



# Public Utility District No. 1 of Skagit County

**Judy Reservoir to Mount Vernon  
Transmission Pipeline - Phase 2**

## **Construction Documents Project Manual**

P.N. 3549  
C.O. 4385

Skagit County, WA

August 2020

## **General Requirements and Specifications**

### **Volume 1 of 3**

# TECHNICAL SPECIFICATIONS



## JUDY RESERVOIR TO MOUNT VERNON TRANSMISSION PIPELINE – PHASE 2

**CO:4385 Project: 3549  
HDR Project No. 10030396**

### ISSUED FOR BIDDING

**November 23, 2020**

#### **DISTRICT OFFICE**

1415 Freeway Drive  
Post Office Box 1436  
Mount Vernon, WA 98273  
(360) 424-7104 -- Telephone  
(360) 424-8764 -- Facsimile

#### **DISTRICT OFFICIALS**

##### Commission

Joe Lindquist, President  
Al Littlefield, Vice President  
Germaine Kornegay, Secretary

##### General Manager

George Sidhu, P.E.

##### Engineering Manager

Mark C. Handzlik, P.E.

##### Operations Manager

Mike Fox



# TECHNICAL SPECIFICATIONS



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##### Operations Manager

Mike Fox



# Specifications and Bid Documents

## JUDY RESERVOIR TO MOUNT VERNON TRANSMISSION PIPELINE – PHASE 2

Project # 3549

C.O. # 4385

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### CERTIFICATION

---

These specifications and design drawings for the Judy Reservoir to Mount Vernon Transmission Pipeline – Phase II have been prepared under the direction of the following Registered Professional Engineer.



Mark Handzlik, P.E.  
Project Manual Less Technical Specifications

# Specifications and Bid Documents

## JUDY RESERVOIR TO MOUNT VERNON TRANSMISSION PIPELINE – PHASE 2

Project # 3549

C.O. #4385

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### CERTIFICATION

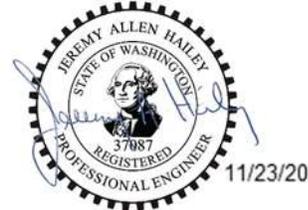
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These specifications and design drawings for the Judy Reservoir to Mount Vernon Transmission Pipeline – Phase II have been prepared under the direction of the following Registered Professional Engineer.

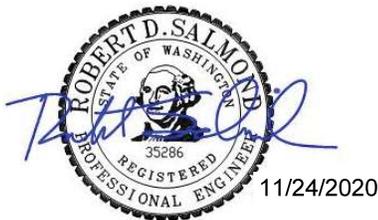
Civil/Pipeline



Corrosion



Electrical/Instrumentations & Controls



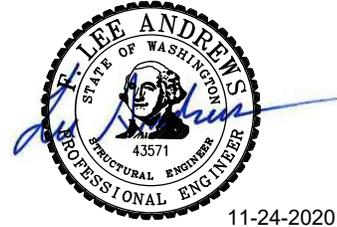
Traffic Control



Civil Roads



Structural



I hereby certify that the Project Plans and Specifications were prepared by me or under my direct supervision and that I am a duly registered Engineer under the laws of the State of Washington.

# Specifications and Bid Documents

## JUDY RESERVOIR TO MOUNT VERNON TRANSMISSION PIPELINE – PHASE 2

Project # 3549

C.O. # 4385

---

### CERTIFICATION

---

These specifications and design drawings for the Judy Reservoir to Mount Vernon Transmission Pipeline – Phase II have been prepared under the direction of the following Registered Professional Engineer.



Kimberlie Staheli, P.E.  
Horizontal Directional Drilling Design Engineer  
Specification Section 02350

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(note: update Section 2.3.C on 01601-3)

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# **INVITATION TO BID**

## INVITATION TO BID

Notice is hereby given that Public Utility District No. 1 of Skagit County (District) will receive sealed Bids for the **Judy Reservoir to Mount Vernon Transmission Pipeline – Phase II**. Each bid shall be placed in a sealed envelope and shall be mailed or delivered to the District office, 1415 Freeway Drive, Mount Vernon, Washington 98273, to arrive no later than 10:00 AM, January 12, 2021. In person meetings are suspended; therefore, the bid opening will be held virtually through ZOOM Cloud Meetings no sooner than 10:01 AM on January 12, 2021. The web link, meeting ID, and passcode listed below, are also posted on the District’s website at [www.SkagitPUD.org](http://www.SkagitPUD.org).

Join Zoom Meeting – Bid Opening – Judy Reservoir to Mount Vernon Transmission Pipeline, Phase II

<https://skagitpud.zoom.us/j/83558679048?pwd=b05zTE0rTC8yeVZ3Y251bGN0OWNEdz09>

Meeting ID: 835 5867 9048

Passcode: 205464

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Passcode: 205464

Find your local number: <https://skagitpud.zoom.us/u/kdupA5Uhb>

### **Judy Reservoir to Mount Vernon Transmission Pipeline – Phase II.**

1. Installation of water transmission and distribution piping and services within right-of-way and private property within the city of Mount Vernon and unincorporated Skagit County.
2. The water transmission pipeline is 36 inches in diameter and is approximately 5.3 miles long.
3. The Work will consist of the following elements:
  - a. Layout and staking of all features under this Contract.
  - b. Clearing and grubbing of the corridor.
  - c. Mobilization and preparation of site and supporting utilities for Contactor and District field office facilities. Includes removal of facilities and restoration of property.
  - d. Removal of structures.
  - e. Installation, maintenance, and removal of temporary erosion control measures.
  - f. Installation and removal of temporary bypass systems for streams.
  - g. Potholing of existing utilities.
  - h. Installation and maintenance of temporary traffic control measures.
  - i. Installation of approximately 5.3 miles of 36-inch-diameter water transmission pipeline.  
Of the approximately 5.3 miles of water transmission pipeline:

- 1) Approximately 25,892 linear feet of 36-inch-diameter welded steel pipe and fittings (cement mortar lined and polyurethane coated) installed by open trench construction.
  - 2) Approximately 1,899 linear feet of 36-inch-diameter welded steel pipe (polyurethane lined and coated) installed by horizontal directional drilling under the Nookachamps Creek.
  - 3) Approximately 230 linear feet of 36-inch-diameter welded steel pipe and fittings (cement mortar lined and polyurethane coated) installed under the bridge for the East Fork Nookachamps Creek crossing.
  - 4) Approximately 140 linear feet of 36-inch-diameter welded steel pipe (cement mortar lined and polyurethane coated) installed within a 48-inch-diameter steel casing installed by bored and jacked casing methods under State Route 9.
- j. Design and installation of dewatering and treatment systems to allow open trenching and pipe installation.
  - k. Handling of surface water.
  - l. Special crossings of roadways including two bored and jacked cased crossings of State Route (SR) 9 and phased open cut crossing of SR 538.
  - m. Special crossing of Stream A involving a temporary stream bypass, the installation of a fish passable precast concrete box culvert.
  - n. Special crossing of Clear Lake Tributary involving a stream bypass and open trench construction.
  - o. Special crossing of the East Fork Nookachamps Creek constructing a new approximately 220 lineal feet long single span steel truss bridge.
  - p. Tapping into finished water line, installation of two (2) 36-inch-diameter flow meters in vaults and associated electrical and SCADA at the Judy Reservoir Water Treatment Plant.
  - q. Installation of a 4-inch-diameter fiber optic conduit and handholes for the entire alignment of the 36-inch-diameter water transmission pipeline, including an approximate 1,930-foot-long HDD of the Nookachamps Creek.
  - r. Installation of new water distribution lines and pressure reducing valve stations.
  - s. Repair or replacement of existing water services.
  - t. Preparation for connections to the District's existing water distribution lines and services along the alignment.
  - u. Installation of pipeline appurtenances, including isolation valves, air valves, drains, manway access, anchor blocks, trench plugs, and drainpipes.
  - v. Installation of cathodic protection system with rectifier and deep well anode bed.
  - w. Flushing, disinfection, and pressure testing.
  - x. Protection of existing utilities.
  - y. Protection of existing 24-inch-diameter water transmission pipeline during construction.
  - z. Abandonment of existing 24-inch-diameter water transmission pipeline.
  - aa. Pavement restoration.
  - bb. Construction of approximately 2.3 miles of Service Road along pipeline including grading and installation of storm culverts and drain piping.
  - cc. Restoration of streams and riparian vegetation.
  - dd. Wetland restoration including plantings.
  - ee. Property restoration of various impacted parcels including landscaping, fence replacement, landscape gravity block wall construction, and asphalt/concrete surfacing.
  - ff. Watering and maintenance of the planting and other vegetation during the Warranty Period.

The location of the proposed work is shown on the project plans.

A Pre-Bid Meeting will be held at 10:30 AM on Tuesday, December 8, 2020. In person meetings are suspended; therefore, the meeting will be held virtually through ZOOM Cloud Meetings. The web link, meeting ID, and passcode listed below, are also posted on the District's website at [www.SkagitPUD.org](http://www.SkagitPUD.org).

Join Zoom Meeting – Pre-Bid Meeting – Judy Reservoir to Mount Vernon Transmission Pipeline, Ph. II

<https://skagitpud.zoom.us/j/87553915765?pwd=Q0tER1d3YkJXUnhncVNwaVB4SnNzZz09>

Meeting ID: 875 5391 5765

Passcode: 728468

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Passcode: 728468

Find your local number: <https://skagitpud.zoom.us/u/kdfjq5WM32>

Bidders must meet the **Supplemental Bidder Responsibility Criteria** outlined in the Supplementary Instructions to Bidders, which includes specific experience requirements for the Bidder, Dewatering Contractor, Pipe Welding Contractor, Bridge Contractor, Horizontal Directional Drilling Contractor and Jack and Bore Contractor.

Public Utility District No. 1 of Skagit County retains the right to reject any and all bids.

Public Utility District No. 1 of Skagit County is an Equal Opportunity and Affirmative Action Employer. Disadvantaged Business Enterprises (Small, Minority and Women Owned Businesses) are encouraged to submit bids.

This project is partially funded through both the Washington State Public Works Board (PWB) program with state funds and the Washington State Drinking Water State Revolving Fund (DWSRF) Program with federal funds from the U.S. Environmental Protection Agency, as such, both federal and state contracting provisions apply, including but not limited to Buy America requirements.

All work performed on the project will be subject the higher wages for each labor classification between both the current Washington State Prevailing wage rates and the Federal Davis-Bacon wage rates.

General contractor and all sub-contractors must be licensed in the state of Washington and meet PWB and DWSRF requirements or provisions.

An unofficial bid set can be viewed on our website [www.SkagitPUD.org](http://www.SkagitPUD.org). Construction plans, specifications, addenda, and plan holders list for this project can be viewed or purchased on-line through Builders Exchange of Washington, Inc., at <http://www.bxwa.com>; 2607 Wetmore Avenue, Everett, WA 98201-2929, (425) 258-1303, Fax (425) 259-3832. Click on: “bxwa.com”; “Posted Projects”; “Public Works”; “PUD #1 of Skagit County” and “Projects Bidding”. *(Note: Bidders are encouraged to “Register as a Bidder” in order to receive automatic e-mail notification of future addenda and to be placed on the “Bidders List”. This service is provided **free of charge** to Prime Bidders, Subcontractors and Vendors bidding this project. Contact Builders Exchange of Washington at (425) 258-1303, should you require further assistance.)* Contract documents will be available on or after November 25, 2020.

Point of Contact: Catherine Price, Contract Coordinator (360) 848-4472

PUBLIC UTILITY DISTRICT NO. 1 OF SKAGIT COUNTY

  
[George Sidhu \(Nov 24, 2020 12:04 PST\)](#)

George Sidhu, P.E., General Manager

Published: November 25, 2020 and December 2, 2020 (Skagit Valley Herald)  
November 25, 2020 (Daily Journal of Commerce)

# **INSTRUCTIONS TO BIDDERS**

## INSTRUCTIONS TO BIDDERS

### 1.01 GENERAL

The Judy Reservoir to Mount Vernon Transmission Pipeline – Phase 2, consists of the following:

The Work consists of installation of water transmission piping along an existing easement and on the Owner's property, from City of Mount Vernon through unincorporated Skagit County to Skagit PUD's Judy Reservoir. The pipeline consists of 36-inch pipe approximately 5.3 miles long. Contractor shall clear the alignment of trees and vegetation within a 50 to 75 – foot wide corridor to allow construction access, stockpiling and staging during installation of the new water transmission line in estimated quantities identified in the Bid Proposal.

An unofficial bid set can be viewed on the District's website [www.SkagitPUD.org](http://www.SkagitPUD.org). Construction plans, specifications, addenda, and plan holders list for this project can be viewed or purchased on-line through Builders Exchange of Washington, Inc., at <http://www/bxwa.com>; 2607 Wetmore Avenue, Everett, WA 98201-2929, (425) 258-1303, Fax (425) 259-3832. Click on: "bxwa.com"; "Posted Projects"; "Public Works", "PUD #1 of Skagit County" and "Projects Bidding". (*Note: Bidders are encouraged to "Register as a Bidder" in order to receive automatic e-mail notification of future addenda and to be placed on the "Bidders List". This service is provided free of charge to Prime Bidders, Subcontractors and Vendors bidding this project. Contact Builders Exchange of Washington at (425) 258-1303, should you require further assistance.*) Addenda will be sent out to those who "Register as a Bidder" on Builders Exchange of Washington, Inc., at <http://www/bxwa.com>. Contract documents will be available on or after November 25, 2020.

This project is partly financed through both the Washington State Drinking Water State Revolving Fund (DWSRF) through the U.S. Environmental Protection Agency along with the Washington State Public Works Board (PWB). DWSRF and PWB requirements and provisions must be met by general contractors and all subcontractors.

### 1.02 STATE & FEDERAL FUNDING REQUIREMENTS

See Specification Section 00950 for State and Federal Funding Requirements.

### 2.01 LOCATION

The location for the project is Skagit County ROW, Skagit County Roads, Skagit PUD Easements and City of Mount Vernon within the County of Skagit, State of Washington as shown on the Contract Drawings.

### 3.01 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE

Bidders shall satisfy themselves as to construction conditions by personal examination of the Plans, Specifications, other Bid Documents, and from attendance at applicable Pre-Bid Meetings. Bidders shall carefully correlate their observations with the requirements of the Contract Documents, and shall otherwise satisfy themselves regarding the expense and difficulties associated with performing the Work, and shall fully account for it in their bids. The submission of a bid shall constitute a representation of compliance by the Bidder with this requirement.

### 3.03 BID DOCUMENTS

The Bid Documents for the Project include the following:  
Project Manual including general and technical specifications.  
Washington State Department of Transportation Standard Specifications (2020 Edition)  
Contract Drawings.  
Skagit PUD Design Standards and Details.  
WSDOT Standard Plans for Road, Bridge and Municipal Construction

### 4.01 BIDS

The project will be awarded based on the lowest responsive responsible Bidder. Bids shall be made on the forms included herewith and shall be addressed to the Public Utility District No. 1 of Skagit County, 1415 Freeway Drive, Mount Vernon, Washington 98273. Each Bid shall be placed in a sealed envelope and shall be mailed or delivered to the Public Utility District No. 1 of Skagit County, to arrive no later than 10:00 AM on January 12, 2021. In person meetings are suspended; therefore, the bid opening will be held virtually through ZOOM Cloud Meetings no sooner than 10:01 AM on January 12, 2021. No Bid may be withdrawn after the time set for the Bid opening or before award and execution of the contract unless the Owner does not award the contract within sixty (60) calendar days after the opening of Bids. The web link, meeting ID, and passcode listed below, are also posted on the District's website at [www.SkagitPUD.org](http://www.SkagitPUD.org)

Join Zoom Meeting – Bid Opening – Judy Reservoir to Mount Vernon Transmission Pipeline, Ph. II

<https://skagitpud.zoom.us/j/83558679048?pwd=b05zTE0rTC8yeVZ3Y251bGN0OWNEdz09>

Meeting ID: 835 5867 9048

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Find your local number: <https://skagitpud.zoom.us/j/83558679048?pwd=b05zTE0rTC8yeVZ3Y251bGN0OWNEdz09>

### 5.01 BID DEPOSIT

As a guarantee of good faith and as required by law, each Bid shall be accompanied by a Bid Deposit in the form of certified check, cashier's check, postal money order, or surety bond payable to the order of the "Public Utility District No. 1 of Skagit County" for an amount not less than 5 percent of the total amount of the Bid, including all potential additions and alternatives, but not including sales tax. If a surety bond is to be used as the bid deposit, the document included with the bid submission must have original

signatures. The Bid Deposits of the three lowest Bidders will be retained until the Contract between the successful Bidder and the Owner have been entered into and a Performance and Payment Bond in an amount of one-hundred percent (100%) of the contract price has been filed as required under these Contract Documents. The Bid Deposits of each other Bidder will be returned as soon as it is determined that they are not one of the three lowest Bidders.

