fabric or deformed billet-steel bars and shall meet the spacing requirements of the specifications, herein. The ends of the longitudinal distribution reinforcement shall be not more than 3 inches and not less than 1 1/2 inches from the ends of the bridge unit.

2. Bending of Reinforcement for Precast Bridge Units:

- a) The outside and inside circumferential reinforcing steel for the corners of the bridge shall be bent to such an angle that is approximately equal to the configuration of the bridge's outside corner.

3. Placement of Reinforcement for Precast Wingwalls and Headwalls:

- a) The cover of concrete over the longitudinal and transverse reinforcement shall be 2 inches minimum.
- b) The clear distance from the end of each precast element to the end of reinforcing steel shall not be less than 1/2 inch nor more than 3 inches.
- c) Reinforcement shall be assembled utilizing a single layer of welded wire fabric, or a single layer of deformed billet-steel bars.
- d) Welded wire fabric shall be composed of transverse and longitudinal wires meeting the spacing requirements of the specifications, herein, below, and shall contain sufficient longitudinal wires extending through the element to maintain the shape and position of the reinforcement.
- e) Longitudinal reinforcement may be welded wire fabric or deformed billet-steel bars and shall meet the spacing requirements of the specifications, herein.

D. Laps, Welds, Spacing

1. Laps, Welds, and Spacing for Precast Bridge Units:
  - a) Tension splices in the circumferential reinforcement shall be made by lapping.
  - b) Laps may be tack welded together for assembly purposes.
  - c) For smooth welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.2 and 8.32.6.
  - d) For deformed welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.1 and 8.32.5.
  - e) The overlap of welded wire fabric shall be measured between the outer-most longitudinal wires of each fabric sheet.
  - f) For deformed billet-steel bars, the overlap shall meet the requirements of AASHTO 8.25.
  - g) For splices other than tension splices, the overlap shall be a minimum of 12" for welded wire fabric or deformed billet-steel bars.
  - h) The spacing center to center of the circumferential wires in a wire fabric sheet shall be not less than 2 inches and not more than 4 inches.
  - i) The spacing center to center of the longitudinal wires shall not be more than 8 inches.
  - j) The spacing center to center of the longitudinal distribution steel for either line of reinforcing in the top slab shall be not more than 16 inches.
  
2. Laps, Welds, and Spacing for Precast Wingwalls and Headwalls:
  - a) Splices in the reinforcement shall be made by lapping.
  - b) Laps may be tack welded together for assembly purposes.
  - c) For smooth welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.2 and 8.32.6.
  - d) For deformed welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.1 and 8.32.5.
  - e) For deformed billet-steel bars, the overlap shall meet the requirements of AASHTO 8.25.

- f) The spacing center-to-center of the wires in a wire fabric sheet shall be not less than 2 inches and not more than 8 inches.

E. Curing:

- 1. The precast concrete elements shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less.
- 2. Any one of the following methods of curing or combinations thereof shall be used:
  - a) Steam Curing: The precast elements may be low-pressure steam cured by a system that will maintain a moist atmosphere.
  - b) Water Curing: The precast elements may be water cured by any method that will keep the sections moist.
  - c) Membrane Curing: A sealing membrane conforming to the requirements of ASTM Specification C309 may be applied and shall be left intact until the required concrete compressive strength is attained. The concrete temperature at the time of application shall be within +/- 10 degrees F of the atmospheric temperature. All surfaces shall be kept moist prior to the application of the compounds and shall be damp when the compound is applied.

2.03 FABRICATION

A. Shop Assembly

1. Marking

- a) Each bridge unit shall be clearly marked by waterproof paint. The following shall be shown on the inside of the vertical leg of the bridge section:
  - 1) Bridge Span X Bridge Rise
  - 2) Date of Manufacture
  - 3) Name or trademark of the manufacturer

B. Shop Finishing

1. Joints

- a) The bridge units shall be produced with flat butt ends.

- b) The ends of the bridge units shall be such that when the sections are laid together they will make a continuous line with a smooth interior free of appreciable irregularities, all compatible within the variations described, herein.
- c) The joint width between adjacent precast units shall not exceed 3/4 inches.

2. Workmanship/Finish

- a) The bridge units, wingwalls, and headwalls shall be substantially free of fractures.
- b) The ends of the bridge units shall be normal to the walls and centerline of the bridge section, within the limits of the variations described, herein, except where beveled ends are specified.
- c) The faces of the wingwalls and headwalls shall be parallel to each other, within the limits of variations described, herein.
- d) The surface of the precast elements shall be a smooth steel form or troweled surface.
- e) Trapped air pockets causing surface defects shall be considered as part of a smooth, steel form finish.

C. Repairs

- 1. Precast elements may be repaired, if necessary, because of imperfections in manufacture or handling damage and will be acceptable if, in the opinion of the purchaser, the repairs are sound, properly finished and cured, and the repaired section conforms to the requirements of this specification.
- 2. Repair concrete in accordance with USBR M-47.

D. Tolerances

- 1. Bridge Units
  - a) Internal Dimensions:
    - 1) The internal dimension shall vary not more than 1% from the design dimensions nor more than 1-1/2 inches whichever is less.
  - b) Slab and Wall Thickness:

- 1) The slab and wall thickness shall not be less than that shown in the design by more than 1/4 inch.
  - 2) A thickness more than that required in the design shall not be cause for rejection.
- c) Length of Opposite Surfaces:
- 1) Variations in laying lengths of two opposite surfaces of the bridge unit shall not be more than 1/2 inch in any section, except where beveled ends for laying of curves are specified by the purchaser.
- d) Length of Section:
- 1) The under-run in length of a section shall not be more than 1/2 inch in any bridge unit.
- e) Position of Reinforcement:
- 1) The maximum variation in position of the reinforcement shall be  $\pm 1/2$  inch.
  - 2) In no case shall the cover over the reinforcement be less than 1 1/2 inches for the outside circumferential steel or be less than 1 inch for the inside circumferential steel as measured to the external or internal surface of the bridge.
  - 3) These tolerances or cover requirements do not apply to mating surfaces of the joints.
- f) Area of Reinforcement:
- 1) The areas of steel reinforcement shall be the design steel areas as shown in the manufacturer's Shop Drawings.
  - 2) Steel areas greater than those required shall not be cause for rejection.
  - 3) The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM Specification for that type of reinforcement.

2. Wingwalls & Headwalls

- a) Wall Thickness:
- 1) The wall thickness shall not vary from that shown in the design by more than 1/2 inch.

- b) Length/Height of Wall sections:
  - 1) The length and height of the wall shall not vary from that shown in the design by more than 1/2 inch.
- c) Position of Reinforcement:
  - 1) The maximum variation in the position of the reinforcement shall be  $\pm 1/2$  inch.
  - 2) In no case shall the cover over the reinforcement be less than 1 1/2 inches.
- d) Size of Reinforcement:
  - 1) The permissible variation in diameter of any reinforcing shall conform to the tolerances prescribed in the ASTM Specification for that type of reinforcing.
  - 2) Steel area greater than that required shall not be cause for rejection.

## 2.04 SOURCE QUALITY CONTROL

### A. Testing, General

- 1. The Precaster shall show that the following tests are performed in accordance with the ASTM standards indicated. Tests shall be performed as indicated herein.
  - a) Air Content: C231 or C173
  - b) Compressive Strength: C31, C39, C497
- 2. Test Equipment:
  - a) Every manufacturer furnishing precast elements under this specification shall furnish all facilities and personnel necessary to carry out the test required.

### B. Test Specimen:

- 1. Concrete compressive strength shall be determined from compression tests made on cylinders or cores.
  - a) For cylinder testing, a minimum of 3 cylinders shall be taken for each lot of bridge elements.