## 5.02 ESCROW BID DOCUMENTS

Within 24 hours after the time of the Bid opening, the three low Bidders shall submit one copy of all documentary information generated in preparation of Bid prices for this Project. This material is hereinafter referred to as "Escrow Bid Documents" (EBD). The EBD of the Successful Bidder will be held in escrow for the duration of the Contract; refer to Supplementary Conditions for further information.

Timely submission of complete EBD is an essential element of the Bidder's responsibility and a prerequisite to Contract award. Failure to provide the necessary EBD is cause for the Owner to reject the Bid.

Bidders may submit EBD in their usual cost-estimating format. It is not the intention of this provision to cause the Bidder extra work during the preparation of the proposal, but to ensure EBD will be adequate to enable complete understanding and proper interpretation for their intended use. The EBD shall be in the language (e.g., English) of the Specifications.

EBD shall clearly itemize the estimated costs of performing the Work to allow a detailed cost review. EBD shall include all quantity takeoffs, crew, equipment, calculations of rates of production and progress, copies of quotations from Subcontractors and Suppliers, and memoranda, narratives, consultant's reports, add/deduct sheets, and all other information used by the Bidder to arrive at the prices contained in the Bid Form. Estimated costs should be broken down into the Bidder's usual estimate categories such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent materials, and subcontract costs as appropriate. Materials, equipment, and indirect costs should be detailed in the Bidder's usual format. Bidder's allocation of material, equipment, indirect costs, contingencies, markup, and other items to each Bid item shall be included. All costs shall be identified. For Bid items amounting to less than \$10,000, estimated unit costs are acceptable without a detailed cost estimate, providing labor, equipment, materials, and subcontracts, as applicable, are included and provided indirect costs, contingencies, and markup, as applicable, are allocated.

EBD shall be submitted in a sealed container. The container shall be clearly marked on the outside with the Bidder's name, date of submittal, Project name, and the words "Escrow Bid Documents."

EBD shall be accompanied by an Escrow Bid Document Certificate; signed by an individual authorized by Bidder to execute the Bid Form, stating material in the EBD constitutes all the documentary information used in the preparation of Bid and that the signatory has personally examined the contents of the container and has found the documents are complete. The Successful Bidder agrees, as a condition of the award of the Contract, the EBD constitutes all of the information used in preparation of its Bid, and that no other Bid preparation information shall be considered in resolving disputes.

Bid documents provided by the Owner should not be included in the EBD, unless needed to comply with the requirements of this Specification.

Prior to award, EBD of the apparent Successful Bidder will be examined, organized, and inventoried by representatives of the Owner, together with members of the Bidder's staff who are knowledgeable in how the Bid was prepared. This examination is to ensure the EBD are authentic, legible, and complete. It will not include review of, and will not constitute approval of, proposed construction methods, estimating assumptions, or interpretations of Contract Documents. Examination will not alter any condition(s) or term(s) of the Contract. EBD will not be used for pre-award evaluation of Bidder's anticipated methods of construction or to assess Bidder's qualifications for performing the Work. If all the documentation required herein has not been included in the original submission, additional documentation shall be submitted, at the Owner's discretion, prior to award of the Contract. The detailed breakdown of estimated costs shall be reconciled and revised, if appropriate, by agreement between the Bidder and Owner before making the award.

If Contract is not awarded to the apparent Successful Bidder, the EBD of the next Bidder to be considered for award shall be processed as described herein. Following award of the Contract, EBD submitted by unsuccessful Bidders will be returned unopened, unless opened as provided above.

If Bidder's proposal is based on subcontracting any part of the Work, each Subcontractor, whose total subcontract price exceeds 5 percent of the Total Contract Price proposed by the Bidder, shall provide EBD to be included with those of the Bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent Successful Bidder.

#### 6.01 EVALUATION OF BIDS AND AWARD OF CONTRACT

The Owner will award the Bid to the lowest responsive, responsible Bidder based on the Total Bid Amounts for Schedule "A" only or combined Schedules "A and B" including sales tax as stated on the Bid Proposal Form. In the case of a conflict between the Total Bid Amount as stated numerically and as stated in words, the words shall take precedence.

In the case of a conflict between the quantity, unit price and unit price extension for a given bid item, the Owner will make adjustments to the unit price extensions based on the unit price. If the Bidder does not provide a unit price or a unit price extension for every bid item, the bid will be considered non-responsive.

The right is reserved by the Owner to waive any and all informality in the Bids, to reject any or all Bids, including nonresponsive, unbalanced, or conditional bids, to reject any or all schedules, to re-advertise for new Bids, or to otherwise carry out the Work. The Owner reserves the right to reject any bid that is materially unbalanced to the Owner's potential detriment. The Owner further reserves the right to delete portions of the Work.

Bids which are incomplete, or which are conditioned in any way, or which contain erasures, alterations, or items not called for in the Bid Form, or which are not in conformity with the law or these Instructions, may be rejected as non-responsive

#### 6.02 RESPONSIBILITY CRITERIA

Before the Owner awards the contract, state law is used to determine that responsible contractors and subcontractors perform the work. Bidder responsibility is determined by the Bidder successfully demonstrating its ability to satisfy the mandatory responsibility criteria and any project specific criteria established by the Owner.

To comply with the responsibility criteria for this bid, a Bidder must provide sufficient information as required. If the Bidder fails to provide the requested information within the time and manner specified in these bid documents, the Owner reserves the option to determine responsibility upon any available information related to any supplemental criteria and/or may find the Bidder not responsible. If the lowest Bidder is found not responsible, the Owner reserves the right to award to the next low Bidder without re-advertising or rebidding the project.

### 6.03 MANDATORY RESPONSIBILITY CRITERIA

It is the intent of Owner to award a contract to the low responsible bidder. Before award, the bidder must meet the following Bidder responsibility criteria to be considered a responsible bidder. The Bidder may be required by the Owner to submit documentation demonstrating compliance with the criteria. The Bidder must:

1. Have a current certificate of registration as a contractor in compliance with chapter 18.27 RCW, which must have been in effect at the time of bid submittal;
2. Have a current Washington Unified Business Identifier (UBI) number;
3. If applicable:
  - a) Have Industrial Insurance (workers' compensation) coverage for the bidder's employees working in Washington, as required in Title 51 RCW;
  - b) Have a Washington Employment Security Department number, as required in Title 50 RCW;
  - c) Have a Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW;
4. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
5. Until December 31, 2013, not have violated more than one time the off-site, prefabricated, non-standard, project specific items reporting requirements of RCW 39.04.370.
6. For public works projects subject to the apprenticeship utilization requirements of RCW 3.0.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ratio, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under chapter 49.04 RCW for the one-year period immediately preceding the first date of advertising for the project.
7. Prior to the award date, the Contractor shall produce evidence of having received by the Department of Labor & Industries training on prevailing wage and public works requirements or are exempt under RCW 39.04.350
8. Satisfy the State & Federal Funding Provisions for Sub-Contracts as described in section 00950 – STATE AND FEDERAL FUNDING REQUIREMENTS.

#### 6.04 SUBCONTRACTOR RESPONSIBILITY CRITERIA

Before award, the Bidder shall verify responsibility criteria for each first tier subcontractor the Contractor hires and a subcontractor of any tier subcontractor that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Verification shall occur at the time of subcontract execution and shall include that each subcontractor meets the responsibility criteria listed in Section 6.03 and possesses an electrical contractor license (if required by RCW Chapter 19.28) or an elevator contractor license (if required by RCW Chapter 70.87). These verification requirements, as well as the responsibility criteria, shall be included in each of the Contractor's subcontracts of any tier. The Contractor shall certify that this verification is complete prior to contract close-out.

#### 6.05 SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA

In addition to the Mandatory and Subcontractor Responsibility Criteria, the Bidder must also meet the Supplemental Bidder Responsibility Criteria as outlined in the Section entitled Supplementary Instructions to Bidders.

#### 6.05 PROTESTS

Any Bidders wanting to file a bid protest shall submit a formal protest consisting of a written letter signed by an authorized official of the company within 48 hours of the bid opening. The protest will be reviewed by the Owner and if warranted, a meeting will be held with the Owner, the low Bidder and the Bidder filing the protest within 4 Calendar days to review the protest. A decision on the protest will be made by the Owner within 7 Calendar days.

#### 6.06 CONTRACT TIME

The Contract completion date is an essential part of the Contract, and it will be necessary for each Bidder to satisfy the Owner of its ability to complete the Work within the time allowed. Bidders shall base their bids on utilizing the full Contract Time of 730 consecutive Calendar Days for the Work, as specified.

#### 7.01 FAILURE TO EXECUTE CONTRACT AND FURNISH BOND

In the event the successful Bidder fails to furnish a Payment and Performance Bond complying with this Invitation for Bids, and fails to sign the contract within ten (10) calendar days after notification by the Owner, an amount equal to 5 percent of the amount of the Bid shall be forfeited to the Owner as liquidated damages, and it is agreed that this said sum is a fair estimate of the amount of damages the Owner would sustain in the event that the Bidder failed to enter into the Contract or furnish the required Bond. Said liquidated damages shall be paid from the Bid Deposit submitted with the Bid. Other Bids will then be reconsidered for award by the Owner.

#### 8.01 CORRECTIONS, INTERPRETATIONS, AND ADDENDA

If Bidders find or observe any omissions, discrepancies, or need for interpretations of the Bid Documents, they shall bring such facts in writing to the attention of the Owner. Written addenda to clarify questions which arise will then be issued. Interpretations or explanations of the Contract Documents will be in the form of written addenda only. Oral statements by the Owner, Engineer, or other representative of the Owner whether made before or after award of the Contract shall in no way modify the Contract Documents.

Any requests for information or interpretation of the Bid Documents shall be made by phone or email to Catherine Price, Contract Coordinator at (360) 424-7104 or price@skagitpub.org. All such requests shall be received no later than three (3) days prior to Bid opening.

#### 10.01 SUBCONTRACTORS & SUPPLIERS

In compliance with RCW 39.30.060 for all projects estimated to cost \$1 million or more, all Bidders must complete and submit the Subcontractors List form provided in the Bid Proposal Forms. The Subcontractors List form must be submitted with the Bid. The failure of a Bidder to submit the names of such subcontractors, or to name itself to perform such work, or the naming of two or more firms (subcontractors or Bidders) to perform the same work shall render the Bidder's bid non-responsive and, therefore, void.

#### 11.01 BIDDER QUALIFICATIONS

It is the intent of District to award a contract to the lowest responsive and responsible Bidder. Before award, the Bidder must also meet the Required Supplemental Bidder Responsibility Criteria listed herein. Further, the apparent low Bidder must submit the Required Bidder's Supplemental Responsibility Statement and any other documentation listed below by 4:30 PM the day of the bid opening, unless the District, in writing, allows additional time. The District reserves the right to require such documentation from other bidders also.

The Owner will utilize the information submitted for the purpose of determining the responsibility of the low Bidder for determining eligibility for award.

#### 12.01 PERMITS

The Owner has obtained or will obtain the permits and approvals required for the Work as listed below. The Contractor shall comply with the provisions of all permits, approvals and easements. All other required permits or licenses shall be the responsibility of the Contractor. Below is a list of the Owner-obtained permits and approvals, which are included for reference in Appendix A.

##### Environmental

- State Environmental Policy Act (SEPA) Determination of Non-significance
- Army Corps of Engineers Nationwide Permit
- Washington State Dept. of Ecology Section 401 Water Quality Certification
- Washington State Dept. of Ecology NPDES Construction Stormwater General Permit
- Washington State Department of Fish and Wildlife Hydraulic Project Approval
- Skagit County Shoreline Substantial Development Permit
- Skagit County Floodplain Development Permit
- City of Mount Vernon Critical Area Permit

##### Access

- Washington State Dept. of Transportation – Utility Franchise Amendment SR-9 MP51.21-2.79
- Washington State Dept. of Transportation – Utility Franchise Amendment SR-9 MP51.00
- Washington State Dept. of Transportation – Construction Access SR-9 & 538 MP2.75-2.79
- City of Mount Vernon Right of Way Permit
- Skagit County Right of Way Permit
- Skagit County Trail Permit

##### Other

Skagit County Administrative Special Use Permit  
Skagit County Clearing & Grading Permit  
Skagit County Building Permit – E. Fork Nookachamps Bridge  
Skagit County Building Permit – Temp Office(s) on Lundvall Property

Should the Contractor procure additional formal or informal access easements, rights of entry, Work or storage areas, or enter private property, he/she shall obtain and file all such private property agreements with the Owner prior to such access. The Contractor shall provide to the Owner property release forms for all Work or access on private property.

### 13.01 PRE-BID MEETING

A Pre-Bid Meeting will be held at 10:30 AM on Tuesday, December 8, 2020. In person meetings are suspended; therefore, the meeting will be held virtually through ZOOM Cloud Meetings. The web link, meeting ID, and passcode listed below, are also posted on the District's website at [www.SkagitPUD.org](http://www.SkagitPUD.org).

Join Zoom Meeting – Pre-Bid Meeting – Judy Reservoir to Mount Vernon Transmission Pipeline, Ph. II

<https://skagitpud.zoom.us/j/87553915765?pwd=Q0tER1d3YkJXUnhncVNwaVB4SnNzZz09>

Meeting ID: 875 5391 5765

Passcode: 728468

One tap mobile

+12532158782,,87553915765#,,,,,0#,,728468# US (Tacoma)

+16699006833,,87553915765#,,,,,0#,,728468# US (San Jose)

Dial by your location

+1 253 215 8782 US (Tacoma)

+1 669 900 6833 US (San Jose)

+1 346 248 7799 US (Houston)

+1 929 205 6099 US (New York)

+1 301 715 8592 US (Germantown)

+1 312 626 6799 US (Chicago)

Meeting ID: 875 5391 5765

Passcode: 728468

Find your local number: <https://skagitpud.zoom.us/u/kdfjq5WM32>

## Mandatory Bidder Responsibility Checklist

The following checklist may be used by Owners in documenting that a Bidder meets the mandatory bidder responsibility criteria. It is suggested that Owners print a copy of documentation from the appropriate website to include with this checklist in the contract file.

<b>General Information</b>	
Project Name:	Project Number:
Bidder's Business Name:	Bid Submittal Deadline:
<b>Contractor Registration –</b> <a href="https://fortress.wa.gov/lni/bbip/">https://fortress.wa.gov/lni/bbip/</a>	
License Number:	Status: Active: Yes <input type="checkbox"/> No <input type="checkbox"/>
Effective Date (must be effective on or before Bid Submittal Deadline):	Expiration Date:
Is Bidder on Infraction List?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Current UBI Number –</b> <a href="http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/">http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/</a>	
UBI Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
<b>Industrial Insurance Coverage –</b> <a href="https://fortress.wa.gov/lni/crpsi/MainMenu.aspx">https://fortress.wa.gov/lni/crpsi/MainMenu.aspx</a>	
Account Number:	Account Current: Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Employment Security Department Number –</b>	
Employment Security Department Number:	
• Has Bidder provided account number on the Bid Form?	Yes <input type="checkbox"/> No <input type="checkbox"/>
• And/or have you asked the Bidder for documentation from Employment Security Department on account number?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>State Excise Tax Registration Number –</b> <a href="http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/">http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/</a>	
Tax Registration Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
<b>Not Disqualified from Bidding –</b> <a href="http://www.lni.wa.gov/TradesLicensing/PrevWage/AwardingAgencies/DebarredContractors/default.asp">http://www.lni.wa.gov/TradesLicensing/PrevWage/AwardingAgencies/DebarredContractors/default.asp</a>	
Is the Bidder listed on the "Contractors Not Allowed to Bid" list of the Department of Labor and Industries?	
Yes <input type="checkbox"/> No <input type="checkbox"/>	
<b>Checked by:</b>	
Name of Employee:	Date:

## Subcontractor Responsibility Checklist

The following checklist may be used by Contractors and Subcontractors in documenting that a subcontractor of any tier meets the subcontractor responsibility criteria. It is suggested that Contractors and Subcontractors print a copy of documentation from the appropriate website to include with this checklist in their contract file.

<b>General Information</b>	
Project Name:	Project Number:
Subcontractor's Business Name:	Subcontract Execution Date:
<b>Contractor Registration –</b> <a href="https://fortress.wa.gov/lni/bbip/">https://fortress.wa.gov/lni/bbip/</a>	
License Number:	Status: Active: Yes <input type="checkbox"/> No <input type="checkbox"/>
Effective Date (must be effective on or before Subcontract Bid Submittal Deadline):	Expiration Date:
<b>Current UBI Number –</b> <a href="http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/">http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/</a>	
UBI Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
<b>Industrial Insurance Coverage –</b> <a href="https://fortress.wa.gov/lni/crpsi/MainMenu.aspx">https://fortress.wa.gov/lni/crpsi/MainMenu.aspx</a>	
Account Number:	Account Current: Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Employment Security Department Number –</b>	
Employment Security Department Number:	
<ul style="list-style-type: none"> <li>• Has Subcontractor provided account number on the Bid Form? Yes <input type="checkbox"/> No <input type="checkbox"/></li> <li>• And/or have you asked the Subcontractor for documentation from Employment Security Department on account number? Yes <input type="checkbox"/> No <input type="checkbox"/></li> </ul>	
<b>State Excise Tax Registration Number –</b> <a href="http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/">http://dor.wa.gov/content/doingbusiness/registermybusiness/brd/</a>	
Tax Registration Number:	Account Closed: Open <input type="checkbox"/> Closed <input type="checkbox"/>
<b>Not Disqualified from Bidding –</b> <a href="http://www.lni.wa.gov/TradesLicensing/PrevWage/AwardingAgencies/DebarredContractors/default.asp">http://www.lni.wa.gov/TradesLicensing/PrevWage/AwardingAgencies/DebarredContractors/default.asp</a>	
Is the Subcontractor listed on the "Contractors Not Allowed to Bid" list of the Department of Labor and Industries? Yes <input type="checkbox"/> No <input type="checkbox"/>	
<b>Contractor Licenses –</b> <a href="https://fortress.wa.gov/lni/bbip/">https://fortress.wa.gov/lni/bbip/</a>	
<u>Electrical:</u> If required by Chapter 19.28 RCW, does the Subcontractor have an Electrical Contractor's License? Yes <input type="checkbox"/> No <input type="checkbox"/>	<u>Elevator:</u> If required by Chapter 70.87 RCW, does the Subcontractor have an Elevator Contractor's License? Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Checked by:</b>	
Name of Employee:	Date:

END OF SECTION

# **SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

## REQUIRED SUPPLEMENTARY BIDDER RESPONSIBILITY CRITERIA

### 1.01 GENERAL

- A. It is the intent of District to award a contract to the lowest responsive and responsible Bidder. Before award, the Bidder must also meet the Required Supplemental Bidder Responsibility Criteria listed herein. **Further, the apparent low Bidder must submit the Required Bidder's Supplemental Responsibility Statement (following this Section) and any other documentation listed below within 48 hours of bid opening, unless the District, in writing, allows additional time.** The District reserves the right to require such documentation from other bidders also.

### 1.02 REQUIRED SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA

#### A. Experience

1. **General Contractor & Prime Bidder:** Within ten (10) years prior to Bid opening, the Prime Contractor must have completed at least three (3) projects that included the installation of a coated and lined welded steel pipeline with a minimum diameter of 24-inches and a minimum length of 1,000 feet or at least (3) projects that included the installation of a steel bridge with a single span of a minimum of 150 feet and H20 loading.

The Prime Contractor may be the same entity as the pipeline contractor and/or the bridge contractor.

2. **General Contractor & Prime Bidder's Project Manager:** Within ten (10) years prior to Bid opening, the General Contractor & Prime Bidder's Project Manager for the Project must have completed at least three (3) projects as the project manager or project superintendent. Each of these projects must have included the installation of a welded steel pipeline with a minimum diameter of 24-inches and a minimum length of 1,000 feet or at least (3) projects that included the installation of a steel bridge with a single span of a minimum of 150 feet.
3. **Prime Contractor's Project Manager:** Within ten (10) years prior to Bid opening, the Prime Contractor's Project Manager for the Project must have completed at least three (3) projects as the project manager or project superintendent. Each of these projects must have included the installation of a welded steel pipeline with a minimum diameter of 24-inches and a minimum length of 1,000 feet or at least (3) projects that included the installation of a steel bridge with a single span of a minimum of 150 feet and H20 loading.
4. **Prime Contractor's Project Superintendent:** Within ten (10) years prior to Bid opening, the Prime Contractor's project superintendent for the Project must have completed at least three (3) projects as the project manager or project superintendent. Each of these projects must have included the installation of a welded steel pipeline with a minimum diameter of 24-inches and a minimum length of 1,000 feet or at least (3) projects that included the installation of a steel bridge with a single span of a minimum of

150 feet. The Bidder's project manager and project superintendent cannot be the same individual.

5. **Bridge Contractor/Subcontractor:** Within ten (10) years prior to Bid opening, the bridge contractor must have completed at least (3) projects that included the installation of a steel bridge with a single span of a minimum of 150 feet.
6. **Bridge Project Manager:** Within ten (10) years prior to Bid opening, the bridge contractor's project manager for the project must have completed at least three (3) projects as the project manager or project superintendent. Each of these projects must have included the installation of at least (3) projects that included the installation of a steel bridge with a single span of a minimum of 150 feet.
7. **Bridge Project Superintendent:** Within ten (10) years prior to Bid opening, the bridge contractor's superintendent for the project must have completed at least three (3) projects as the project manager or project superintendent. Each of these projects must have included the installation of at least (3) projects that included the installation of a steel bridge with a single span of a minimum of 150 feet.
8. **Horizontal Directional Drill Contractor:** Within ten (10) years prior to Bid opening, the Horizontal Directional Drilling Contractor must have completed at least five (5) projects that each included a minimum length of 1,000 LF and a minimum diameter of 30-inches and at least one (1) of the five (5) projects with a minimum diameter of 36-inches.
9. **Horizontal Directional Drill Project Manager:** Within ten (10) years prior to Bid opening, the Horizontal Directional Drilling Contractor must have completed at least five (5) projects that each included a minimum length of 1,000 LF and a minimum diameter of 30-inches and at least one (1) of the five (5) projects with a minimum diameter of 36- inches.
10. **Horizontal Directional Drill Operator:** Within five (5) years prior to Bid opening, the Horizontal Directional Drilling Operator must have completed at least three (3) projects operating drilling rigs of the size and capacity proposed on the project. In addition, the operator must meet the additional qualifications as stated in section 02350, 1.4 Quality Assurance.
11. **Horizontal Directional Drill Steering Technician:** The Horizontal Directional Drilling Steering Technician must have a minimum of two (2) year experience operating locating systems for HDD installations with the equipment proposed for use on this project.

Also within five (5) years prior to Bid opening, the Horizontal Directional Drilling Steering Technician must have completed at least five (5) projects as steering technician for installation lengths of 1200 feet or greater as stated in section 02350, 1.4 Quality Assurance

12. **Horizontal Directional Drill Mud Technician:** Within five (5) years prior to Bid opening, the Horizontal Directional Drilling Mud Technician must have operated

soil separation plans for HDD rigs on at least three (3) HDD installations of the size and capacity proposed on the project as stated in section 02350, 1.4 Quality Assurance.

13. **Jack and Bore Contractor:** Within ten (10) years prior to Bid opening, the Jack and Bore Contractor must have completed at least three (3) projects that each included a minimum length of 50 LF and a minimum diameter of 30-inches and at least one (1) of the three (3) projects with a minimum diameter of 48-inches.
14. **Dewatering Contractor:** Within ten (10) years prior to Bid opening, Bidder must have completed at least three (3) projects that included the continuous dewatering of both surface and groundwater for a min. project length of 500 lineal feet at a depth of 14 feet below existing grade.
15. **Pipe Welding Contractor:** Within ten (10) years prior to Bid opening, the pipe welding contractor must have completed at least five (5) projects that included the installation of a welded steel pipeline with a minimum diameter of 24-inches and a minimum length of 1,000 feet.
16. **Documentation:** The Bidder shall submit the Bidder's Supplemental Responsibility Statement as provided in the following section. The District may also use independent sources of information that may be available to demonstrate whether the Bidder is in compliance with these criteria.
17. **Evaluation:** In evaluating whether these criteria are met, the District may check references for the previous projects and may evaluate the project owner's assessment of the Bidder's performance, including but not limited to the following areas:
  - a. Quality control;
  - b. Safety record;
  - c. Timeliness of performance;
  - d. Use of skilled personnel;
  - e. Management of subcontractors;
  - f. Availability of and use of appropriate equipment;
  - g. Compliance with contract documents;
  - h. Management of submittals process, change orders, and close-out.

### 1.03 PROCEDURE

#### A. Requests for Criteria Modification.

1. A Bidder may request that District modify the Supplemental Bidder Responsibility Criteria listed above. This request must be in writing to the District project manager and must be received by the District project manager at least **ten (10) business days** before the bid opening. The District project manager will evaluate the information submitted by the Bidder and will respond within three (3) business days after receipt of the request. If District evaluation results in a change of the criteria, the District will issue an addendum to the bid documents identifying the new or revised criteria and made available to all bidders.

B. Additional Information/Clarifications.

1. The District may require at any time that the Bidder submit information in addition to the Bidder's Supplemental Responsibility Statement in order to demonstrate compliance with the Supplemental Bidder Responsibility Criteria. The District may require at any time that the Bidder clarify or supplement the Bidder's Supplemental Responsibility Statement.

C. Appeal of Responsibility Decision.

1. If the District determines the Bidder does not meet the Supplemental Bidder Responsibility Criteria above and is therefore not a responsible bidder, the District will notify the Bidder in writing with the reasons for its determination. If the Bidder disagrees with this determination, the Bidder may appeal to the District's General Manager by presenting additional information in writing within one (1) business day after receipt of the District's determination. The District's General Manager will consider the additional information and will issue his decision regarding the appeal.

**END OF SECTION**

# **BID PROPOSAL FORMS**

## BID PROPOSAL FORM

### BIDDER'S CHECKLIST

This Checklist has been prepared and furnished to aid Bidders in including all necessary supporting information with their Bid. Bidder's submittals shall include, but not be limited to, the following:

ITEM	CHECKED
1. Bid to Commission	_____
2. Bid Schedule	_____
3. Proposal Signature, Addenda Acknowledgement and Non-Collusion Declaration Sheet	_____
4. Subcontractor List	_____
5. EPA 6100-4 DBE Sub-Contractor Utilization Form	_____
6. EPA 6100-3 DBE Sub-Contractor Performance Form	_____
7. Bidders List	_____
8. Bid Deposit	_____
9. Certification of Compliance with Wage Payment Statutes	_____
10. Certification of Non-Segregated Facilities	_____
11. American Iron & Steel Acknowledgement Form	_____

## **BID TO COMMISSION**

TO: Board of Commissioners  
Public Utility District No. 1 of Skagit County, Washington

Gentlemen:

The undersigned has examined the site, specifications, plans, laws and ordinances covering the improvements contemplated. In accordance with the terms, provisions and requirements of the foregoing, the following lump sums and unit prices are tendered as an offer to perform the Work and furnish the labor, tools, equipment, materials, appurtenances, incidentals, and guarantees, where required, complete in place, in good working order.

As a guarantee of good faith and as required by law, a Bid Deposit in the form of a certified check, cashier's check, postal money order or surety bond made payable to the order of Public Utility District No. 1 of Skagit County ("District") is attached hereto. The undersigned understands and hereby agrees that, should this offer be accepted and the undersigned fail or refuse to enter into a Contract, furnish the required Payment and Performance Bond and required liability insurance, the undersigned shall forfeit to the District an amount equal to five percent (5%) of the amount Bid as liquidated damages, all as provided for in this Invitation for Bids.

The undersigned hereby proposes to undertake and complete the work embraced in this improvement, in accordance with the terms of the Specifications and Contract Documents, at the following lump sum and unit prices:

**Judy Reservoir to Mount Vernon Transmission Pipeline – Phase II**

**BID SCHEDULE A – PUD TRANSMISSION PIPELINE**

<b>Item No.</b>	<b>Bid Schedule Description</b>	<b>Estimated Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
1	Mobilization	1	LS	\$	\$
2	Furnish, Install, Maintain and Remove Onsite Owner's Rep Office Trailer	1	LS	\$	\$
3	SPCC, TESC, Contractor's Safety Plan, Accident Prevention Plan and Site Specific Safety Plan	1	LS	\$	\$
4	Furnish Traffic Control Measures	1	LS	\$	\$
5	Furnish Traffic Control Labor	20,800	HRS	\$	\$
6	Furnish Traffic Control Supervisor (TCS)	520	DAYS	\$	\$
7	Erosion and Sediment Control Per SWPPP	1	LS	\$	\$
8	Maintain Erosion Control Measures Per SWPPP by ESC Lead	500	DAYS	\$	\$
9	Furnish, Install and Remove High Visibility/Silt Fence	45,467	LF	\$	\$
10	Wetland Pre and Post Construction Survey	1	LS	\$	\$
11	Survey Monument Restoration	12	EA	\$	\$
12	Furnish, Install and Remove Stabilized Construction Entrance	33	EA	\$	\$
13	Furnish, Install and Restore Construction Staging Area 1	1	LS	\$	\$
14	Furnish, Install and Restore Construction Staging Area 2	1	LS	\$	\$
15	Furnish, Install and Restore Construction Staging Area 3	1	LS	\$	\$
16	Furnish, Install and Restore Construction Staging Area 4	1	LS	\$	\$
17	Furnish, Install and Restore Construction Staging Area 5	1	LS	\$	\$
18	Furnish, Install and Restore Construction Staging Area 6	1	LS	\$	\$
19	Furnish, Install and Restore Construction Staging Area 7	1	LS	\$	\$
20	Furnish, Install and Restore Construction Staging Area 8	1	LS	\$	\$
21	Furnish, Install and Restore Construction Staging Area 9	1	LS	\$	\$
22	Furnish, install and Remove Optional Construction Area 1	1	LS	\$	\$

23	Furnish, install and Remove Optional Construction Area 2	1	LS	\$	\$
24	Furnish, install and Remove Optional Construction Area 3	1	LS	\$	\$
25	Clearing, Grubbing and Stripping within Designated Clearing Limits - Beginning of Project to Station 92+10	1	LS	\$	\$
26	Clearing, Grubbing and Stripping within Designated Clearing Limits - Station 110+10 to Station 115+60	1	LS	\$	\$
27	Clearing, Grubbing and Stripping within Designated Clearing Limits - Station 115+60 to Station 174+80	1	LS	\$	\$
28	Clearing, Grubbing and Stripping within Designated Clearing Limits - Station 174+80 to Station 213+20	1	LS	\$	\$
29	Clearing, Grubbing and Stripping within Designated Clearing Limits - Station 213+20 to Station 279+00	1	LS	\$	\$
30	Clearing, Grubbing and Stripping within Designated Clearing Limits - Station 279+00 to Station 339+20	1	LS	\$	\$
31	Clearing, Grubbing and Stripping within Designated Clearing Limits - Station 339+20 to 361+83	1	LS	\$	\$
32	Furnish and Install Adequate Site and Trench Safety Systems	26,230	LF	\$	\$
33	Furnish and Install Rigid Excavation Support System Station 293+40 to 294+60 and 313+72 to 314+20	1	LS	\$	\$
34	Furnish 36" Steel Pipe, 3/16" wall with lining and coating	7,919	LF	\$	\$
35	Furnish 36" Steel Pipe, 1/4" wall with lining and coating	16,290	LF	\$	\$
36	Furnish 36" Steel Pipe, 1/2" wall with lining and coating	60	LF		
37	Furnish 36" Steel Pipe, 3/8" wall with lining and coating	1,993	LF	\$	\$
38	Furnish 36" Steel Pipe, 3/4" wall with lining and coating	1,899	LF	\$	\$
39	Install 36" Steel Pipe (Cross Country)	21,645	LF	\$	\$
40	Install 36" Steel Pipe (Road Right-of-Way)	4,478	LF	\$	\$
41	Install HDD Crossing At Nookachamps Creek	1	LS	\$	\$
42	Install 36" (3/8" & 1/2" Wall) Steel Pipe (Seismic Provision Segments)	2,053	LF	\$	\$
43	Furnish and Install 30" Butterfly Valves	2	EA	\$	\$
44	Furnish and Install 36" Butterfly Valves & Dismantling Joints	19	EA	\$	\$