- 1) A lot is defined as the precast elements made using the same concrete mix during a single day's production.
  - 2) Each lot shall be considered separately for the purpose of testing and acceptance.
- b) For core testing, one core shall be cut from each of 3 precast elements selected at random from each group of 15 or fewer elements made using a single concrete mix in the same day's production.
- 1) **Plugging Core Holes:** The core holes shall be plugged and sealed by the manufacturer in a manner such that the elements will meet all of the test requirements of this specification. Precast elements so sealed shall be considered satisfactory for use.
- C. **Compression Testing:**
1. Cylinders shall be made and tested as prescribed by the ASTM C 39 Specification.
  2. Cores shall be obtained and tested for compressive strength in accordance with the provisions of the ASTM C42 Specification.
- D. **Acceptability of Cylinder Tests:**
1. When the average compressive strength of all cylinders tested is equal to or greater than the design compressive strength, and not more than 10% of the cylinders tested have a compressive strength less than the design concrete strength, and no cylinder tested has a compressive strength less than 80% of the design compressive strength, then the lot shall be accepted.
  2. When the compressive strength of the cylinders tested does not conform to these acceptance criteria, the acceptability of the lot may be determined as described in acceptability of core tests below.
- E. **Acceptability of Core Tests:**
1. The compressive strength of the concrete in a lot is acceptable when the average core test strength is equal to or greater than the design concrete strength.
  2. When the compressive strength of a core tested is less than the design concrete strength, the precast element from which that core was taken may be re-cored.

- a) When the compressive strength of the re-core is equal to or greater than the design concrete strength, the compressive strength of the concrete in that lot is acceptable.
- b) When the compressive strength of any re-core is less than the design concrete strength, the precast element from which that core was taken shall be rejected.
  - 1) Two precast elements from the remainder of the lot shall be selected at random and one core shall be taken from each.
  - 2) If the compressive strength of both cores is equal to or greater than the design concrete strength, the compressive strength of the remainder of that group is acceptable.
  - 3) If the compressive strength of either of the two cores tested is less than the design concrete strength, the remainder of the group shall be rejected or, at the option of the manufacturer, each precast element of the remainder of the group shall be cored and accepted individually, and any of these elements that have cores with less than the design concrete strength shall be rejected.

F. Inspections

- 1. The quality of materials, the process of manufacture, and the finished precast elements shall be subject to inspection by the Sponsor's inspector.
- 2. The Sponsor may place an inspector in the plant when the products covered by this specification are being manufactured.

G. Verification of Performance

- 1. The Precaster shall provide documentation demonstrating compliance with this section to the product manufacturer and/or the Structure Design Engineer at regular intervals or upon request.
- 2. The Precaster shall submit Precast Production Reports to the product manufacturer and/or the Structure Design Engineer as required.

H. Rejection

- 1. The precast elements shall be subject to rejection on account of any of the specification requirements. Individual precast elements may be rejected because of any of the following:
  - a) Fractures or cracks passing through the wall, except for a single end crack that does not exceed one half the thickness of the wall.



- b) Defects that indicate proportioning, mixing, and molding not in compliance with Part 2.02, herein.
- c) Honeycombed or open texture.
- d) Damaged ends, where such damage would prevent making a satisfactory joint.

### PART 3 – EXECUTION

#### 3.01 EXAMINATION

##### A. Verification of Conditions

- 1. The Contracting Agency shall provide the Contractor with the control points for construction of the proposed culverts. The Contractor shall provide survey control to field locate the position and elevation of the proposed culverts during installation.
- 2. If site conditions differ from the Drawings, the Contractor shall notify the Contracting Officer prior to commencing Work on the culverts installations.

#### 3.02 PREPARATION

A. To ensure correct installation of the precast concrete bridge system, care and caution must be exercised in forming the support areas for bridge units, headwall, and wingwall elements. Exercising special care will facilitate the rapid installation of the precast components.

##### B. Footings

- 1. Contractor shall coordinate in-situ testing of soils to assure that the minimum design parameters, as indicated on the Drawings, are met.
- 2. Refer to Section 01452 – Quality Control Testing for Earthwork and Cast-in-Place Concrete.
- 3. Do not over excavate foundations unless testing indicates foundation soils do not meet design parameters for bearing capacity. The Contractor shall not begin over excavation of the foundation without approval by the Engineer. Over excavation shall then be permitted to amend foundation soils to meet or exceed the footing design requirements.
- 4. The testing laboratory shall certify that the bearing capacity meets or exceeds the footing design requirements, prior to the Contractor pouring of the footings. Unless otherwise approved by the Manufacturer, Structure

Design Engineer, and Contracting Officer, a copy of the report shall be submitted to the product manufacturer and/or Structure Design Engineer prior to shipment of precast concrete elements.

5. The bridge units and wingwalls shall be installed on either precast or cast-in-place concrete footings, as designed by the Structure Design Engineer.
  - a) The size and extent, and elevation of the footings shall be as designed by the Structure Design Engineer.
  - b) Unless otherwise approved by the Structure Design Engineer, a keyway shall be formed in the top surface of the bridge footing as specified on the Shop Drawings.
  - c) No keyway is required in the wingwall footings, unless otherwise specified on the Shop Drawings.
6. Unless otherwise approved by the Structure Design Engineer, the footings shall be given a smooth float finish and shall reach a compressive strength of 2,000 psi before placement of the bridge and wingwall elements.
7. Backfilling shall not begin until the footing has reached the full design compressive strength without written approval from the culvert manufacturer and/or Structure Design Engineer.
8. The footing surface shall be constructed in accordance with grades shown on the Drawings and/or the Shop Drawings. When tested with a 10-foot straight edge, the surface shall not vary more than 1/4 inch in 10 feet.
9. If a precast concrete footing is used, the Contractor shall prepare a 4-inch thick base layer of compacted granular material the full width of the footing prior to placing the precast footing, unless otherwise approved by the Structure Design Engineer.
10. The foundations for precast concrete bridge elements and wingwalls must be connected by reinforcement to form one monolithic body. Expansion joints shall not be used.
11. The Contractor shall be responsible for the construction of the foundations per the Drawings, Shop Drawings, and Specifications.

### 3.03 INSTALLATION

#### A. General

1. The installation of the precast concrete elements shall be as explained in the Shop Drawings or other documentation provided by the manufacturer and/or the Structure Design Engineer.

2. A representative of the product manufacturer and/or the Structure Design Engineer may elect to, and shall be allowed to be on site during the installation of the precast elements. Costs incurred by the representative(s) shall be considered incidental to the Work and shall be borne by the Contractor.
  
3. Lifting:
  - a) It is the responsibility of the Contractor to ensure that suitable equipment (crane or other suitable equipment) of the correct lifting capacity is available to handle the precast concrete units. This can be accomplished by using the weights given for the precast concrete components and by determining the lifting reach for said equipment.
  - b) Contractor shall evaluate the site conditions well in advance of shipping to ensure proper equipment location and to avoid any lifting restrictions.
  - c) The lift anchors or holes provided in each unit are the only means to be used to lift the elements.
  - d) The precast concrete elements must not be supported or raised by other means than those described in the Shop Drawings or other documentation by the manufacturer and/or Structure Design Engineer.
  
4. Construction equipment weight restrictions:
  - a) In no case shall equipment operating in excess of the design load (HS25) be permitted over the bridge units unless approved by the manufacturer and/or the Structure Design Engineer.
  - b) Unless otherwise approved by the manufacturer and/or Structure Design Engineer, in the immediate area of the bridge units, the following restrictions for the use of heavy construction machinery during backfilling operations apply:
    - 1) No construction equipment shall cross the bare precast concrete bridge unit.
    - 2) After the compacted fill level has reached a minimum of 4 inches over the crown of the bridge, construction equipment with a weight of less than 10 tons may cross the bridge.

- 3) After the compacted fill level has reached a minimum of 1 foot over the crown of the bridge, construction equipment with a weight of less than 30 tons may cross the bridge.
- 4) After the compacted fill level has reached the design cover, or 2 feet minimum, over the crown of the precast concrete bridge, construction equipment within the design load limits for the road may cross the precast concrete bridge.