45	Furnish and Install Weld-O-Let on Existing 24-inch CCP TL for Water Source	5	EA	\$	\$
46	Slope Trench Drain System Station 278+00 to Station 286+50	850	LF	\$	\$
47	Engineer Ordered Over Excavation	2,660	CY		
48	Furnish and Install Trench Stabilization Material	4,000	TN	\$	\$
49	Rock Excavation	1,481	CY	\$	\$
50	Furnish and Place Controlled Low Strength Material	50	CY	\$	\$
51	Furnish and Install Trench Plugs	22	EA	\$	\$
52	Furnish and Install Trench Plugs with Drains	10	EA	\$	\$
53	Furnish & Install Seismic Resistant Harness Couplings 198+05, 201+75, 205+50, & 209+25	4	EA	\$	\$
54	Furnish Seismic Resistant Double Ball Joint Fittings Stations 212+93 and 213+53	2	EA	\$	\$
55	Dewatering System Station 88+60 to Station 92+80	1	LS	\$	\$
56	Dewatering System Station 110+10 to Station 110+80	1	LS	\$	\$
57	Dewatering System Station 207+00 to Station 279+20	1	LS	\$	\$
58	Furnish and Install Keyblock on 30" JRSW Pipeline	1	LS	\$	\$
59	Furnish and Install Tie-In #1 At Judy Reservoir	1	LS	\$	\$
60	Furnish and Install Tie-In #2 At Judy Reservoir	1	LS	\$	\$
61	Furnish and Install Tie-In #3 At Judy Reservoir	1	LS	\$	\$
62	Remove Segment, Tie-In and Cap 24" Transmission Pipeline - Station 82+38	1	LS	\$	\$
63	Isolate & Secure ex. 24-inch and 30-inch transmission pipelines at Judy Reservoir	1	LS	\$	\$
64	Furnish and Install 8" Distribution Line and Water Meter Connections Station 899+35.66 to Station 921+34 on Old Day Cr. Rd.	1	LS	\$	\$
65	Furnish and Install 8" Distribution Line on Timber lane	1	LS	\$	\$
66	Furnish and Install 8" Distribution Line Connection at Station 322+61	1	LS	\$	\$
67	Furnish and Install 8" Distribution Line and Water Meter Connections at Station 314+90 (Graber Lane)	1	LS	\$	\$
68	Furnish and Install 8" Distribution Line and Water Meter Connections at Station 305+92.25 (Merrifield Rd.)	1	LS	\$	\$

69	Furnish and Install Modifications to Distribution System and Valving at Station 296+39 (Wayward Wy)	1	LS	\$	\$
70	Furnish and Install 8" and 18" Distribution Piping and PRV stations in Beaver Lake Road	1	LS	\$	\$
71	Furnish and Install 8" distribution line on Austin Road	1	LS	\$	\$
72	Furnish and Install 2" Distribution Line and Service Connections from Station 173+60 to 197+00 (S. of SR-9)	1	LS	\$	\$
73	Furnish and install 8" and 2" distribution lines and service connections At Station 160+95 (E. of SR-9 – Sta. 800+00 to 805+52)	1	LS	\$	\$
74	Furnish and Install Culvert Crossing at Stream A	1	LS	\$	\$
75	Furnish and Install 18" Trenchless Crossing at SR 9	1	LS	\$	\$
76	Furnish and Install Bridge Structure and Piping	1	LS	\$	\$
77	Furnish & Install Bridge Piles	794	LF	\$	\$
78	Furnish, Install and Remove Preload at Bridge Approaches	1	LS	\$	\$
79	Furnish and Install Geogrid Stabilization Raft at Abutment No. 1	1	LS	\$	\$
80	Furnish and Install 48" Trenchless Crossing at SR 9	1	LS	\$	\$
81	Furnish and Install Open Cut Crossing at Clear Lake Tributary	1	LS	\$	\$
82	Furnish and Install Drain Assembly	21	EA	\$	\$
83	Furnish and Install 1" AVAR Assembly	3	EA	\$	\$
84	Furnish and Install 2" AVAR Assembly	13	EA	\$	\$
85	Furnish and Install 4" AVAR Assembly	34	EA	\$	\$
86	Furnish and Install Manway	16	EA	\$	\$
87	Furnish and Install Flowmeter Vaults	1	LS	\$	\$
88	Waterline Flushing, Pressure Testing, Disinfection and Bac-T testing	1	LS	\$	\$
89	Remove and Replace Culvert Pipe 12" and Smaller Diameter	248	LF	\$	\$
90	Remove and Replace Culvert Pipe 12" to 24" Diameter	81	LF	\$	\$
91	Remove and Replace 36" culvert	1	LS	\$	\$
92	Fine Grading and Filling - Station 500+80 to Station 568+00	1	LS	\$	\$
93	Fine Grading and Filling - Station 583+50 to Station 598+00	1	LS	\$	\$

94	Planing Bituminous Pavement	9,053	SY	\$	\$
95	Furnish, Place and Compact Hot Mix Asphalt Concrete for Final Patch and Driveway Restoration	482	TN	\$	\$
96	Furnish, Place, and Compact Hot Mix Asphalt Pavement Overlay	2,523	TN	\$	\$
97	Pavement Marking	7,854	LF	\$	\$
98	Furnish and Install Shoulder Ballast	291	TN	\$	\$
99	Driveway Restoration - CSTC	69	TN	\$	\$
100	Furnish and Install Landscaping and Restoration - Schulberg and Cann	1	LS	\$	\$
101	Furnish and Install Landscaping and Restoration - Johnson	1	LS	\$	\$
102	Furnish and Install Landscaping and Restoration - Cannon	1	LS	\$	\$
103	Furnish and Install Landscaping and Restoration - Thomson	1	LS	\$	\$
104	Furnish and Install, Temporary Access, Landscaping and Restoration - Seventh Day Adventist Church	1	LS	\$	\$
105	Furnish and Install Drainage Improvements - Lemley	1	LS	\$	\$
106	Landscape Restoration (All other Parcels)	1	LS	\$	\$
107	Furnish and Place Wetland Forest Mix	1	LS	\$	\$
108	Furnish and Place Shrub-Shrub Planting	1	LS	\$	\$
109	Furnish and Place Wetland Seed Mix 1	1	LS	\$	\$
110	Furnish and Place Wetland Seed Mix 2 (Pasture)	1	LS	\$	\$
111	Furnish and Place Upland Forest Mix 1	1	LS	\$	\$
112	Furnish and Place Upland Forest Mix with Erosion Cont. Matting	1	LS	\$	\$
113	Furnish and Place Upland Shrub Mix	1	LS	\$	\$
114	Furnish and Place Upland Shrub Mix w/ Erosion Cont. Matting	1	LS	\$	\$
115	Furnish and Place Upland Seed Mix	1	LS	\$	\$
116	Furnish and Place Pasture Seed Mix	1	LS	\$	\$
117	Furnish and Place Pasture Seed Mix with EC Matting	1	LS	\$	\$
118	Furnish and Place Sod Lawn Seed Mix	1	LS	\$	\$
119	Furnish and Install Fence Type A	5,044	LF	\$	\$
120	Furnish and Install Fence Type B	1,701	LF	\$	\$
121	Furnish and Install Fence Type C	280	LF	\$	\$
122	Furnish and Install Fence Type D	5,939	LF	\$	\$
123	Furnish and Install Fence Type E	206	LF	\$	\$

124	Furnish and Install Standard HD Gates	29	EA	\$	\$
125	Furnish and Install Fiber Optic Conduit	26,230	LF	\$	\$
126	Furnish and Install Fiber Optic Handhole	34	EA	\$	\$
127	Furnish and Install Fiber Optic Conduit HDD Crossing Nookachamps Creek	1	LS	\$	\$
128	Furnish and Install Cathodic Protection Test Stations	12	EA	\$	\$
129	Cathodic Deep Well Anode	1	LS	\$	\$
130	Furnish and Install Lockable/Removeable Bollards (Not along TL Route See Sch. B)	4	EA	\$	\$
131	Record Drawings	1	LS	\$	\$
132	Spare Parts	1	LS	\$	\$
133	Operations and Maintenance Manuals	1	LS	\$	\$
134	Minor Change – District Ordered Restoration	1	LS	\$25,000.00	\$25,000.00
135	Minor Change – Transmission Line Installation	1	LS	\$25,000.00	\$25,000.00
136	Minor Change – Distribution Line Installation	1	LS	\$25,000.00	\$25,000.00
137	Minor Change – Bridge Installation	1	LS	\$25,000.00	\$25,000.00
138	Minor Change – Bore & Jack	1	LS	\$25,000.00	\$25,000.00
139	Minor Change – HDD Installation	1	LS	\$25,000.00	\$25,000.00
140	Minor Change – Storm Sewer/Culvert Installation	1	LS	\$25,000.00	\$25,000.00
141	Minor Change – Dewatering	1	LS	\$25,000.00	\$25,000.00

**Sub-Total Base Bid Schedule A** \$ \_\_\_\_\_

**Washington State Sales Tax (8.5%)** \$ \_\_\_\_\_

**Total Bid Amount Schedule A (Including Washington State Sales Tax)** \$ \_\_\_\_\_

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Total Bid Amount Schedule A (written in words)

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Total Bid Amount Schedule A (written in words)

**AND /100 DOLLARS**

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Total Bid Amount Schedule A (written in words)

**Judy Reservoir to Mount Vernon Transmission Pipeline – Phase II**  
**BID SCHEDULE B – BRIDGE/SERVICE ROAD IMPROVEMENTS**

Item No.	Bid Schedule Description	Estimated Quantity	Unit	Unit Price	Total
1	Mobilization (Schedule B Only)	1	LS	\$	\$
2	Clearing, grubbing and stripping within designated clearing limits – Station 598+00 to Station 623+95.54	1	LS	\$	\$
3	Furnish and install precast bridge deck and anchorage	1	LS	\$	\$
4	Furnish and install precast bridge railing and approach railings	1	LS	\$	\$
5	Furnish and install precast approach walls and backfill	1	LS	\$	\$
6	Fine grading and filling - Station 568+00 to Station 583+50	1	LS	\$	\$
7	Fine grading and filling - Station 598+00 to Station 623+95.54	1	LS	\$	\$
8	Bridge Weight Limit Signs	2	EA	\$	\$
9	Furnish and Install Lockable/Removeable Bollards Along TL Route	76	EA	\$	\$

**Sub-Total Base Bid Schedule B** \$ \_\_\_\_\_

**Washington State Sales Tax (8.5%)** \$ \_\_\_\_\_

**Total Bid Amount Schedule B (Including Washington State Sales Tax)** \$ \_\_\_\_\_

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Total Bid Amount Schedule B (written in words)

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Total Bid Amount Schedule B (written in words)

**AND /100 DOLLARS**

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Total Bid Amount Schedule B (written in words)

**Total Bid Amount Schedules A & B (Incl. Washington State Sales Tax) \$ \_\_\_\_\_**

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Total Bid Amount Schedule A & B (written in words)

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Total Bid Amount Schedule A & B (written in words)

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**AND /100 DOLLARS**  
Total Bid Amount Schedule A & B (written in words)



## SUBCONTRACTORS LIST – RCW 39.30.060 FORM

In compliance with RCW 39.30.060 and as modified by Engrossed Senate Bill 5457 (approved on 3/25/20) for all projects estimated to cost \$1 million or more, all Bidders must complete and submit this Subcontractors List form with their Bid Proposal.

List of Subcontractors: The Bidder shall indicate on the Subcontractors List the names of the subcontractors with whom the Bidder, if awarded the contract, will subcontract for performance of the work of heating, ventilation and air conditioning, plumbing as described in Chapter 18.106 RCW, and electrical as described in Chapter 19.28 RCW.

In addition, the Bidder shall indicate on the Subcontractors List the names of the subcontractors with whom the Bidder, if awarded the contract, will subcontract for performance of the work of structural steel installation and rebar installation.

List Bidder if Bidder Performing Work: If the Bidder will perform the work in any of the three areas required, the Bidder shall name itself for the work on the Subcontractors List.

Name Only One Form for Each Category of Work: The Bidder shall not list more than one firm (subcontractor or Bidder) for each category of work identified, unless subcontractors vary with bid alternates or additive, in which case the Bidder must indicate which firm will be used for which alternate or additive.

Substitution of Subcontractors: Substitution of any listed subcontractor may only be according to the procedure and parameters set forth in RCW 39.30.060.

Factors relating to Non-Responsiveness: Failure of the Bidder to submit the names of such subcontractors, or to name itself to perform such work, or the naming of two or more firms (subcontractor or Bidder) to perform the same work shall render the Bidder’s bid non-responsive and, therefore, void.

Applicable to Direct Subcontractors: The requirement of this section to name the Bidders’ proposed heating, ventilation and air conditioning, plumbing and electrical subcontractors applies only to proposed heating, ventilation and air conditioning, plumbing and electrical subcontractors who will contract directly with the Bidder.

Submission Requirements: The Subcontractors List must be submitted with the Bid Proposal.

Trade	<b>Bidder must check one box for each Trade. If subcontracting the work, Bidder must name the subcontractor.</b>
HVAC (Heating, Ventilation and Air Conditioning)	<input type="checkbox"/> N/A (this project does not include this work) <input type="checkbox"/> Bidder will self-perform this work <input type="checkbox"/> Name and address of subcontractor <hr/> <hr/>
Plumbing	<input type="checkbox"/> N/A (this project does not include this work) <input type="checkbox"/> Bidder will self-perform this work <input type="checkbox"/> Name and address of subcontractor <hr/> <hr/>
Electrical	<input type="checkbox"/> N/A (this project does not include this work) <input type="checkbox"/> Bidder will self-perform this work <input type="checkbox"/> Name and address of subcontractor <hr/> <hr/>

Structural Steel Installation	<input type="checkbox"/> N/A (this project does not include this work) <input type="checkbox"/> Bidder will self-perform this work <input type="checkbox"/> Name and address of subcontractor <hr/> <hr/>
Rebar Installation	<input type="checkbox"/> N/A (this project does not include this work) <input type="checkbox"/> Bidder will self-perform this work <input type="checkbox"/> Name and address of subcontractor <hr/> <hr/>



OMB Control No: 2090-0030  
 Approved: 8/ 13/ 2013  
 Approval Expires: 8/ 31/ 2015

**Disadvantaged Business Enterprise (DBE) Program  
 DBE Subcontractor Performance Form**

This form is intended to capture the DBE<sup>1</sup> subcontractor's<sup>2</sup> description of work to be performed and the price of the work submitted to the prime contractor. An EPA Financial Assistance Agreement Recipient must require its prime contractor to have its DBE subcontractors complete this form and include all completed forms in the prime contractors bid or proposal package.

Subcontractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Prime Contractor Name		Issuing/Funding Entity:	

Contract Item Number	Description of Work Submitted to the Prime Contractor Involving Construction, Services, Equipment or Supplies	Price of Work Submitted to the Prime Contractor
DBE Certified By: <input type="checkbox"/> DOT <input type="checkbox"/> SBA		Meets/ exceeds EPA certification standards? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Unknown
<input type="checkbox"/> Other: _____		

<sup>1</sup> A DBE is a Disadvantaged, Minority, or Woman Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

<sup>2</sup> Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**EPA FORM 6100-3 (DBE Subcontractor Performance Form)**

**Disadvantaged Business Enterprise (DBE) Program  
DBE Subcontractor Performance Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

<b>Subcontractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

**EPA FORM 6100-3 (DBE Subcontractor Performance Form)**

**Disadvantaged Business Enterprise (DBE) Program  
 DBE Subcontractor Utilization Form**

This form is intended to capture the prime contractor's actual and/or anticipated use of identified certified DBE<sup>1</sup> subcontractors<sup>2</sup> and the estimated dollar amount of each subcontract. An EPA Financial Assistance Agreement Recipient must require its prime contractors to complete this form and include it in the bid or proposal package. Prime contractors should also maintain a copy of this form on file.

Prime Contractor Name		Project Name	
Bid/ Proposal No.	Assistance Agreement ID No. (if known)	Point of Contact	
Address			
Telephone No.		Email Address	
Issuing/Funding Entity:			

I have identified potential DBE certified subcontractors	<input type="radio"/> YES	<input checked="" type="radio"/> NO	
If yes, please complete the table below. If no, please explain:			
<b>Subcontractor Name/ Company Name</b>	<b>Company Address/ Phone/ Email</b>	<b>Est. Dollar Amt</b>	<b>Currently DBE Certified?</b>
Continue on back if needed			

<sup>1</sup> A DBE is a Disadvantaged, Minority, or Women Business Enterprise that has been certified by an entity from which EPA accepts certifications as described in 40 CFR 33.204-33.205 or certified by EPA. EPA accepts certifications from entities that meet or exceed EPA certification standards as described in 40 CFR 33.202.

<sup>2</sup> Subcontractor is defined as a company, firm, joint venture, or individual who enters into an agreement with a contractor to provide services pursuant to an EPA award of financial assistance.

**EPA FORM 6100-4 (DBE Subcontractor Utilization Form)**

**Disadvantaged Business Enterprise (DBE) Program  
DBE Subcontractor Utilization Form**

I certify under penalty of perjury that the forgoing statements are true and correct. Signing this form does not signify a commitment to utilize the subcontractors above. I am aware of that in the event of a replacement of a subcontractor, I will adhere to the replacement requirements set forth in 40 CFR Part 33 Section 33.302 (c).

<b>Prime Contractor Signature</b>	<b>Print Name</b>
<b>Title</b>	<b>Date</b>

The public reporting and recordkeeping burden for this collection of information is estimated to average three (3) hours per response. Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

**EPA FORM 6100-4 (DBE Subcontractor Utilization Form)**

### BIDDERS LIST

Contractors are required to complete the following information for all subcontractors submitting bids for this work. The Bidders List is required to be submitted with the Bid. (use additional sheets if necessary)

Subcontractor's Name and Point of Contact	Address, Phone, and E-Mail Address	Work Bid by Subcontractor	Status as MBE/WBE or Non MBE/WBE

## **CERTIFICATION OF NONSEGREGATED FACILITIES**

(Applicable to federally assisted construction contracts and related subcontracts exceeding \$10,000, which are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certified, further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or area, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed contractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such, certification in this file.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and title of signer (please type)

\_\_\_\_\_  
Company Name (please type)

# AMERICAN IRON AND STEEL

**(Applicable to federally assisted construction contracts funded or partially funded by the Environmental Protection Agency through the Drinking Water State Revolving Fund (DWSRF). This acknowledgement must be included in all contracts including any and all sub-tier contracts.)**

As a bidder and potential contractor on the Judy Reservoir to Mount Vernon Transmission Pipeline Ph. II Project, I understand that this project is subject to American Iron and Steel provisions. These provisions apply to projects for the construction, alteration, maintenance, or repair of a public water system as defined in the Safe Drinking Water Act (42 U.S.C 300j-12). These provisions do not apply if the Department of Health approved the engineering plans and specifications for the project prior to January 17, 2014.

As a bidder and potential contractor, I also understand that for the benefit of the project owner and Washington State that the Drinking Water State Revolving Loan Fund (DWSRF) is paying for the goods and services under this agreement. DWSRF contains provisions, commonly known as "Buy American," that requires all iron and steel products used in the project be produced in the United States (American Iron and Steel Requirements). The act defines iron and steel products as, "...the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials."

As a bidder and potential contractor, I hereby represent and warrant to and for the benefit of the project owner and the state that:

- a) I have reviewed and understand the American Iron and Steel Requirements,
- b) All of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirements, unless a waiver of the requirements is approved, and
- c) I will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirements, as may be requested by the project owner or the state.

As a bidder and potential contractor, notwithstanding any other provisions of this agreement, any failure to comply with this paragraph by any and all contractors including all sub-tier contractors shall permit the project owner or state to recover as damages against the contractor any loss, expense or cost (including without limitation attorney's fees) incurred by the project owner or state resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or part, from the state or any damages owed to the state by the project owner). While there are no direct contractual obligation with the state, as a lender to the project owner for the funding of its project, the project owner and the contractor agree that the state is a third-party beneficiary and neither this paragraph nor any other provision of the agreement necessary to give this paragraph force or effect shall be amended or waived without the prior written consent of the state.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and title of signer (please type)

\_\_\_\_\_  
Company Name (please type)

## Certification of Compliance with Wage Payment Statutes

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date November 25, 2020, the bidder is not a “willful” violator, as defined in RCW 49.48.082, of any provision of chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

I certify under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

---

Bidder

---

Signature of Authorized Official\*

---

Printed Name

---

Title

---

Date

---

City

---

State

*Check One:*

Individual  Partnership  Joint Venture  Corporation

State of Incorporation, or if not a corporation, State where business entity was formed:

---

If a co-partnership, give firm name under which business is transacted:

---

*\* If a corporation, proposal must be executed in the corporate name by the president or vice-president (or any other corporate officer accompanied by evidence of authority to sign). If a co-partnership, proposal must be executed by a partner.*

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, \_\_\_\_\_

Of \_\_\_\_\_

Hereinafter called the Contractor (Principal), and \_\_\_\_\_

a corporation duly organized and existing under and by virtue of the laws of the State of \_\_\_\_\_

hereinafter called the Surety, and authorized to transact business within the State of Washington as Surety,

are held and firmly bound unto Public Utility District No. 1 of Skagit County, Washington (Obligee) in the

full and penal sum of five percent (5%) of the total bid amount appearing on the bid proposal of said

principal for the work hereinafter described, for the payment of which, well and truly be made to the Owner,

the Contractor and the Surety bind themselves and each of their heirs, executors, administrators, successors,

and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THE ABOVE OBLIGATION ARE SUCH THAT WHEREAS, the Principal

herein is herewith submitting his or its bid proposal for **Judy Reservoir to Mount Vernon Transmission**

**Pipeline – Phase 2 Project**

NOW THEREFORE, if the bid proposal submitted by the Principal is accepted, and the contract is awarded

to said Principal, and if said Principal shall duly make and enter into and execute said contract and shall

furnish the Performance and Payment Bond as required by the bidding and contract documents within a period

of ten (10) days from and after said award, exclusive of the day of such award, then its obligation to pay the

above-mentioned penal sum as liquidated damages shall be null and void, otherwise it shall remain and be in

full force and effect.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Surety

By \_\_\_\_\_

By \_\_\_\_\_

Attorney-In-Fact

Title \_\_\_\_\_

Corporate Seal

Corporate Seal

The Attorney-In-Fact who executes this bond on behalf of the Surety must attach a copy of his Power of Attorney as evidence of his authority.

**STATEMENT OF BIDDER'S QUALIFICATIONS**

*(All Supplementary Bidder Responsibility Criteria is to be submitted no later than 4:30PM on the day of the bid)*

**COMPARABLE CONTRACT HISTORY BIDDER**

The following is a list of the last three jobs our organization completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

The following is a list of the last three jobs our organization's designated Project Manager as completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

The following is a list of the last three jobs our organization's designated Project Superintendent as completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

--	--	--	--	--	--

Name of Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Contractor's License Number

**COMPARABLE CONTRACT HISTORY BRIDGE CONTRACTOR**

The following is a list of the last three jobs our organization completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Single Span Length (FT)	Owner Rep.	Phone No.

The following is a list of the last three jobs our organization’s designated Project Manager as completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Single Span Length (FT)	Owner Rep.	Phone No.

The following is a list of the last three jobs our organization’s designated Project Superintendent as completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Single Span Length (FT)	Owner Rep.	Phone No.

Name of Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone:

---

---

Date

---

Signature

---

Title

---

Contractor's License Number

**COMPARABLE CONTRACT HISTORY HORIZONTAL DIRECTIONAL DRILL  
(HDD) CONTRACTOR**

The following is a list of the last three jobs our organization completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

The following is a list of the last three jobs our organization’s designated Project Manager as completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

The following is a list of the last three jobs our organization’s designated Drill Operator as completed which are similar in character to this project within the last 5 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

The following is a list of the last five jobs our organization's designated Steering Technician has completed which are similar in character to this project within the last 5 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

The following is a list of the last three jobs our organization's designated Mud Technician has completed which are similar in character to this project within the last 5 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

Name of Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Contractor's License Number

**COMPARABLE CONTRACT HISTORY JACK AND BORE CONTRACTOR**

The following is a list of the last three jobs our organization completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

Name of Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Contractor's License Number

**COMPARABLE CONTRACT HISTORY DEWATERING CONTRACTOR**

The following is a list of the last three jobs our organization completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

Name of Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

\_\_\_\_\_ Date

\_\_\_\_\_ Signature

\_\_\_\_\_ Title

\_\_\_\_\_ Contractor's License Number

**COMPARABLE CONTRACT HISTORY PIPE WELDING CONTRACTOR**

The following is a list of the last five jobs our organization completed which are similar in character to this project within the last 10 years as described in the Supplementary Instructions to Bidders:

Year	Project Name	Pipe Diameter	Feet	Owner Rep.	Phone No.

Name of Company: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Contractor's License Number

# **AGREEMENT**

**AGREEMENT**  
**Project #3549**

THIS CONTRACT is made and entered into by and between the **PUBLIC UTILITY DISTRICT NO. 1 OF SKAGIT COUNTY** (District/Owner) and \_\_\_\_\_ (Contractor) whose names are subscribed hereto.

WITNESSETH:

WHEREAS the Owner has caused the preparation of certain Contract Documents entitled **JUDY RESERVOIR TO MOUNT VERNON TRANSMISSION PIPELINE – PHASE 2 PROJECT**.

WHEREAS the Owner has invited proposals, has received and analyzed said proposals, and has duly given notice of Acceptance of Proposal to the Contractor herein set forth and as stated more in detail in the Contract Documents which are defined in Section II General Conditions, all of which Contract Documents are made a part hereof and which constitute the whole Contract between the Owner and the Contractor.

NOW, THEREFORE, it is hereby agreed that:

1. The Contractor shall furnish the work, pay all costs, and perform all requirements of this Contract in the manner specified in the Contract Documents, and;
2. The Proposal calls for unit prices and lump sums in the Bid Schedule(s) set forth in (1) above. The Owner shall pay to the Contractor a corrected Total Contract Amount computed from the unit prices and lump sums in said Bid Schedule(s) set forth in the Contractor's Proposal and the actual quantities of units furnished. Based upon the lump sum and unit prices in said Bid Schedule(s) set forth in the Contractor's Proposal and upon the quantities estimated from the Contract Drawings for bidding purposes, the estimated Total Contract Amount is (spell out dollar amount/100) Dollars (capitalize each word of the dollar amount) (\$ insert numeric dollar amount); \$ \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
(\$ \_\_\_\_\_ . \_\_\_\_\_ ), and;
3. In Washington State the Owner is required to pay state or local sales or use taxes included in the Total Contract Amount and the Contractor is required to receive the said taxes for payment to the state, the amount payable to the Contractor by the Owner shall be the Total Contract Amount as above specified including the amount of the said taxes, and;
4. It is further agreed that the Contractor will start work within ten (10) Calendar days after the date specified in the Owner's Notice to Proceed and shall be substantially complete within 730 Calendar days from the date of Notice to Proceed is issued, and;
5. In the event that the Contractor fails to substantially complete the Project by the date of substantial completion as specified above or as modified by Change Order, the Contractor shall be liable for liquidated damages of Five Thousand and no/100 Dollars

(\$5,000.00) per calendar day thereafter until the Owner determines the Project to be substantially complete, and;

6. The attached Indemnification Agreement is hereby made part of this agreement.

IN WITNESS WHEREOF, two (2) identical counterparts of this Contract, each of which shall for all purposes be deemed an original hereof, have been duly executed by the parties hereto.

(Contractor)

PUBLIC UTILITY DISTRICT NO. 1  
OF SKAGIT COUNTY, WASHINGTON

By \_\_\_\_\_  
(Name, Title here)

By \_\_\_\_\_  
George Sidhu, P.E., General Manager

Date \_\_\_\_\_

Date \_\_\_\_\_

**INDEMNIFICATION AGREEMENT**

The Contractor agrees to defend, indemnify, and hold the District harmless from any and all claims, demands, losses, and liabilities to or by third parties arising from, resulting from, or connected with work performed or to be performed under this Contract by the Contractor, its agents, employees, and subcontractors, even though such claims may prove to be false, groundless or fraudulent, to the fullest extent permitted by law and subject to the limitations provided below.

The Contractor's duty to indemnify the District shall not apply to liability for damages arising out of bodily injury to persons or damage to property caused by or resulting from the sole negligence of the District or the District's agents or employees. The Contractor's duty to indemnify the District for liability for damages arising out of bodily injury to persons or damage to property caused by or resulting from the concurrent negligence of Contractor, its agents, employees, or subcontractors and/or the District or the District's agents or employees, shall apply only to the extent of negligence of Contractor, its agents, employees, or subcontractors.

With respect to claims against Contractor by the District pursuant to this Contract only, Contractor expressly waives any immunity that may be granted it under the Workers' Compensation, Industrial Insurance or like statutes and/or any administrative regulations issued pursuant thereto. This waiver does not include or extend to any claims by Contractor's employees directly against Contractor.

Further, Contractor's defense and indemnification obligations under this Contract shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable to or for any third party under Workers' Compensation, Industrial Insurance or like statutes and/or any administrative regulations issued pursuant thereto.

Contractor's duty to indemnify the District for liabilities or losses, other than for bodily injury to persons or damage to property caused by or resulting from negligence, shall apply only to the extent of the fault of Contractor, its agents, employees, or subcontractors, except in situations where fault is not a requirement for liability, in which case indemnity will be provided to the extent the liability or loss was caused by Contractor or its agents, employees, or subcontractors.

Contractor's duty to defend, indemnify and hold the District harmless shall include, as to all claims, demands, losses and liabilities to which it applies, the District's actual attorneys' fees and costs incurred in connection with defending such claim(s) including, without limitation, consultant and expert witness fees and expenses and personnel-related costs in addition to costs otherwise recoverable by statute or court rule.

**THE UNDERSIGNED HEREBY CERTIFY THAT THIS AGREEMENT WAS MUTUALLY NEGOTIATED.**

CONTRACTOR  By: _____ Name, Title Dated: _____	PUBLIC UTILITY DISTRICT NO. 1 OF SKAGIT COUNTY  By: _____ George Sidhu, P.E., General Manager Dated: _____
--	---

The Contractor shall cause each of its subcontractors (and suppliers to the extent any perform any work on the Project site) to execute an Indemnification Contract substantially in the form of the foregoing by which each such entity or person assumes to the District all obligations Contractor assumes to the District as set forth above.

**Certificate of Owner's Attorney**

I, the undersigned, **Peter Gilbert**, the duly authorized and acting legal representative of Public Utility District No. 1 of Skagit County, do hereby certify as follows

I have examined the attached contract(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements are adequate and have been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provisions thereof.