B. Leveling Pad/Shims

1. The bridge units and wingwalls shall be set on masonite or steel shims measuring 6" x 6", minimum, unless shown otherwise on the Shop Drawings.
2. A minimum gap of 1/2 inch shall be provided between the footing and the bottom of the bridge's vertical legs or the bottom of the wingwall.

C. Placement of Bridge Units

1. The bridge units shall be placed as shown on the Drawings and/or Shop Drawings, unless otherwise approved by the Contracting Officer.
2. Special care shall be taken in setting the elements to the true line and grade.
3. The joint width between adjacent precast units shall not exceed 3/4 inches.
4. It is imperative that any lateral spreading of the bridge elements be avoided during and after their placement.
  - a) Generally, horizontal cable ties are shipped in the larger bridge elements to prevent this spreading.
  - b) If, due to site restrictions, these ties must be removed prior to placement of the bridge element, the contractor must provide hardwood wedges on site. These hardwood wedges are placed in the keyway outside the legs of the bridge elements, and smaller shims and wedges are added before complete release of the bridge element from the crane.
  - c) Also, a supply of 1/4-, 1/2-, and 3/8-inch-thick steel or masonite shims for various shimming purposes should be on site, per Item B, above.

D. Placement of Wingwalls and Headwalls

1. The wingwalls and headwalls shall be placed as shown on the Drawings and/or Shop Drawings.
2. Special care shall be taken in setting the elements to the true line and grade.

E. Waterproofing/Joint protection and Subsurface Drainage

1. External Protection of Joints:
  - a) The butt joint made by two adjoining bridge units shall be covered with a 7/8" x 1 3/8" preformed bituminous joint sealant and a minimum of a 9-inch wide joint wrap.
  - b) The surface shall be free of dirt before applying the joint material.
  - c) A primer compatible with the joint wrap to be used shall be applied for a minimum width of 9 inches on each side of the joint.
  - d) The external wrap shall be either EZ-WRAP RUBBER by PRESS-SEAL GASKET CORPORATION, SEAL WRAP by MAR MAC MANUFACTURING CO. INC. or approved equal.
  - e) The joint shall be covered continuously from the bottom of one bridge section leg, across the top of the bridge and to the opposite bridge section leg.
  - f) Any laps that result in the joint wrap shall be a minimum of six inches long with the overlap running downhill.
2. In addition to the joints between bridge units, the joint between the end bridge unit and the headwall shall also be sealed as described above.
3. If precast wingwalls are used, the joint between the end bridge unit and the wingwall shall be sealed with a 2'-0" strip of filter fabric.
4. Also, if lift holes are formed in the bridge units, they shall be primed and covered with a 9" x 9" square of joint wrap.
5. During the backfilling operation, care shall be taken to keep the joint wrap in its proper location over the joint.
6. Subsoil drainage shall be as indicated on the Shop Drawings, or as otherwise directed by the Structure Design Engineer.

F. Grouting

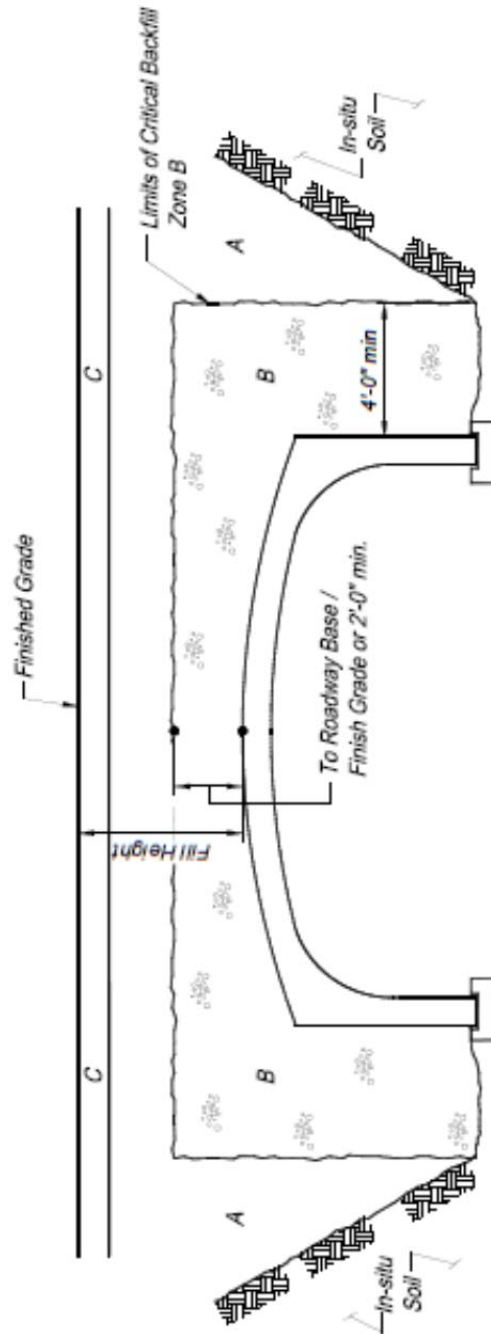
1. Grouting shall not be performed when temperatures are expected below 35° for a period of 72 hours.

2. Fill the bridge-foundation keyway with cement grout (Portland cement and water or cement mortar composed of Portland cement, sand and water) with a minimum 28-day compressive strength of 3000 psi.
3. Vibrate as required to ensure that the entire key around the bridge element is completely filled.
4. If bridge elements have been set with temporary ties (cables, bars, etc.) grout must attain a minimum compressive strength of 1500 psi before ties may be removed.
5. All grout shall have a maximum aggregate size of ¼ inch.
6. Lifting and erection anchor recesses shall be filled with grout.

### 3.04 BACKFILL

- A. Do not perform backfilling during wet or freezing weather.
- B. No backfill shall be placed against any structural elements until they have been approved by the Structure Design Engineer.
- C. Backfill shall be considered as all replaced excavation and new embankment adjacent to the precast concrete elements.
- D. The Project construction and material specifications, which include the specifications for excavation for structures and roadway excavation and embankment construction, shall apply except as modified in this section.
- E. Backfill Zones (see graphic, below):
  1. In-situ soil
  2. Zone A: constructed embankment or overfill.
  3. Zone B: fill that is directly associated with precast concrete bridge installation.
  4. Zone C: road structure.

F. Required Backfill Properties



SPAN	FILL HEIGHT	ACCEPTABLE MATERIAL INSIDE ZONE B
≤ 24'-0"	≥ 12'-0"	A1, A3
≤ 24'-0"	< 12'-0"	A1, A2, A3, A4
> 24'-0"	all	A1, A3

1. In-situ soil
  - a) Natural ground is to be sufficiently stable to allow effective support to the precast concrete bridge units.
  - b) As a guide, the existing natural ground should be of similar quality and density to Zone B material for minimum lateral dimension of one bridge span outside of the bridge footing.
  
2. Zone A Soils
  - a) Zone A Soils requires fill material with specifications and compacting procedures equal to that for normal road embankments.
  
3. Zone B Soils
  - a) Generally, Zone B soils shall be reasonably free of organic matter, and, near concrete surfaces, free of stones larger than 3 inches in diameter.
  - b) See chart, below, for detailed descriptions of acceptable Zone B soils.