\_\_\_\_\_  
Peter Gilbert, Attorney

Date: \_\_\_\_\_

**PERFORMANCE AND PAYMENT BOND**

Bond No. \_\_\_\_\_

Amount: \$ \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, that

Of \_\_\_\_\_  
Hereinafter called the Contractor (Principal), and \_\_\_\_\_

\_\_\_\_\_ a corporation duly organized and existing under and by virtue of the laws of the State of \_\_\_\_\_ hereinafter called the Surety, and authorized to transact business within the State of Washington as Surety, are held and firmly bound unto Public Utility District No. 1 of Skagit County, Washington as Owner (Obligee), in the sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), lawful money of the United States of America, for the payment of which, well and truly be made to the Owner, the Contractor and the Surety bind themselves and each of their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents as follows:

THE CONDITIONS OF THE ABOVE OBLIGATION ARE SUCH THAT:

WHEREAS, the Contractor has executed and entered into a certain Contract hereto attached, with the Owner, dated \_\_\_\_\_, 20\_\_\_\_.

For: \_\_\_\_\_

IN WITNESS: NOW THEREFORE, if Contractor, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the said Contract for the duration thereof, including the one-year warranty period, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, at the time and in the manner therein specified and shall pay all laborers, mechanics, subcontractors or lower tier subcontractors, and material persons, and all persons who shall supply such person or persons, or subcontractors or lower tier subcontractors, with provisions and supplies for the carrying on of such work, on his or their part, and shall indemnify and save harmless Owner, its officers and agents, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

And Surety, for value received, hereby further stipulates and agrees that no change, extension of time, alteration or addition to the terms of Contract or to the work to be performed thereunder or the plans or specifications accompanying the same shall in any way affect its obligation of this Bond, and it does hereby waive notice of any change, extension of time, alterations or additions to the terms of the Contract, the plans or the specifications.

Surety hereby agrees that modifications and changes may be made in the terms and provisions of the Contract without notice to Surety, and any such modifications or changes increasing the total amount to be paid the Contractor shall automatically increase the obligation of the Surety on this Bond in a like amount.

The Surety expressly acknowledges that it shall be liable, under this Bond, for any liquidated damages assessed against the Contractor in accordance with the provisions of the Contract.

Any claim(s) relating to or against this Bond shall be subject to and decided by arbitration in accordance with the provisions of the Revised Code of Washington Chapter 7.04.

Any dispute relating to the performance or enforcement of the provisions of this Bond shall be governed by Washington State Law. Jurisdiction and venue shall be Skagit County Courts. If non-binding arbitration or mediation is conducted involving the Owner, the Contractor, the Surety, or any other party concerning or in any way relating the work required or alleged to be required by the Contract, the Contractor and Surety expressly consent to a

consolidated or joint arbitration if and as called for by the Owner. The prevailing party in each such litigation shall be entitled to recover its attorneys' fees, in addition to any other relief granted.

IN WITNESS WHEREOF, the Contractor and the Surety have caused this bond and two (2) counterparts thereof to be signed and sealed by their duly authorized officers.

Signed and sealed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Surety

By \_\_\_\_\_

By \_\_\_\_\_

Attorney-In-Fact

Title \_\_\_\_\_

Corporate Seal

Corporate Seal

Address of local office and agent of Surety  
Company:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

APPROVED AS TO FORM:

\_\_\_\_\_, Owner \_\_\_\_\_, 20\_\_\_\_

This Bond is executed in pursuance of Chapter 39.08, Revised Code of Washington.

NOTE: The Surety named on this Bond shall be one which is licensed to conduct business in the state where the project is located, and named in the current list of Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act for the Surety at the time of the signing of this Bond.

Corporate Seal:

CERTIFICATE AS TO CORPORATE SEAL

I hereby certify that I am the (Assistant) Secretary of the Corporation named as Principal in the within Bond; that \_\_\_\_\_ who signed the said Bond on behalf of the Principal, was \_\_\_\_\_ of said Corporation; that I know his signature thereto is genuine, and that said Bond was duly signed, sealed, and attested for and in behalf of said Corporation by authority of its government body.

\_\_\_\_\_  
Secretary or Assistant Secretary

A copy of this bond shall be filed with the County Auditor.

**ATTACH POWER OF ATTORNEY**

# **GENERAL CONDITIONS**

## **GENERAL CONDITIONS**

### **NOTICE OF DISCLAIMER**

TAKE NOTICE, that the General Conditions are the 2020 Edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction.

TAKE NOTICE, that these General Conditions have been materially amended by certain additions, deletions or other modifications to meet the needs of the Public Utility District No.1 of Skagit County. These amendments are contained in the Supplementary General Conditions.

**END OF SECTION**

**SUPPLEMENTARY GENERAL  
CONDITIONS**

## SUPPLEMENTARY GENERAL CONDITIONS

The following provisions of the Washington State 2020 Standard Specifications for Road, Bridge, and Municipal Construction (WSDOT) Division 1 General Requirements is hereby amended, changed, or supplemented and superseded as follows. All other provisions which are not amended, changed, or supplemented remain in full force.

1	Order of Precedence	
2	Section 1-01.3	Definitions
3	Section 1-03	Award and Execution of Contract
3.1	Section 1-03.4	Contract Bond
3.2	Section 1-03.8	Award and Execution of Contract
4	Section 1-05	Control of Work
4.1	Section 1.05.0	General
4.2	Section 1-05.4	Conformance with and Deviations from Plans and Stakes
4.3	Section 1-05.10	Guarantees
5	Section 1-07	Legal Relations and Responsibilities to the Public
5.1	Section 1-07.1(1)	Owner Safe Access
5.2	Section 1-07.6	Permits and Licenses
5.3	Section 1-07.9	Wages
5.4	Section 1-07.18	Public Liability and Property Damage Insurance
5.5	Section 1-07.26	Personal Liability of Public Officers
6	Section 1-08	Prosecution and Progress
6.1	Section 1-08.5	Time for Completion (Contract Time)
6.2	Section 1.08.9	Liquidated Damages
6.3	Section 1.08.10(2)	Termination for Public Convenience
7	Section 1-09	Measurement and Payment
7.1	Section 1-09.4	Equitable Adjustment
7.2	Section 1-09.6	Force Account
7.3	Section 1-09.11(3)	Time Limitations and Jurisdiction
7.4	Section 1-09.13(3)	Claims Resolution
7.5	Section 1-09.14	Claims Against Contractor's Retainage and/or Public Contract Bond
8	Section 1-10	Temporary Traffic Control
8.1	Section 1-10.2(2)	Traffic Control Plans

**1 ORDER OF PRECEDENCE. THE ORDER OF PRECEDENCE OF THE CONDITIONS OF THE CONTRACT ARE AS LISTED BELOW, FIRST IS THE HIGHEST AND LAST IS THE LOWEST:**

Addenda  
Bid Forms  
Technical Specifications  
Drawings  
Special Provisions  
Supplementary General Conditions  
Division 1 General Conditions (WSDOT) 2020 Edition

**2 SECTION 1-01.3 DEFINITIONS IS SUPPLEMENTED BY ADDING THE FOLLOWING DEFINITIONS:**

Whenever these words are used in the Contract Documents, they shall have the following meanings:

"COMMISSION": Redefined to mean the three elected Commissioners of the District; substitute for "Commission" and "Washington State Transportation Commission" whenever cited.

"CONTRACTING AGENCY", "DISTRICT" or "OWNER": Public Utility District No. 1 of Skagit, Washington; substitute for "State," "Department," and "Department of Transportation" whenever cited.

"GENERAL MANAGER": The person appointed by the Commission per RCW 54.16.100 as the chief administrative officer of the District; substitute for "Secretary" and "Secretary of Transportation" whenever cited.

"ENGINEER": Public Utility District No. 1 of Skagit County and its sub consultants.

"STANDARD PLANS": Redefined to refer to the Standard Detail Sheets included with the Plans and Specifications as well as the 2020 WSDOT Standard Plans. The requirements of the Standard Detail Sheets shall be controlling in the case of any discrepancy between the Standard Details and the 2020 WSDOT Standard Plans.

**3 SECTION 1-03 AWARD AND EXECUTION OF CONTRACT IS SUPPLEMENTED BY ADDING THE FOLLOWING:**

**3.1 Add the following to Section 1-03.4, Contract Bond:**

Upon substantial completion of the Project, the Contractor shall provide a Utility Maintenance Bond for 25% of the Total Contract Amount on the form specified by the District that warrants all equipment, materials, and labor it furnishes or performs under

the Agreement against defects in design, materials, and workmanship for one (1) year after final acceptance as described in Section 1-05.10.

**3.2 Add the following new Section 1-03.8 Award and Execution of Contract:**

1-03.8 Award and Execution of Contract.

1-03.8(1) The Contract for the Project shall be awarded to the responsible Bidder submitting the lowest responsive Bid. The lowest responsive Bid shall be determined by the total of the amount of the base Bid and the amount(s) Bid for any alternate(s) which the Owner, in its discretion, elects to include in the Contract.

**4 SECTION 1-05 CONTROL OF WORK IS REVISED AS FOLLOWS:**

**4.1 Insert the following new Section 1-05.0 General:**

1-05.0 General

Where the Specifications, the Owner's instructions, laws, ordinances, or any government authority require any work to be specially tested, or inspected, the Contractor shall give the Owner timely notice that such test of completed work is ready for inspection. If the inspection is by another authority than the Owner, the Contractor shall give the Owner timely notice of the date fixed for such inspection. Required certificates of inspection by other authority than the Owner shall be secured by the Contractor.

**4.2 Revise Section 1-05.4, Conformance With And Deviation From Plans And Stakes, as follows:**

Delete the word "Engineer" and replace with "Contractor" throughout this section with reference to setting stakes, marks, lines, etc. for the layout and prosecution of the Work. All surveying and layout required for this Project shall be performed by the Contractor. The Engineer retains final authority for determination of conformity of the Work and shall be notified immediately of any errors found to cause deviations in the Work.

**4.3 Delete Section 1-05.10, Guarantees, and replace with the following:**

1-05.10 Guarantees

The Contractor shall furnish to the Contracting Agency any guarantee or warranty furnished as a normal trade practice in connection with the purchase of any equipment, materials, or items used in the construction of the project.

The Contractor shall be responsible for correcting all defects in workmanship and materials incurred within one year (365 days) after the date of final acceptance of the project. When corrections of defects are made, the Contractor shall be responsible for correcting all defects in workmanship and/or materials in the corrected Work for one year

after acceptance of the correction by the Owner. The Contractor shall commence remedying such defects within seven (7) days of receipt of notice of discovery thereof from the Owner and shall complete such Work within a reasonable time. In emergencies, where damage may result from delay or where loss of service may result, such corrections may be made by the Owner, in which case the cost shall be borne by the Contractor. In the event the Contractor does not complete corrections within a reasonable time, the Work shall be otherwise accomplished and the cost of same shall be paid by the Contractor.

The Contractor shall be liable for any costs, losses, expenses, or damages, including consequential damages, suffered by the Owner resulting from defects in the Contractor's Work including but not limited to costs, labor, materials, equipment and administration incurred by Owner in making emergency repairs of such defective Work and associated costs of engineering, inspection, and supervision by the Owner or Engineer. The Contractor shall defend, indemnify and hold the Owner harmless from any and all claims which may be made against the Owner as a result of Contractor's defective Work.

**5 SECTION 1-07 LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC IS SUPPLEMENTED BY ADDING THE FOLLOWING:**

**5.1 Add the following Section 1-07.1(1) Owner Safe Access:**

**1-07.1(1) Owner Safe Access.**

The Contractor shall provide safe access for the Owner and its inspectors to adequately inspect the quality of work and the conformance with Contract Documents. The Contractor shall provide adequate lighting, ventilation, ladders, and other protective facilities as may be necessary for the safe performance of inspections.

**5.2 Add the following to Section 1-07.6, Permits And Licenses:**

The Contractor shall comply with all requirements of all permits provided by the Owner for this project.

**5.3 Add the following to Section 1-07.9, Wages, 1-07.9(1), General:**

Current Washington State Department of Labor and Industries prevailing wage rates are available at:

<https://lni.wa.gov/licensing-permits/public-works-projects/prevailing-wage-rates/> and are included as Appendix G.

Current Davis Bacon Wage Determinations are available at:

<https://beta.sam.gov/> and are included as Appendix H.

This project is subject to the higher of the two wages for each work classification.

**5.4 Revise Section 1-07.18, Public Liability and Property Damage Insurance as follows:**

All reference to the State or Department of Transportation shall be supplanted with Public Utility District No. 1 of Skagit County.

**5.5 Revise Section 1-07.26, Personal Liability of Public Officers, as follows:**

Neither the Owner nor any elected official, officer, or its employees shall be personally liable for any acts or failure to act in connection with the Contract, it being understood that in such manners, they are acting solely as agents of the Owner.

No right of action shall accrue upon or by reason of this Contract to or for the use or benefit of anyone other than the parties to this Contract. The parties to this Contract are the Contractor and the Owner.

**6 SECTION 1-08, PROSECUTION AND PROGRESS, IS REVISED AS FOLLOWS:**

**6.1 Supplement Section 1-08.5, Time For Completion (Contract Time), with the following:**

Contractor shall complete all work associated with the Bid Schedule within 730 consecutive Working Days after the issuance of the Notice to Proceed.

**6.2 Section 1-08.9, Liquidated Damages replaced numbered paragraphs 1 and 2 with the following:**

1. To pay liquidated damages for each working day beyond the number of days established for substantial completion, to authorize the Owner to deduct these liquidated damages from any money due or coming due to the Contractor.

**6.3 Revise Section 1-08.10(2), Termination For Public Convenience, as follows:**

Substitute "Resolution" for "Executive Order", substitute "Commission" for "President", and delete "or Governor".

**7 SECTION 1-09, MEASUREMENT AND PAYMENT, IS REVISED AS FOLLOWS:**

**7.1 Supplement Section 1-09.4, Equitable Adjustment, with the following:**

All bilateral agreements shall constitute a full accord and satisfaction and represent payment in full as to adjustments in both Contract price and time of completion for all costs, whether direct or indirect, arising out of, or incidental to, or otherwise attributable to, the changed work including any and all delays and impacts resulting from the change to the contract. Acceptance of payment by Contractor pursuant to such bilateral

agreement shall constitute a waiver of any and all claims, known or unknown, arising out of, or incidental to, or otherwise attributable to the changed work.

**7.2 Revise Section 1-09.6, Force Account, as follows:**

Revise Item No. 1 as follows: Substitute “21 Percent” for “29 percent” for Contractor’s allowance for overhead and profit.

**7.3 Revise Section 1-09.11(3), TIME LIMITATIONS AND JURISDICTION**

Revise as follows: Substitute Public Utility District No.1 of Skagit County for State of Washington (six times). Substitute Superior Court of Skagit County for Superior Court of Thurston County.

**7.4 Replace Sections 1-09.13(3), (3)A, (3)B and (4), Claims Resolution, with the following:**

**CLAIMS 1-09.13(3)**

The Contractor and Contracting agency mutually agree that claims submitted in accordance with Section 1-09.11 and not resolved by nonbinding ADR process, shall be resolved by litigation unless the Contracting agency elects to resolve the claim through binding arbitration.

**Venue.** The venue of any Dispute Resolution Proceedings between the parties to this Agreement shall be Mount Vernon, Washington unless otherwise mutually agreed in writing.

**Injunctive Proceedings.** Notwithstanding any other provisions of these Dispute Resolution Procedures, any Disputes otherwise subject to submission to these Dispute Resolution Procedures may instead be first submitted, by any party having a legal interest therein, to the jurisdiction of the Superior Court for Skagit County, State of Washington, if and only to the extent necessary to secure injunctive relief reasonably necessary under the circumstances.

**7.5 Add the following new Section 1-09.14 Claims Against Contractor’s Retainage and/or Public Contract Bond:**

**1-09.14 Claims Against Contractor’s Retainage and/or Public Contract Bond**

The Contractor shall be liable for all costs incurred by the Owner, including, but not limited to, legal fees, salary/wage costs of Owner’s employees and litigation costs (whether or not recoverable by statute or court rule) arising out of claims against the retainage or the Contractor’s Public Contract Bond. Owner may deduct any such costs from funds otherwise due the Contractor, including the retention, by unilateral Change Order.