**Acceptable Soils for use in Zone B Backfill**

Typical USCS Materials	AASHTO Group	AASHTO Subgroup	Percent passing US Sieve No.			Character of Fraction passing No. 40 Sieve		Soil Description
			#10	#40	#200	Liquid Limit	Plasticity Index	
GW, GP, SP	A-1	A-1a	50 max	30 max	15 max		6 max	Largely gravel but can include sand and fines
GM, SW, SP, SM		A-1b	50 max	50 max	25 max		6 max	Gravelly sand or graded sand, may include fines
GM, SM, ML, SP, GP	A-2	A-2-4			35 max	40 max	10 max	Sands, gravels with low-plasticity silt fines
SC, GC, GM		A-2-5			35 max	41 min	10 max	Sands, gravels with plastic silt fines
SP, SM, SW	A-3			51 min	10 max		non-plastic	Fine sands
ML, SM, SC	A-4				36 min	40 max	10 max	Low-compressibility silts

4. Zone C Soils

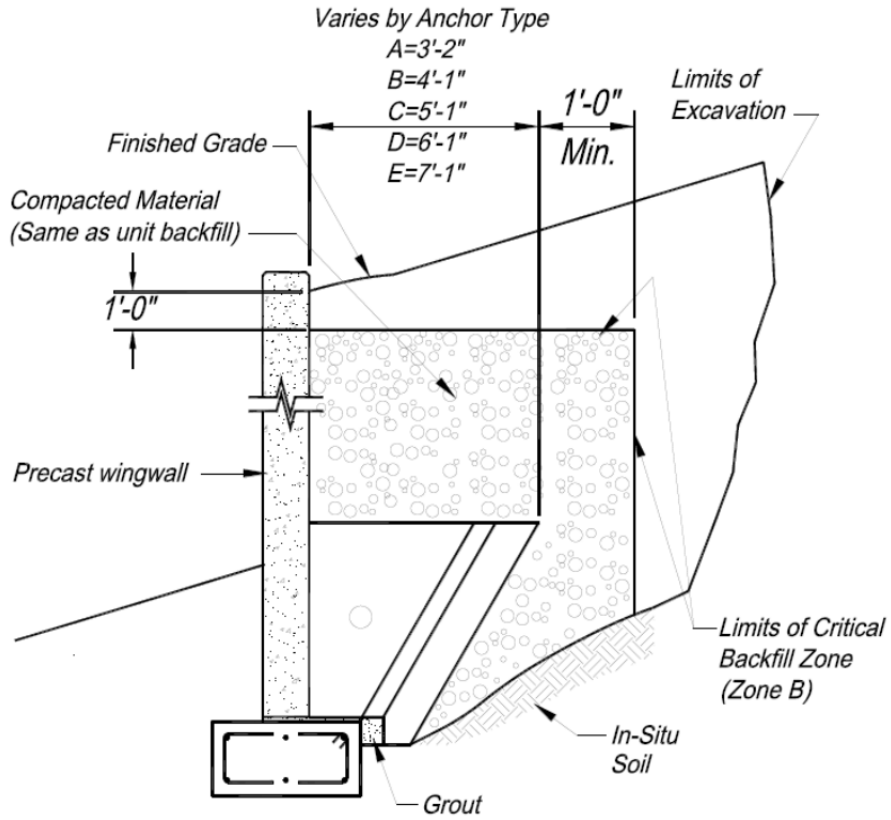
- a) Zone C soils comprise the road section of gravel, asphalt or concrete built in compliance with local engineering practices.

G. Placing and Compacting Backfill

1. Dumping for backfilling is not allowed any nearer than 3 ft from the bridge leg.
2. The fill must be placed and compacted in layers not exceeding 8 inches.
3. The maximum difference in the surface levels of the fill on opposite sides of the bridge must not exceed 2 feet.
4. The fill behind wingwalls must be placed at the same time as that of the bridge fill. It must be placed in progressively placed horizontal layers not exceeding 8 inches per layer.
5. The backfill of Zone B shall be compacted to a minimum density of 95% of the Standard Proctor, as required by AASHTO T-99.
6. Soil within 1 foot of concrete surfaces should be hand-compacted. Elsewhere, use of rollers is acceptable.
7. If vibrating roller-compactors are used, they should not be started or stopped within Zone B and the vibration frequency should be at least 30 revolutions per second.
8. The backfill material and compacting behind wingwalls should satisfy the criteria for the bridge backfill, Zone B.
9. Backfill against a waterproofed surface shall be placed carefully to avoid damage to the waterproofing material.

H. Backfill at Wingwalls

1. Backfill in front of wingwalls shall be carried to ground lines shown in the Drawings.
2. Also, refer to graphic, below



### 3.05 MONITORING

- A. The contractor shall check settlements and horizontal displacement of foundation to ensure that they are within the allowable limit provided by the Structure Design Engineer. These measurements should give an indication of the settlements and deformations along the length of the foundations.
- B. The first measurement row should take place after the erection of all precast bridge system elements, a second after completion of backfilling, and a third before opening of the bridge to traffic. Further measurements may be made according to local conditions.
- C. The maximum difference in vertical displacements 'v' should not exceed 1 inch along the length of one foundation.

**END OF SECTION**

**DIVISION 4 – NOT USED**

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**DIVISION 5 – METALS**

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## **SECTION 05120 – CORRUGATED GALVANIZED STEEL STRUCTURAL PLATE**

### PART 1 – GENERAL

#### 1.01 GENERAL

- A. This specification covers the design, manufacturing and installation of corrugated galvanized steel structural plate structures, which may be used for the culvert installations indicated on the Drawings.
- B. The Contractor shall select the type of material for use in construction of the culverts located on Old Twisp Highway South. The Contractor shall be responsible for acquiring a set of construction drawings (Shop Drawings) for the culverts and associated elements.
  - 1. The Shop Drawings shall be sealed and signed by a Washington State licensed registered professional engineer (Structure Design Engineer), in accordance with State regulations and code.
  - 2. The Shop Drawings shall be incorporated into the Bid Package, following review and approval from the Contracting Officer and the Engineer.
  - 3. The Shop Drawings shall incorporate the design parameters and criteria shown on the Drawings and described in the Specifications.
  - 4. All costs associated with acquiring an approved set of construction drawings (Shop Drawings and accompanying documentation) shall be considered incidental to the Work.
- C. Construction of these elements is subject to limitations on road closure periods. If these elements cannot be completed within the allowed road closure period, the Contractor will need to mitigate for an extended road closure, which may include construction of a temporary road to bypass the construction of these elements.

#### 1.02 ALTERNATIVES

- A. As described in 1.01, above, the proposed culverts and appurtenances may be constructed of corrugated galvanized steel structural plate. Alternative methods of construction are:
  - 1. Cast-in-place reinforced concrete; Section 03300
  - 2. Plant-precast reinforced concrete; Section 03410
  - 3. Aluminum structural plate; Section 05140

### 1.03 PAYMENT

- A. Include in lump-sum prices offered in the schedule for Installation of the North Culvert, as applicable.
- B. Include in lump-sum prices offered in the schedule for Installation of the South Culvert, as applicable.
- C. Costs shall include labor, equipment, tools, and materials for excavation, installation of corrugated galvanized steel structural plate elements, placement of backfill, compaction of backfill, and installation of other materials associated with the corrugated galvanized steel structural plate elements shown on the Drawings for installation of the culverts in Old Twisp Highway South.
- D. The costs associated with road closure mitigation are incidental to the Work.
- E. The costs associated with development of structural construction drawings (Shop Drawings), design calculations, and supplemental specifications for corrugated galvanized steel structural plate elements are incidental to the Work.

### 1.04 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. AASHTO M145: Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
  - 2. AASHTO M111: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 3. AASHTO M167: Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted pipe, Pipe Arches, and Arches
  - 4. AASHTO M190: Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
  - 5. AASHTO M232: Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 6. AASHTO M291: Carbon and Alloy Steel Nuts
  - 7. AASHTO T99: Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop
  - 8. AASHTO Standard Specifications for Highway Bridges, Section 12
  - 9. AASHTO Standard Specifications for Highway Bridges, Section 26

- B. ASTM International (ASTM)
  - 1. ASTM A153: Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 2. ASTM A449: Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
  - 3. ASTM A563: Carbon and Alloy Steel Nuts
  - 4. ASTM A761: Corrugated Steel Structural Plate, Zinc Coated, for Field Bolted Pipe, Pipe Arches, and Arches
  - 5. ASTM A807: Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
  - 6. ASTM D698: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>)
- C. Washington State Department of Transportation (WSDOT)
  - 1. WSDOT: Standard Specifications for Road, Bridge and Municipal Construction (latest edition); M 41-10

#### 1.05 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

#### 1.06 SYSTEM DESCRIPTION

- A. North Culvert
  - 1. Approximate Dimensions:
    - a) Span (wall to wall, inside): 19 ft
    - b) Rise (bottom to top, inside): 4 ft
  - 2. Minimum opening area (finished grade): 20 square feet
- B. South Culvert
  - 1. Approximate Dimensions:
    - a) Span (wall to wall, inside): 14 ft

- b) Rise (bottom to top, inside): 7 ft
- 2. Minimum opening area (finished grade): 70 square feet
- 3. Gauge:
  - a) Unless otherwise required by the Structure Design Engineer, plate gauge shall be 12 gauge for all plates.
- 4. Corrugation:
  - a) Unless otherwise required by the Structure Design Engineer, the galvanized steel structural plate shall have 6 inch x 2 inch annular corrugations. The corrugation profile shall have AASHTO recognition for a minimum of 10 years.
- C. The selected structure will be designated by standard applicable catalog structure number, span, rise, and other common criteria.
- D. Cover over the structure shall be determined from the crown of the structure to the bottom of flexible pavement or top of rigid pavement.
- E. Design
  - 1. Design Criteria: The design of the structure(s) shall be in accordance with:
    - a) AASHTO Standard Specification for Highway Bridges, 17th Edition with interim revisions; Section 12 Working Stress Design.
    - b) Okanogan County Department of Public Works, Okanogan County Road and Street Standards and Guidelines for Developments
  - 2. Design Loads: Design loads shall be as indicated on the Drawings and as described in these Specifications. Construction loads and any temporary loads exceeding the service live load are not allowed on the structure without approval from the Structure Design Engineer.
    - a) The Structure Design Engineer shall specify the materials and extents of the foundations or bedding and backfill material within the critical backfill zone with consideration of structure shape and in situ conditions.
    - b) The Structure Design Engineer shall consider the structural capacity of trench walls or adjacent embankments to provide balanced soil loads on the structure.
    - c) The Structure Design Engineer shall consider hydraulic forces on the ends of the structure. End treatment such as headwalls, slope collars, slope paving, or cut-off walls shall be considered to protect

the backfill and provide stability and protection to the ends of the structure as well as to prevent erosion or washout.

- d) The Structure Design Engineer shall consider scour effects on the structure foundation. The use of scour counter-measures shall be considered for strip footings.

F. Shop Drawings:

- 1. Shop drawings (including sealed and signed construction drawings by the Structure Design Engineer for the culverts and appurtenances) and design calculations shall be prepared and submitted to the Contracting Officer for approval.
- 2. The Contractor shall be responsible for verification of all field dimensions prior to fabrication.

1.07 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

- 1. RSN 05120-1, Shop drawings and design calculations for corrugated galvanized steel structural plate elements.

1.08 QUALIFICATION OF WELDERS

- A. Welder shall be able to demonstrate prior experience with procedures, materials, and equipment of the type required for the Work.

1.09 DELIVERY, STORAGE, AND PROTECTION

- A. Protect elements from corrosion, deformation, and other types of damage.
- B. Store items in an enclosed area free from contact with soil and weather.
- C. Remove and replace damaged items with new items.

PART 2 – PRODUCTS

2.01 QUALIFIED SUPPLIERS

- A. Each bidder is required to identify their intended bridge supplier as part of the bid submittal. Qualified suppliers must have at least ten (10) years experience fabricating equal or larger type structures.
- B. Pre-Approved Manufacturers:
  - 1. CONTECH Engineered Solutions, LLC (formerly CONTECH Construction Products Inc.), 700 Tech Drive, Winchester, KY 40391

2. Big R Bridge; P.O. Box 1290, Greely, CO 80632-1290
- C. Suppliers other than those listed above may be used provided the Contracting Officer evaluates the proposed supplier and approves the supplier 5 business days prior to bid.
  - D. The Contractor must provide the following documentation, for any proposed Supplier who is not pre-approved, at least 5 business days prior to bid:
    1. Product literature
    2. All documentation to ensure substitution will be in compliance with these Specifications.
    3. Project-specific representative drawings for bridge projects listed above with material, complete design calculations and design specification references.
  - E. Proposed suppliers must have at least 10 years of experience designing these types of structures and a minimum of 15 successful projects, of similar shape and construction as specifically written in these Specifications and drawings, each of which has been in service at least 3 years. List the location, shape, size, owner, and a contact for reference for each project.
  - F. The Contracting Officer will evaluate and verify the accuracy of the submittal prior to bid. If the Contracting Officer determines that the qualifying criteria have not been met, the contractor's proposed supplier shall be rejected. This ruling shall be final.

## 2.02 MATERIALS

- A. Structural Plate: Galvanized steel structural plate shall consist of plate and appurtenant items as shown on the Drawings and shall conform to the requirements of AASHTO M167 or ASTM A761 and Table 1.

**Table 1 – MULTI-PLATE - 6x2 Corrugated Structural Plate Section Properties**

<b>Gage</b>	<b>Nominal Thickness (in)</b>	<b>Uncoated Thickness (in)</b>	<b>Moment of Inertia (in<sup>4</sup>/in)</b>	<b>Section Modulus (in<sup>3</sup>/in)</b>	<b>Radius of Gyration (in)</b>	<b>Area of Section (in<sup>2</sup>/ft)</b>
12	0.111	0.1046	0.0604	0.0574	0.682	1.556
10	0.138	0.1345	0.0782	0.0733	0.684	2.003
8	0.168	0.1644	0.0962	0.0888	0.686	2.449
7	0.188	0.1838	0.1080	0.0989	0.688	2.739
5	0.218	0.2145	0.1269	0.1147	0.690	3.199
3	0.249	0.2451	0.1462	0.1302	0.692	3.658
1	0.280	0.2758	0.1658	0.1458	0.695	4.119

<b>Gage</b>	<b>Nominal Thickness (in)</b>	<b>Uncoated Thickness (in)</b>	<b>Moment of Inertia (in<sup>4</sup>/in)</b>	<b>Section Modulus (in<sup>3</sup>/in)</b>	<b>Radius of Gyration (in)</b>	<b>Area of Section (in<sup>2</sup>/ft)</b>
5/16	0.318	0.3125	0.1900	0.1640	0.698	4.671
3/8	0.380	0.3750	0.2320	0.1950	0.704	5.613

- B. Hot Dip Galvanizing: Galvanizing shall conform to AASHTO M111 or ASTM A153.
- C. Bituminous (Asphalt) Coating: If specified, bituminous coating shall conform to AASHTO M190.
- D. Fasteners
  - 1. Nuts and bolts shall conform to AASHTO M232 and M291 or ASTM A449, Type 1 (bolts) and A563, Grade C (nuts).

### 2.03 FABRICATION AND QUALITY CONTROL

- A. All manufacturing processes including corrugating, punching, curving, special fabrication and galvanizing shall be performed in the United States of America at a common location.
- B. All raw materials shall be domestic and certification of origin in the United States of America.
- C. All raw materials shall be traceable and certified by the mill for material composition and physical properties.
- D. All welds shall be in accordance with AWS/ANSI standard practice and shall be completed prior to hot dip galvanizing.

## PART 3 – EXECUTION

### 3.01 PREPARATION

- A. Where dimensions of the culverts shown on the Drawings are tentative and subject to change dependent upon material furnished, confirm locations and dimensions prior to fabrication of the corrugated galvanized steel structural plate.

### 3.02 INSTALLATION

- A. Assembly
  - 1. The structure shall be assembled in accordance with the shop drawings and plate layout provided by the manufacturer.
  - 2. Bolts shall be tightened to an applied torque between 100 and 300 ft-lbs.

B. Installation

1. The structure shall be installed in accordance with AASHTO Standard Specifications for Highway Bridges Section 26 or ASTM A807, the Drawings (including Shop Drawings) and Specifications, and the manufacturer's recommendations.
2. The Contractor shall provide footings as required per the Drawings and Specifications, inclusive of the approved Shop Drawings.
3. The Contractor shall provide proper bedding and backfill to avoid distortion that may create undesirable stresses in the structure and/or settlement of the roadway. The bedding shall be free of rock formations, protrusions, frozen material or organic material.