**8.1 SECTION 1-10, TEMPORARY TRAFFIC CONTROL, IS REVISED AS FOLLOWS:**

**8.1 Revise Section 1-10.2(2), Traffic Control Plans, as follows:**

Delete the first sentence of Section 1-10.2(2) and replace with the following:

The District is providing approved traffic control plans for the project that the Contractor will implement to handle traffic safety during construction.

END OF SECTION

**SECTION 00950**  
**STATE AND FEDERAL FUNDING REQUIREMENTS**

**1. General**

Because this project is funded, in part, by the Washington State Department of Health Drinking Water State Revolving Fund through the Environmental Protection Agency (Federal) along with the Public Works Board (State), the following federal and state contracting provisions apply. The Contractor, as a condition of this contract, shall abide by the regulations and requirements listed herein. In the event of conflict with other conditions of this contract, these clauses shall take precedence.

During the performance of this contract, the contractor must comply with all federal and state nondiscrimination laws, including, but not limited to Chapter 49.60 RCW, Washington's Law against Discrimination, and 42 U.S.C. 12101 et seq, the Americans with Disabilities Act. If the contractor fails or refuses to comply with any applicable nondiscrimination law, regulation, or policy, DOH may rescind, cancel, or terminate this contract in whole or in part, and declare the contractor ineligible for further contracts. The contractor shall, however, be given reasonable time to cure this noncompliance.

The contractor must also include the following terms and conditions in contracts with all contractors, subcontractors, engineers, vendors, and any other entity for work or services listed in Attachment I: Scope of Work.

“The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this Contract. The contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under U.S. Environmental Protection Agency financial agreements. If the contractor fails to carry out these requirements, it is a material breach of this contract, which may result in contract termination.

**2. Required Bid Submittals**

The following submittals are required to be included on the bidder's checklist and submitted with the bid proposal:

- Subcontractor and Supplier Listing—RCW 39.30.060 & Senate Bill 5457
- EPA Form 6100-3 (DBE Subcontractor Performance Form) for all DBE subcontractors.
- EPA Form 6100-4 (DBE Subcontractor Utilization Form)
- Complete Bidders List
- Certification of Compliance with Wage Payment Statutes
- Certification of Non-Segregated Facilities

**3. Civil Rights**

All contracts must include and comply with the following:

**Title VI of the Civil Rights Act of 1964, 42 U.S.C. § 2000d**

No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity

receiving federal financial assistance.

**Section 504 of the Rehabilitation Act of 1973, 29 U.S.C. § 794**

No otherwise qualified individual with a disability in the United States shall, solely by reason of his or her disability, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving federal financial assistance.

**The Age Discrimination Act of 1975, 42 U.S.C. § 6102**

No person in the United States shall, on the basis of age, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance.

**Equal Employment Opportunity, Executive Order No. 11246 (1965)**

Through a series of Executive Orders, and a decision by the Equal Employment Opportunity Commission, the federal government has established a national policy designed to battle discrimination based on race, color, sex, religion, and national origin in federal assistance programs and to enhance hiring, training, and promotion opportunities for minorities and women in construction programs financed, in part, by federal dollars.

If a contract exceeds \$10,000, the contractor shall comply with Executive Order 11246, "Equal Employment Opportunity," as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60.

Contractor's compliance with Executive Order 11246 shall be based on implementation of the Equal Opportunity Clause, and specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4.

**4. Equal Opportunity Clause (41 CFR part 60-1.4(b))**

During the performance of this contract, the contractor agrees as follows:

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.
3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant

thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

6. If the contractor doesn't comply with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further government contracts or federally assisted construction contracts according to procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
7. The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding on each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the contractor may request the United States to enter into such litigation to protect the interests of the United States.

## **5. Federal Equal Employment Opportunity Construction Contract Specifications**

(Executive Order 11246 and 41 CFR part 60-4.3)

1. As used in these specifications:
  - a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;
  - b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;
  - c. "Employer identification number" means the federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
  - d. "Minority" includes:
    - i. Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
    - ii. Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
    - iii. Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
    - iv. American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).
2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the notice which contains the applicable goals for minority

### STATE AND FEDERAL FUNDING REQUIREMENTS

and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the contractor is participating (pursuant to 41 CFR 60–4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the plan area (including goals and timetables) shall be according to that plan for those trades that have unions participating in the plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the plan goals and timetables.
4. The contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in geographical areas where they do not have a federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where they perform the work. Goals periodically appear in the Federal Register notice form. You can obtain such notices from any Office of Federal Contract Compliance Programs or from federal procurement contracting officers. The contractor is expected to make uniform progress in meeting its goals in each craft during the period specified.
5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246, nor the regulations promulgated pursuant thereto.
6. To count the nonworking training hours of apprentices and trainees in meeting the goals, the contractor must employ such apprentices and trainees during the training period, and make a commitment to employ them at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.
7. The contractor shall take specific affirmative action's to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based on its effort to achieve maximum results from its actions. The contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
  - a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities where the contractor assigns employees to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
  - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

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- c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and the action taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the contractor may have taken.
- d. Provide immediate written notification to the director of the Federal Contract Compliance Program when the union or unions the contractor has a collective bargaining agreement with doesn't refer to the contractor, a minority person or woman sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities or participate in training programs for the area, which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially programs the Department of Labor funds or approves. The contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and asking them to help the contractor meet its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper or annual report; by reviewing the policy with all management personnel and all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees that have any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel, such as superintendents or general foremen, before initiating construction work at any job site. The contractor must make and maintain a written record identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
- j. Encourage present minority and female employees to recruit other minority persons and women, and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a contractor's work force.
- k. Validate all tests and other selection requirements where there is an obligation to do so under

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affirmative action steps, at least as extensive as the standards prescribed in paragraph 7 of these specifications, to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the director of the Federal Contract Compliance Program shall proceed according to 41 CFR 60-4.8.

14. The contractor shall designate a responsible official to monitor all employment related activity to carry out the company EEO policy, to submit reports relating to the provisions hereof as the government may require, and to keep records. Records for each employee must include the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (mechanic, apprentice trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations where the work was performed. The contractor must maintain records in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, we won't require contractors to maintain separate records.
15. Nothing herein provided shall be construed as a limitation on the application of other laws, which establish different standards of compliance, or on the application of requirements for hiring local or other area residents (those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

## **6. Reporting Requirements (EEO-1)**

On or before September 30 of each year, a contractor subject to Title VII of the Civil Rights Act of 1964, as amended, that has 100 or more employees, must file an "Employer Information Report EEO-1" with the EEOC or its delegate. Instructions on how to file are on the EEOC website at <http://www.eeoc.gov/employers/eo1survey/howtofile.cfm>. The contractor shall retain a copy of the most recent report filed.

## **7. Segregated Facilities (41 CFR part 60-1.8)**

The contractor must provide facilities for employees in a manner that prevents segregation on the basis of race, color, religion, sex or national origin. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensuring that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. This obligation extends to all contracts containing the equal opportunity clause regardless of the amount of the contract. The term "facilities," as used in this section, means waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, wash rooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. Separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to ensure privacy between the sexes.

## **8. Americans with Disabilities (ADA) Provision**

While performing this contract, the contractor must comply with all federal and state nondiscrimination laws, including, but not limited to Chapter 49.60 RCW, Washington's Law against Discrimination, and 42 U.S.C. 12101 et seq, the Americans with Disabilities Act. If the contractor fails or refuses to comply with any applicable nondiscrimination law, regulation, or policy, DOH may rescind, cancel, or terminate this contract in whole or in part, and declare the contractor ineligible for further contracts. The contractor shall, however, be given reasonable time to cure this noncompliance.

The contractor must also include the following terms and conditions in contracts with all contractors,

### STATE AND FEDERAL FUNDING REQUIREMENTS

subcontractors, engineers, vendors, and any other entity for work or services listed in Attachment I: Scope of Work.

“The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this Contract. The contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under U.S. Environmental Protection Agency financial agreements. If the contractor fails to carry out these requirements, it is a material breach of this contract, which may result in contract termination.

## **9. American Iron and Steel Provision**

Congress passed a law January 17, 2014, that requires water systems to use U.S. steel and iron products for projects funded in part or in full by a Drinking Water State Revolving Fund (DWSRF) loan.

The act defines iron and steel products as, “...the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.”

## **10. Prohibition Statement**

While the contract is in effect, the contractor and its employees may not engage in severe forms of trafficking in persons, procure a commercial sex act, or use forced labor (Section 106 of the Trafficking Victims Protection Act of 2009, as amended). The contractor shall require this prohibition statement in contracts with all contractors, subcontractors, engineers, vendors, and any other entity for work or services listed in Attachment I: Scope of Work.

If the contractor or any of its employees is determined to have violated the terms of this section, this contract may be terminated.

## **11. Prevailing Wage**

The work performed under this contract is subject to the wage requirements of the Davis-Bacon Act. The contractor and subcontractors must conform to wage requirements prescribed in the federal Davis-Bacon and Related Acts. These acts require them to pay laborers and mechanics employed on contracts funded in whole or in part by SRF appropriations in excess of \$2,000, prevailing wage rates and fringe benefits for corresponding classes of laborers and mechanics employed on similar projects in the area. Attachment 1A or 1B to this specification insert, and an up-to-date wage determination **must** be included in full into **any** contract and in any subcontract in excess of \$2,000. You can find wage determinations at <https://beta.sam.gov>.

## **12. Certification Regarding Suspension, Debarment, Ineligibility or Voluntary Exclusion**

1. The contractor, by signing this agreement, certifies that it is not suspended, debarred, proposed for debarment, declared ineligible or otherwise excluded from contracting with the federal government, or from receiving contracts paid for with federal funds. If the contractor is unable to certify to the statements contained in the certification, they must provide an explanation as to why they cannot.
2. The contractor shall provide immediate written notice to DOH if at any time it learns that its certification was erroneous when submitted or became erroneous due to changed circumstances.
3. The terms covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded, as used in this clause, have the meaning set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may ask DOH for help obtaining a copy of those

regulations.

4. The contractor agrees it shall not knowingly enter into any lower tier covered transaction with a person proposed for debarment under the applicable Code of Federal Regulations, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction.
5. The contractor further agrees by signing this agreement, that it will include the clause titled, "Certification Regarding Suspension, Debarment, Ineligibility Or Voluntary Exclusion," without modification in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
6. Pursuant to 2CFR180.330, the contractor must ensure that any lower tier covered transaction complies with certification of suspension and debarment requirements.
7. The contractor acknowledges that failing to disclose the information required in the Code of Federal Regulations may result in the delay or negation of this funding agreement, or cause DOH to pursue legal remedies, including suspension and debarment.
8. The contractor agrees to keep proof in its agreement file, that it, and all lower tier recipients or contractors, are not suspended or debarred, and will make this proof available to the DOH on request. The recipient or contractor must run a search in [www.sam.gov](http://www.sam.gov) and print a copy of completed searches to document proof of compliance.

This term and condition supersedes EPA Form 5700-49, "Certification Regarding Debarment, Suspension, and Other Responsibility Matters."

### **13. Disadvantaged Business Enterprises (Temporarily suspended except for item c)**

Small, minority and women-owned firms should be afforded the maximum opportunity to compete for and obtain bid documents for DWSRF-funded projects. The level of participation by small, minority and women-owned firms should be consistent with their general availability within the professional community involved.

#### **a. General Compliance (40 CFR Part 33).**

The contractor shall comply with the requirements of the U.S. Environmental Protection Agency's Program for Participation by Disadvantaged Business Enterprises (DBE) 40 CFR Part 33.

#### **b. Non-discrimination Provision (40CFR Appendix A to Part 33).**

The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. The contractor's failure to carry out these requirements is a material breach of this contract, which may result in contract termination or other legally available remedies.

The contractor shall comply with all federal and state nondiscrimination laws, including, but not limited to Title VI and VII of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and Chapter 49.60 RCW, Washington's Law Against Discrimination, and 42 U.S.C. 12101 et seq, the Americans with Disabilities Act (ADA).

**c. Six Good Faith Efforts (40 CFR Part 33 Subpart C) (This section is still required)**

The contractor agrees to make the following good faith efforts whenever procuring subcontracts, equipment, services and supplies. The contractor shall retain records documenting compliance with the following six good faith efforts.

1. Ensuring Disadvantaged Business Enterprises are made aware of contracting opportunities to the full extent practicable through outreach and recruitment activities. For tribal, state and local and government recipients, this will include placing Disadvantaged Business Enterprises on solicitation lists and soliciting them whenever they are potential sources. You can find Qualified Women and Minority business enterprises online at [www.omwbe.wa.gov](http://www.omwbe.wa.gov) or by contacting the Washington State Office of Minority and Women’s Enterprises at 360-704-1181.
2. Making information on forthcoming opportunities available to Disadvantaged Business Enterprises and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by Disadvantaged Business Enterprises in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for at least 30 calendar days before the bid or proposal closing date.
3. Considering in the contracting process whether firms competing for large contracts could subcontract with Disadvantaged Business Enterprises. For tribal, state and local government recipients, this will include dividing total requirements when economically feasible into smaller tasks or quantities to permit maximum participation by Disadvantaged Business Enterprises in the competitive process.
4. Encourage contracting with a consortium of Disadvantaged Business Enterprises when a contract is too large for one of these firms to handle individually.
5. Using services and assistance of the Small Business Administration and the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce.
6. If the prime contractor awards subcontracts, requiring the subcontractors to take the six good faith efforts in paragraphs 1 through 5 above.

**d. Fair Share Objective Goal (40 CFR Part 33 Subpart D).**

A fair share objective is a goal based on the capacity and availability of qualified, certified Minority Business Enterprises (MBEs) and Women’s Business Enterprises (WBEs) in the relevant geographic market. As mandated by EPA, all general contractors and subcontractors must comply with the requirements of the EPA’s Program for Utilization of Small, Minority, and Women’s Business Enterprises (40 CFR, Part 33) in procurement under the DWSRF program. The goals for the utilization of disadvantaged businesses are as follows:

Construction	10% MBE	6% WBE
Supplies	8% MBE	4% WBE
Equipment	8% MBE	4% WBE
Purchased Services	10% MBE	4% WBE

All general contractors and subcontractors must accept the fair share objective/goals stated above and attest to the fact they are purchasing the same or similar construction, supplies, services, and equipment, in the same or similar relevant geographic buying market as the Washington Office of Minority Women Business goals.

The DWSRF program exempts borrowers that receive a total of \$250,000 or less in EPA funds in a given fiscal year from the Fair Share Objective requirements.

**IMPORTANT:** Only MBEs and WBEs certified by EPA, SBA, DOT, or by state, local, tribal or private entities whose certification criteria match EPA's can be counted towards the MBEs and WBEs utilization goal.

**e. MBE/WBE Reporting (40 CFR Part 33 Parts 33.302, 33.502 and 33.503).  
(suspended)**

The contractor shall provide EPA Form 6100-2 DBE Subcontractor Participation Form to all DBE subcontractors. Subcontractors may submit EPA Form 6100-2 Subcontractor Participation Form to the EPA Region 10 DBE coordinator in order to document issues or concerns with their usage or payment for a subcontract. The contractor shall require all DBE subcontractors to complete EPA Form 6100-3 DBE Subcontractor Performance Form. The contractor shall complete EPA Form 6100-4 DBE Subcontractor Utilization Form.

The contractor shall submit EPA Form 6100-4 and all completed EPA Form 6100-3 forms with the bid proposal.

**f. Bidders List (40 CFR Part 33 part 33.501)**

All bidders shall submit the following information for all firms that bid or quote on subcontracts (including both DBE and non-DBE firms) with their bid proposal.

1. Entity's name with point of contact;
2. Entity's mailing address, telephone number, and e-mail address;
3. The procurement on which the entity bid or quoted, and when; and,
4. Entity's status as an MBE/WBE or non-MBE/WBE

**g. Contract Administration Provisions (40 CFR part 33.302).**

The contractor shall comply with the contract administration provisions of 40 CFR, Part 33.302.