C. Backfill

1. The structure shall be backfilled using clean, well graded granular materials that meet the requirements of AASHTO M145 soil classifications A-1, A-2 or A-3.
2. Backfill materials shall be placed in symmetrical lifts on each side of the structure. The differential between the lifts on either side shall not exceed 24 inches. Each layer of soil shall be placed in 6 to 8 inch loose lifts and compacted to a minimum of 90% density per AASHTO T99 or ASTM D698 (Standard Proctor).
3. Backfill soils shall be free of rocks exceeding 3 inches, frozen lumps, ice, organic matter and foreign materials that could cause hard spots or decompose to create voids.
4. The presence of a high percentage of silt or fine sand in the native soils suggests the need for well-graded granular material in the critical backfill zone or the use of non-woven geotextile to prevent soil migration.
5. During backfilling operations, only small tracked construction equipment (such as a D-4 dozer or smaller) shall be near the structure as fill progresses above the crown and to the minimum height of cover. After adequate cover and compaction is achieved, live loads may increase at the direction of the Structure Design Engineer.

D. Critical Zone Backfill

1. The Structure Design Engineer shall determine the extents of the critical backfill zone and provide a detail on the Shop Drawings.

E. Subsoil Drainage



1. Subsoil drainage shall be as indicated on the Drawings, or as otherwise directed by the Structure Design Engineer.

**END OF SECTION**

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## **SECTION 05140 – ALUMINUM STRUCTURAL PLATE**

### PART 1 – GENERAL

#### 1.01 SCOPE

- A. This specification covers the design, manufacturing, and installation of the corrugated aluminum structural plate structures, which may be used for the culvert installations indicated on the Drawings.
- B. The Contractor shall select the type of material for use in construction of the culverts located on Old Twisp Highway South. The Contractor shall be responsible for acquiring a set of construction drawings (Shop Drawings) for the culverts and associated elements.
  - 1. The Shop Drawings shall be sealed and signed by a Washington State licensed registered professional engineer (Structure Design Engineer), in accordance with State regulations and code.
  - 2. The Shop Drawings shall be incorporated into the Bid Package, following review and approval from the Contracting Officer and the Engineer.
  - 3. The Shop Drawings shall incorporate the design parameters and criteria shown on the Drawings and described in the Specifications.
  - 4. All costs associated with acquiring an approved set of construction drawings (Shop Drawings and accompanying documentation) shall be considered incidental to the Work.
- C. Construction of these elements is subject to limitations on road closure periods. If these elements cannot be completed within the allowed road closure period, the Contractor will need to mitigate for an extended road closure, which may include construction of a temporary road to bypass the construction of these elements.

#### 1.02 ALTERNATIVES

- A. As described in 1.01, above, the proposed culverts and appurtenances may be constructed of aluminum structural plate. Alternative methods of construction are:
  - 1. Cast-in-place reinforced concrete; Section 03300
  - 2. Plant-precast reinforced concrete; Section 03410
  - 3. Corrugated galvanized steel structural plate; Section 05120

### 1.03 PAYMENT

- A. Include in lump-sum prices offered in the schedule for Installation of the North Culvert, as applicable.
- B. Include in lump-sum prices offered in the schedule for Installation of the South Culvert, as applicable.
- C. Costs shall include labor, equipment, tools, and materials for excavation, installation of aluminum structural plate elements, placement of backfill, compaction of backfill, and installation of other materials associated with the aluminum structural plate elements shown on the Drawings for installation of the culverts in Old Twisp Highway South.
- D. The costs associated with road closure mitigation are incidental to the Work.
- E. The costs associated with development of structural construction drawings (Shop Drawings), design calculations, and supplemental specifications for aluminum structural plate elements are incidental to the Work.

### 1.04 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO)
  - 1. AASHTO M145: Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
  - 2. AASHTO M190: Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
  - 3. AASHTO M219: Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
  - 4. AASHTO M232: Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 5. AASHTO M291: Carbon and Alloy Steel Nuts
  - 6. AASHTO T99: Standard Method of Test for Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop
  - 7. AASHTO T180: Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
  - 8. AASHTO Standard Specifications for Highway Bridges, Section 12
  - 9. AASHTO Standard Specifications for Highway Bridges, Section 26

- B. ASTM International (ASTM)
  - 1. ASTM A307: Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
  - 2. ASTM A563: Carbon and Alloy Steel Nuts
  - 3. ASTM A807: Installing Corrugated Steel Structural Plate Pipe for Sewers and Other Applications
  - 4. ASTM B209: Aluminum and Aluminum-Alloy Sheet and Plate
  - 5. ASTM B221: Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
  - 6. ASTM B684: Platinum-Iridium Electrical Contact Materials
  - 7. ASTM B746: Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
  - 8. ASTM D698: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>)
  - 9. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>)
- C. American Welding Society, Inc. (AWS)
  - 1. AWS D1.2: Structural Welding Code – Aluminum
- D. Washington State Department of Transportation (WSDOT)
  - 1. WSDOT: Standard Specifications for Road, Bridge and Municipal Construction (latest edition); M 41-10

## 1.05 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

## 1.06 SYSTEM DESCRIPTION

- A. North Culvert
  - 1. Approximate Dimensions:
    - a) Span (wall to wall, inside): 19 ft

- b) Rise (bottom to top, inside): 4 ft
  - 2. Minimum opening area (finished grade): 20 square feet
- B. South Culvert
  - 1. Approximate Dimensions:
    - a) Span (wall to wall, inside): 14 ft
    - b) Rise (bottom to top, inside): 7 ft
  - 2. Minimum opening area (finished grade): 70 square feet
  - 3. Thickness (unless otherwise required by the Structure Design Engineer):
    - a) Plate thickness shall be 0.125 inches for all plates, or
    - b) Plate properties shall conform to Table 1.
  - 4. Ribs (unless otherwise required by the Structure Design Engineer):
    - a) Reinforcing ribs shall be Type II, Type IV, or Type VI as required by curving radii and plate and rib composition section properties in Table 2.
  - 5. Corrugation (unless otherwise required by the Structure Design Engineer):
    - a) The Aluminum Structural Plate shall have 9 inch x 2-1/2 inch annular corrugations. The corrugation profile shall have AASHTO recognition for a minimum of 15 years.
- C. The required structure will be designated by standard applicable catalog structure number, span, rise, and other common criteria.
- D. N shall equal 9.625 inches, or other as required by Manufacturer and approved by the Structure Design Engineer.
- E. Cover over the structure shall be determined from the crown of the structure to the bottom of flexible pavement or top of rigid pavement.
- F. Design
  - 1. Design Criteria: The design of the structure(s) shall be in accordance with:
    - a) AASHTO Standard Specification for Highway Bridges, 17th Edition with interim revisions; Section 12 Working Stress Design.

b) Okanogan County Department of Public Works, Okanogan County Road and Street Standards and Guidelines for Developments

2. Design Loads: Design loads shall be as indicated on the Drawings and as described in these Specifications. Construction loads and any temporary loads exceeding the service live load are not allowed on the structure without approval from the Structure Design Engineer.

a) The Structure Design Engineer shall specify the materials and extents of the foundations or bedding and backfill material within the critical backfill zone with consideration of structure shape and in situ conditions.

b) The Structure Design Engineer shall consider the structural capacity of trench walls or adjacent embankments to provide balanced soil loads on the structure.

c) The Structure Design Engineer shall consider hydraulic forces on the ends of the structure. End treatment such as headwalls, slope collars, slope paving or cut-off walls shall be considered to protect the backfill and provide stability and protection to the ends of the structure as well as to prevent erosion or washout.

d) The Structure Design Engineer shall consider scour effects on the structure foundation. The use of scour counter-measures shall be considered for strip footings.

G. Shop Drawings:

1. Shop drawings (including sealed and signed construction drawings by the Structure Design Engineer for the culverts and appurtenances) and design calculations shall be prepared and submitted to the Contracting Officer for approval.

2. The Contractor shall be responsible for verification of all field dimensions prior to fabrication.

H. Aluminum Box Culverts: Shall conform to ASTM B684.

## 1.07 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 05140-1, Shop drawings and design calculations for aluminum structural plate elements.

1.08 QUALIFICATION OF WELDERS

- A. Welder shall be able to demonstrate prior experience with procedures, materials, and equipment of the type required for the Work.

1.09 DELIVERY, STORAGE, AND PROTECTION

- A. Protect elements from corrosion, deformation, and other types of damage.
- B. Store items in an enclosed area free from contact with soil and weather.
- C. Remove and replace damaged items with new items.

PART 2 – PRODUCTS

2.01 QUALIFIED SUPPLIERS

- A. Each bidder is required to identify their intended bridge supplier as part of the bid submittal. Qualified suppliers must have at least ten (10) years experience fabricating equal or larger type structures.
- B. Pre-Approved Manufacturers:
  - 1. CONTECH Engineered Solutions, LLC (formerly CONTECH Construction Products Inc.), 700 Tech Drive, Winchester, KY 40391
  - 2. Big R Bridge; P.O. Box 1290, Greely, CO 80632-1290
- C. Suppliers other than those listed above may be used provided the Contracting Officer evaluates the proposed supplier and approves the supplier 5 business days prior to bid.
- D. The Contractor must provide the following documentation, for any proposed Supplier who is not pre-approved, at least 5 business days prior to bid:
  - 1. Product literature
  - 2. All documentation to ensure substitution will be in compliance with these Specifications.
  - 3. Project-specific representative drawings for bridge projects listed above with material, complete design calculations and design specification references.
- E. Proposed suppliers must have at least ten (10) years experience designing these types of structures and a minimum of fifteen (15) successful projects, of similar shape and construction as specifically written in these Specifications and drawings, each of which has been in service at least three (3) years. List the location, shape, size, owner, and a contact for reference for each project.



- F. The Contracting Officer will evaluate and verify the accuracy of the submittal prior to bid. If the Contracting Officer determines that the qualifying criteria have not been met, the contractor’s proposed supplier shall be rejected. This ruling shall be final.

2.02 MATERIALS

- A. Aluminum Structural Plate: Aluminum Structural Plate shall consist of plate, ribs and appurtenant items as shown on the Drawings and shall conform to the requirements of AASHTO M219 or ASTM B746 and Table 1.

**Table 1 – ALUMINUM STRUCTURAL PLATE - 9x2-1/2 Corrugated Plate Section Properties**

Nominal Thickness (in)	Moment of Inertia (in <sup>4</sup> /ft)	Section Modulus (in <sup>3</sup> /ft)	Radius of Gyration (in)	Area of Section (in <sup>2</sup> /ft)
*0.100	0.997	0.767	0.844	1.404
0.125	1.248	0.951	0.844	1.750
0.150	1.499	1.131	0.845	2.100
0.175	1.751	1.309	0.845	2.449
0.200	2.004	1.484	0.846	2.799
0.225	2.258	1.657	0.847	3.149
0.250	2.513	1.828	0.847	3.501

\* 0.100 inch thick plate shall be used for un-curved elements only.

**Table 2 – ALUMINUM STRUCTURAL PLATE/RIB Composite Section Properties**

Rib Type @ Spacing	Metal Thickness (inches)					
	0.125	0.150	0.175	0.200	0.225	0.250
	<b>Plastic Moment Capacity, Mp (kip-ft/ft)</b>					
No Rib	2.65	3.18	3.71	4.24	4.77	5.30
Type II @ 54	4.62	5.46	6.04	6.61	7.17	7.74
@ 27	6.18	7.25	7.94	8.60	9.25	9.87
@ 18	7.41	8.66	9.48	10.26	11.00	11.71
@ 9	10.63	12.13	13.08	14.05	15.03	16.02
Type IV @ 54	5.87	6.82	7.43	8.04	8.63	9.21
@ 27	8.32	9.59	10.39	11.14	11.85	12.55
@ 18	10.42	11.90	12.84	13.72	14.57	15.39
@ 9	16.45	18.46	19.41	20.38	21.37	22.37
Type VI @ 54	8.74	9.51	10.24	10.95	11.64	12.32
@ 27	13.76	14.33	15.16	16.19	17.36	17.48
@ 18	20.09	20.56	20.79	21.30	21.74	22.58
@ 9	32.24	34.35	36.46	38.54	39.88	40.63

- B. Aluminum Alloy Plate: Plates shall be fabricated from 5052-H141 aluminum alloy conforming to AASHTO M219 or ASTM B209.
- C. Aluminum Alloy Ribs: Ribs shall be fabricated from 6061-T6 aluminum alloy conforming to ASTM B221.
- D. Field Applied Bituminous (Asphalt) Coating: If specified, field applied bituminous coating shall conform to AASHTO M190.
- E. Fasteners
  - 1. Steel nuts and bolts shall conform to AASHTO M232 and M291 or ASTM A307, Grade A (bolts) and A563, Grade A (nuts).
  - 2. Aluminum nuts and bolts, if required, shall conform to ASTM B746. The structural design shall conform to the provisions of AASHTO Standard Specifications for Highway Bridges Section 12.6.2.

### 2.03 FABRICATION AND QUALITY CONTROL

- A. Final manufacturing processes including corrugating, punching, curving, special fabrication and optional zinc priming shall be performed in the United States of America at a common location.
- B. All raw materials shall be traceable and certified by the mill for material composition and physical properties.
- C. If required, welds shall be in accordance with AWS D1.2.

## PART 3 – EXECUTION

### 3.01 PREPARATION

- A. Where dimensions of the culverts shown on the Drawings are tentative and subject to change dependent upon material furnished, confirm locations and dimensions prior to fabrication of the aluminum structural plate.

### 3.02 INSTALLATION

- A. Assembly
  - 1. The structure shall be assembled in accordance with the shop drawings and plate layout provided by the manufacturer.
  - 2. Bolts shall be tightened to an applied torque between 100 and 150 ft-lbs.
- B. Installation

1. The structure shall be installed in accordance with AASHTO Standard Specifications for Highway Bridges Section 26 or ASTM A807, the Drawings and Specifications, and the manufacturer's recommendations.
2. The Contractor shall provide footings as required per the Drawings and Specifications, inclusive of the approved Shop Drawings.
3. The Contractor shall provide proper bedding and backfill to avoid distortion that may create undesirable stresses in the structure and/or settlement of the roadway. The bedding shall be free of rock formations, protrusions, frozen material, or organic material.

C. Backfill

1. The structure shall be backfilled using clean, well graded granular materials that meets the requirements of AASHTO M145 soil classifications A-1, A-2 or A-3. Aluminum box culverts shall be backfilled with A-1, A-2-4, A-2-5, or A-3 material.
2. Backfill materials shall be placed in symmetrical lifts on each side of the structure. The differential between the lifts on either side shall not exceed 24 inches. Each layer of soil shall be placed in 6 to 8 inch loose lifts and compacted to a minimum of 90% density per AASHTO T99 or ASTM D698 (Standard Proctor). Aluminum box culverts shall be compacted to 90% density per AASHTO T180 or ASTM D1557 (Modified Proctor).
3. Backfill soils shall be free of rocks exceeding 3 inches, frozen lumps, ice, organic matter, and foreign materials that could cause hard spots or decompose to create voids.
4. The presence of a high percentage of silt or fine sand in the native soils suggests the need for well graded granular material in the critical backfill zone or the use of non-woven geotextile to prevent soil migration.
5. During backfilling operations, only small tracked construction equipment (such as a D-4 dozer or smaller) shall be near the structure as fill progresses above the crown and to the minimum height of cover. After adequate cover and compaction is achieved, live loads may increase at the direction of the Structure Design Engineer.

D. Critical Zone Backfill

1. The Structure Design Engineer shall determine the extents of the critical backfill zone and provide a detail on the Shop Drawings.

E. Subsoil Drainage

1. Subsoil drainage shall be as indicated on the Drawings, or as otherwise directed by the Structure Design Engineer.

**END OF SECTION**

## **SECTION 05500 – METAL FABRICATIONS**

### PART 1 – GENERAL

#### 1.01 SCOPE

- A. The Work shall consist of furnishing and installing fabricated metal elements for the headwall and/or wingwalls for the two proposed culverts, where applicable:
  - 1. Metal fabrications shall use the following Specifications, at a minimum, and may be supplemented by specifications specific to the metal fabrications proposed for installation, upon approval by the Contracting Officer.

#### 1.02 PAYMENT

- A. Include in lump-sum prices offered in the schedule for structures that require metal fabrications.

#### 1.03 REFERENCES

- A. American Institute of Steel Construction (AISC)
  - 1. AISC M016 Manual of Steel Construction – Allowable Stress Design – Ninth Edition
- B. American Iron and Steel Institute (AISI)
- C. American Society of Mechanical Engineers (ASME)
  - 1. ASME B18.2.1-1996 (with 1999 Addenda) Square and Hex Bolts and Screws (Inch Series)
- D. ASTM International (ASTM)
  - 1. ASTM A36/A36M: Carbon Structural Steel
  - 2. ASTM A108: Steel Bars, Carbon, Cold-Finished, Standard Quality
  - 3. ASTM A123/A123M: Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 4. ASTM A153/A153M: Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 5. ASTM A307: Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
  - 6. ASTM A325: Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength

7. ASTM A385: Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
  8. ASTM A500/A500M: Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
  9. ASTM A501: Hot-Formed and Seamless Carbon Steel Structural Tubing
  10. ASTM A563: Carbon and Alloy Steel Nuts
  11. ASTM A668/A668M: Steel Forgings, Carbon and Alloy, for General Industrial Use
  12. ASTM F436: Hardened Steel Washers
  13. ASTM F844: Washers, Steel, Plain (Flat), Unhardened for General Use
- E. American Welding Society, Inc. (AWS)
1. AWS D1.1/D1.1M Structural Welding Code – Steel
- F. Federal Specifications (FS)
1. FS FF-S-85C Screw, Cap, Slotted and Hexagon Head

#### 1.04 DEFINITIONS

- A. Bridge – is used interchangeably with culvert.
- B. Culvert – is used interchangeably with bridge.

#### 1.05 SUBMITTALS

- A. Submit the following in accordance with Section 01330 – Submittals:
1. RSN 05500-1, Shop and fabrication detail drawings for headwalls and wingwalls for culvert installations, where applicable. Indicate which culvert the drawings refer to.
- B. Submittals shall include dimensioned detail drawings that meet the design parameters shown on the drawings and indicated in the Specifications. Drawings shall include details and a materials list for installation of the metal fabrication, complete with performance criteria (e.g., torque limits for fasteners).

#### 1.06 QUALIFICATION OF WELDERS

- A. Welder shall be able to demonstrate prior experience with procedures, materials, and equipment of the type required for the Work.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Protect metal fabrications from corrosion, deformation, and other types of damage.
- B. Store items in an enclosed area free from contact with soil and weather.
- C. Remove and replace damaged items with new items.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Bolts, nuts, and washers
  - 1. Eyebolts: Forged steel, ASTM A668, class C.
  - 2. Nuts: ASTM A563.
  - 3. Capscrews: FS FF-S-85
  - 4. Washers:
    - a) For use with ASTM A325 bolts: ASTM F436
    - b) Unhardened for general use: ASTM F844
- B. Bolts:
  - a) ASTM A307, except for anchor bolts and studbolts
  - b) Provide anchor bolts as shown on the Drawings
  - c) ASTM A36 steel
  - d) Length of bolt threads: ASME B18.2.1
  - e) Thread class: 2 free-fit, American National coarse-thread series.
- C. Studbolts:
  - a) Suitable for end welding to steel with automatically timed stud-welding equipment.
- D. Miscellaneous Structural Steel
  - 1. Angles: ASTM A36
  - 2. Other Shapes: ASTM A36

3. Galvanized per ASTM A123

## 2.02 ANCHORS

### A. Expansion Anchors:

1. AISI Type 316 stainless steel, when submerged in water, or hot-dip galvanized
2. Self-drilling anchors, snap-off or flush type
3. Bolt length as shown on the Drawings

### B. Wedge Anchors:

1. AISI Type 316 stainless steel, when submerged in water, or hot-dip galvanized
2. Bolt length as shown on the Drawings

### C. Stud Anchors:

1. ASTM A108, deformed bar anchors and stud anchors
2. Flux-filled ends suitable for end welding to steel with automatically timed stud-welding equipment

## 2.03 FABRICATION

### A. Fabricate metalwork in accordance with AISC M016, and these Specifications.

1. Perform welding in accordance with AWS D1.1.
2. Grind all welds smooth.

### B. If straightening is necessary, use methods that will not injure the metal.

### C. After shop Work completion and before galvanizing, clean material of rust, loose scale, dirt, oil, grease, slag and other foreign substances from welded areas.

### D. Galvanizing:

1. Galvanize items of metalwork unless otherwise specified or shown on the Drawings in accordance with ASTM A123 and A385.
2. Galvanize bolts, nuts, washers, and lockouts in accordance with ASTM A153. Remove excess spelter or centrifugal spinning.
3. Galvanizing Repair:



- a) Re-dip material with damaged galvanizing unless damage is local and can be repaired by zinc primer.
- b) If the galvanized coating becomes damaged after being dipped twice, material will be rejected.
- c) Repair procedure where local paint repair is authorized:
  - 1) Clean damaged areas by wiping with clean rags saturated with mineral spirits or xylene, followed by wire brushing.
  - 2) Re-clean areas with solvent to remove residue.
  - 3) Apply two or more coats of zinc primer:
    - a. Total minimum dry-film thickness: 4 mils
    - b. Zinc primer: MIL-DTL-24441/19

### PART 3 – EXECUTION

#### 3.01 PREPARATION

- A. Where locations and dimensions of miscellaneous metalwork shown on the Drawings are tentative and subject to change dependent upon equipment furnished, confirm locations and dimensions prior to fabrication of miscellaneous metalwork.

#### 3.02 INSTALLATION

- A. Embedded Metalwork:
  1. Accurately locate metalwork to be embedded in concrete. Hold metalwork in correct position and alignment and protect metalwork from damage and displacement during placement and setting of concrete.
  2. Unless otherwise specified, use only metal braces, supports and other items to position and align embedded metalwork. Do not use wooden braces, supports, or other items to position and align embedded metalwork if braces and supports will also be embedded in concrete.
- B. Anchors:
  1. The Contractor may use suitable adhesive, expansion, or wedge anchors meeting the requirements of this section in lieu of embedded anchors shown on Drawings, provided that anchors are approved by the Contracting Office.
  2. Drill holes for anchors straight, true, and of the diameter recommended by the anchor manufacturer.

3. Install anchors in accordance with manufacturer's recommendations.
  4. Follow manufacturer's recommendations when embedded steel or reinforcement is encountered during drilling of anchors.
  5. When drilling water is used, clean surfaces of concrete to remain exposed immediately to prevent discoloration.
- C. Galvanizing Repair:
1. Clean damaged areas by wiping with clean rags saturated with mineral spirits or xylene, followed by wire brushing.
  2. Re-clean areas with solvent to remove residue.
  3. Apply two or more coats of zinc primer:
    - a) Total minimum dry-film thickness: 4 mils
    - b) Zinc primer: MIL-DTL-24441/19
- D. Holes in metalwork:
1. Drill, or drill and tap as required, holes in metalwork required for installation.

**END OF SECTION**

**DIVISIONS 6 THROUGH 16 – NOT USED**

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**FIGURES**

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**SEE MOST CURRENT WSDOT STANDARD PLANS C-20.10-00, C-20.40-03, C-22.45-00, C-1, and C-1b  
WHICH CAN BE FOUND HERE:**

<http://www.wsdot.wa.gov/publications/>

Attached here are the most current versions as of 8/17/2012

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**DRAWINGS**

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