1. The contractor shall pay its subcontractor for satisfactory performance no more than 30 days from the contractor's receipt of payment.
2. The contractor shall notify the owner in writing prior to any termination of a DBE subcontractor.
3. If a DBE subcontractor fails to complete work under the subcontract for any reason, the contractor shall employ the six good faith efforts when soliciting a replacement subcontractor.
4. The contractor shall employ the six good faith efforts even if the contractor has achieved its fair share objectives.

**h. Third Party Beneficiary**

The Washington State Department of Health Drinking Water State Revolving Fund is

providing partial funding for this project. All parties agree that Washington State shall be, and is hereby, named as an express third-party beneficiary of this contract, with full rights as such.

**i. Access to the Construction Site and to Records**

The contractor shall provide Washington State Department of Health and U.S. Environmental Protection Agency personnel safe access to the construction site and to the contractor's records.

The contractor shall maintain accurate records and accounts to facilitate the owner's audit requirements and shall ensure that all subcontractors maintain auditable records.

These project records shall be separate and distinct from the contractor's other records and accounts.

All such records shall be available to the owner and to Washington State Department of Health and EPA personnel for examination. The contractor must retain all records pertinent to this project for three years after the final audit.

**14. Attachments:**

1. Wage Rate Requirements for Subrecipients
  - a. Attachment 1A for municipal borrowers
2. Current Wage Rate Determination (Verified by Contract Manager)
3. Certification Of Non-segregated Facilities
4. Notice To Labor Unions Or Other Organization Of Workers: Non-Discrimination In Employment
5. American Iron and Steel Requirements – The Use of American Iron and Steel

**15. WAGE RATE REQUIREMENTS FOR SUBRECIPIENTS**

The following terms and conditions specify how recipients will assist EPA in meeting its Davis-Bacon Act responsibilities when the act applies to EPA awards of financial assistance with respect to government recipients and subrecipients. If a subrecipient has questions about when the act applies, how to obtain correct wage determinations, act provisions, or compliance monitoring, it may contact DOH.

1. Applicability of the Davis-Bacon (DB) prevailing wage requirements

Under the FY 2013 Continuing Resolution, Davis-Bacon prevailing wage requirements apply to construction, alteration, and repair of treatment works carried out in whole or in part with assistance from a state water pollution control revolving fund and to any construction project carried out in whole or in part by assistance from a drinking water treatment revolving loan fund. If a subrecipient encounters a unique situation at a site that presents uncertainties regarding DB applicability, the subrecipient must discuss the situation with the state recipient before authorizing work on that site.
2. Obtaining Wage Determinations.
  - (a) Before issuing requests for bids, proposals, quotes or other methods for soliciting contracts, subrecipients shall obtain the wage determination for the locality where a covered activity subject to DB will take place. Subrecipients must submit the wage determination to Department of Health before inserting it into a solicitation or contract, or issuing task orders, work assignments or similar instruments to existing contractors unless the state recipient provides other directions. These wage determinations shall be incorporated into solicitations and any subsequent contracts. Prime contracts must contain a

provision requiring subcontractors to follow the wage determination incorporated into the prime contract.

- (i) While the solicitation remains open, the subrecipient shall monitor <https://beta.sam.gov> weekly to ensure that the wage determination contained in the solicitation remains current. The subrecipient shall amend the solicitation if DOL issues a modification more than 10 days prior to the closing date (bid opening) for the solicitation. If DOL modifies or supersedes the applicable wage determination less than 10 days before the closing date, the subrecipient may ask the state recipient whether there is reasonable time to notify interested contractors of the modified wage determination. The state recipient will provide a report of its findings to the subrecipient.
- (ii) If the subrecipient does not award the contract within 90 days after closing the solicitation, any modifications or supersedes DOL makes to the wage determination contained in the solicitation shall be effective unless the state recipient obtains, at the subrecipient's request, an extension of the 90 day period from DOL (29 CFR 1.6(c)(3)(iv)). The subrecipient shall monitor <https://beta.sam.gov> on a weekly basis if it does not award the contract within 90 days of closure of the solicitation to ensure that wage determinations contained in the solicitation remain current.
- (b) If the subrecipient carries out activity subject to DB by issuing a task order, work assignment or similar instrument to an existing contractor (ordering instrument) rather than by publishing a solicitation, the subrecipient shall insert the appropriate DOL wage determination from <https://beta.sam.gov> into the ordering instrument.
- (c) Subrecipients shall review all subcontracts subject to DB that prime contractors enter into to verify that the prime contractor required its subcontractors to include the applicable wage determinations.
- (d) If DOL determines that the subrecipient failed to incorporate a wage determination or used a wage determination that clearly doesn't apply to the contract or ordering instrument, it may issue a revised wage determination after the subrecipient awarded the contract or issued an ordering instrument (29 CFR 1.6(f)). If this occurs, the subrecipient must either terminate and issue a revised contract or ordering instrument, or use a change order to incorporate DOL's wage determination into the contract or ordering instrument retroactive to the beginning. The subrecipient must compensate its contractor for any wage increases resulting from DOL's revised wage determination.

STATE AND FEDERAL FUNDING REQUIREMENTS

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**ATTACHMENT 1A  
LABOR STANDARDS PROVISIONS  
MUNICIPAL BORROWERS**

**Contract and Subcontract provisions.**

(a) The recipient must ensure that subrecipient(s) insert the following clauses in full in any contract in excess of \$2,000 entered for the actual construction, alteration or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from federal funds, or according to guarantees of a federal agency or financed from funds obtained by pledge of any contract of a federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the FY 2013 Continuing Resolution:

(1) Minimum wages.

- (i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Subrecipients may obtain wage determinations from the U.S. Department of Labor at <https://beta.sam.gov>.

- (ii)(A) The subrecipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The state award official shall approve a request for an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

- (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

- (2) The classification is utilized in the area by the construction industry; and
  - (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
- (B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the subrecipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), documentation of the action taken and the request, including the local wage determination shall be sent by the subrecipient(s) to the state award official. The state award official will transmit the request, to the administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210 and to the EPA DB Regional Coordinator concurrently. The administrator, or an authorized representative, will approve, modify, or disapprove every additional classification request within 30 days of receipt and so advise the state award official or will notify the state award official within the 30-day period that additional time is necessary.
  - (C) If the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the subrecipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the request and the local wage determination, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The request shall be sent to the EPA DB Regional Coordinator concurrently. The administrator, or an authorized representative, will issue a determination within 30 days of receipt of the request and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.
  - (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.
- (iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.
  - (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.
- (2) Withholding. The subrecipient(s), shall upon written request of the EPA award official or an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract or any other federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the (Agency) may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary

STATE AND FEDERAL FUNDING REQUIREMENTS

to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b) (2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii) (A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the subrecipient, that is, the entity that receives the subgrant or loan from the state capitalization grant recipient. Such documentation shall be available on request of the state recipient or EPA. As to each payroll copy received, the subrecipient shall provide written confirmation in a form satisfactory to the state indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division website at <http://www.dol.gov/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the subrecipient(s) for transmission to the state or EPA if requested by the EPA, the state, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the subrecipient(s).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance" signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under § 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is

- being maintained under § 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;
- (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;
  - (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.
- (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph (a)(3)(ii)(B) of this section.
- (D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.
- (iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the state, EPA or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the federal agency or state may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.
- (4) Apprentices and trainees.
- (i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a state Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a state Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with

STATE AND FEDERAL FUNDING REQUIREMENTS

the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. If the Office of Apprenticeship Training, Employer and Labor Services, or a state Apprenticeship Agency it recognizes, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

- (ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits according to the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. IF the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
  - (iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
- (5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.
  - (6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.
  - (7) Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.
  - (8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.
  - (9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be

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resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Subrecipient(s), state, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

- (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).
- (iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

**4. Contract Provision for Contracts in Excess of \$100,000.**

- (a) Contract Work Hours and Safety Standards Act. The subrecipient shall insert the following clauses set forth in paragraphs (a)(1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by Item 3, above or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.
  - (1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.
  - (2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.
  - (3) Withholding for unpaid wages and liquidated damages. The subrecipient, upon written request of the EPA award official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.
  - (4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the

clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

- (b) In addition to the clauses contained in Item 3, above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the subrecipient shall insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the subrecipient shall insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

#### 5. Compliance Verification

- (a) The subrecipient shall periodically interview a sufficient number of employees entitled to DB prevailing wages (covered employees) to verify that contractors or subcontractors are paying the appropriate wage rates. As provided in 29 CFR 5.6(a)(6), all interviews must be conducted in confidence. The subrecipient must use Standard Form 1445 (SF 1445) or equivalent documentation to memorialize the interviews. Copies of the SF 1445 are available from EPA on request.
- (b) The subrecipient shall establish and follow an interview schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. Subrecipients must conduct more frequent interviews if the initial interviews or other information indicated that there is a risk that the contractor or subcontractor is not complying with DB. Subrecipients shall, "immediately conduct interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence."
- (c) The subrecipient shall periodically conduct spot checks of a representative sample of weekly payroll data to verify that contractors or subcontractors are paying the appropriate wage rates. The subrecipient shall establish and follow a spot check schedule based on its assessment of the risks of noncompliance with DB posed by contractors or subcontractors and the duration of the contract or subcontract. At a minimum, if practicable, the subrecipient should spot check payroll data within two weeks of each contractor or subcontractor's submission of its initial payroll data and two weeks prior to the completion date the contract or subcontract. Subrecipients must conduct more frequent spot checks if the initial spot check or other information indicates that there is a risk that the contractor or subcontractor is not complying with DB. In addition, during the examinations the subrecipient shall verify evidence of fringe benefit plans and payments thereunder by contractors and subcontractors who claim credit for fringe benefit contributions.
- (d) The subrecipient shall periodically review contractors and subcontractors use of apprentices and trainees to verify registration and certification with respect to apprenticeship and training programs approved by either the U.S Department of Labor or a state, as appropriate, and that contractors and subcontractors are not using disproportionate numbers of, laborers, trainees and apprentices. These reviews shall be

conducted in accordance with the schedules for spot checks and interviews described in Item 5(b) and (c) above.

- (e) Subrecipients must immediately report potential violations of the DB prevailing wage requirements to the EPA DB contact listed above and to the appropriate DOL Wage and Hour District Office listed at <http://www.dol.gov/contacts/whd/america2.htm>.

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**ATTACHMENT 2  
FEDERAL & STATE WAGE RATE DETERMINATIONS**

Washington State Prevailing Wage Determination is included as Appendix G can be found at <https://secure.lni.wa.gov/wagelookup/>

Federal Davis-Bacon Wage Determination is included as Appendix H and can be found at <https://beta.sam.gov>

This project is subject to the higher of the two wages for each wage classification.

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**ATTACHMENT 3  
CERTIFICATION OF NONSEGREGATED FACILITIES**

(Applicable to federally assisted construction contracts and related subcontracts exceeding \$10,000, which are not exempt from the Equal Opportunity clause.)

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor certifies, further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work area, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or area, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed contractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity clause, and that he will retain such, certification in this file.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name and title of signer (please type)

[THIS FORM SHALL BE COMPLETED IN FULL AND SUBMITTED WITH THE BID PROPOSAL]

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**ATTACHMENT 4  
NOTICE TO LABOR UNIONS OR OTHER ORGANIZATION OF WORKERS: NON-  
DISCRIMINATION IN EMPLOYMENT**

TO: \_\_\_\_\_  
(name of union or organization of worker)

The undersigned currently holds contract(s) with \_\_\_\_\_  
(name of applicant)

involving funds or credit of the U.S. Government or (a) subcontract(s) with a prime contractor holding such contract(s).

You are advised that under the provisions of the above contract(s) or subcontract(s) and according to Section 202 of Executive Order 11246 dated September 24, 1965, the undersigned is obliged not to discriminate against any employee or applicant for employment because of race, color, creed, or national origin. This obligation not to discriminate in employment includes, but is not limited to, the following:

EMPLOYMENT, UPGRADING, TRANSFER OR DEMOTION

RECRUITMENT AND ADVERTISING

RATES OF PAY OR OTHER FORMS OF COMPENSATION

SELECTION FOR TRAINING INCLUDING APPRENTICESHIP, LAYOFF OR TERMINATION

This notice is furnished to you pursuant to the provisions of the above contract(s) or subcontract(s) and Executive Order 11246.

The undersigned will post copies of this notice in conspicuous places available to employees or applicants for employment.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
(Contractor or Subcontractor(s))

\_\_\_\_\_  
(Date)

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**ATTACHMENT 5  
AMERICAN IRON AND STEEL PROVISION  
USE OF AMERICAN IRON AND STEEL**

**MUST BE INCLUDED IN ALL CONTRACTS (PRIME AND SUB-CONTRACTORS):**

This provision applies to projects for the construction, alteration, maintenance, or repair of a public water system as defined in the Safe Drinking Water Act (42 U.S.C 300j-12). This provision does not apply if the Department of Health approved the engineering plans and specification for the project prior to January 17, 2014.

The contractor acknowledges to and for the benefit of the project owner and Washington State that she or he understands that the Drinking Water State Revolving Loan Fund is paying for the goods and services under this agreement. DWSRF contains provisions, commonly known as “Buy American;” that requires all iron and steel products used in the project be produced in the United States (American Iron and Steel Requirements). The act defines iron and steel products as, “...the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.”

The contractor hereby represents and warrants to and for the benefit of the project owner and the state that:

- a) The contractor has reviewed and understands the American Iron and Steel Requirements,
- b) All of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirements, unless a waiver of the requirements is approved, and
- c) The contractor will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirements, as may be requested by the project owner or the state.

Notwithstanding any other provisions of this agreement, any failure to comply with this paragraph by the contractor shall permit the project owner or state to recover as damages against the contractor any loss, expense or cost (including without limitation attorney’s fees) incurred by the project owner or state resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or part, from the state or any damages owed to the state by the project owner). While the contractor has no direct contractual obligation with the state, as a lender to the project owner for the funding of its project, the project owner and the contractor agree that the state is a third-party beneficiary and neither this paragraph nor any other provision of the agreement necessary to give this paragraph force or effect shall be amended or waived without the prior written consent of the state.

## AIS Product Questions

### **1. Q: Do all fasteners qualify for de minimis exemption?**

**A: No.** There is no broad exemption for fasteners from the American Iron and Steel (AIS) requirements. Significant fasteners used in SRF projects are not subject to the de minimis waiver for projects and must comply with the AIS requirements. Significant fasteners include fasteners produced to industry standards (e.g., ASTM standards) and/or project specifications, special ordered or those of high value. When bulk purchase of unknown-origin fasteners that are or incidental use and small value are used on a project, they may fall under the national de minimis waiver for projects. The list of potential items could be varied, such as big-box/hardware-store-variety screws, nails, and staples. The key characteristics of the items that may qualify for the de minimis waiver would be items that are incidental to the project purpose (such as drywall screws) and not significant in value of purpose (such as common nails or brads). EPA also clarifies that minor components of two listed products – valves and hydrants – may not need to meet the AIS requirements if the minor components compromise a very small quantity of minor, low-cost fasteners that are of unknown origin.

### **2. Q: If the iron or steel is made from recycled metals will the vendor/supplier have to provide a certification document certifying that the recycled metals are domestically produced?**

**A: No.** Recycled source materials used in the production of iron and steel products do not have to come from the U.S. Iron or steel scrap, for instance, are considered raw materials that may come from anywhere. While certification is not required for the raw material, EPA does recommend that additional final processing of iron and steel be certified to have occurred in the U.S.

### **3. Q: Do tanks used for filtration systems, if delivered to the construction site separately and then filled with filtration media onsite, have to be domestically produced?**

**A: No.** Tanks that are specifically designed to be filters, or as parts of a filtration system, do not have to be domestically produced because these parts are no longer simply tanks, even if the filter media has not been installed and will be installed at the project site, as is customary to do for shipping purposes. These parts have only one purpose which is to be housing for filters and cannot be used in another fashion.

### **4. Q: Can a recipient use non-domestic flanged pipe?**

**A: No.** While the Consolidated Appropriations Act of 2014 does not specifically mention flanged pipe, since it does mention both pipe and flanges, both products would need to be domestically produced. Therefore, flanged pipe would also need to be domestically produced.

### **5. Q: Can a recipient use non-domestic couplings, expansion joints, and other similar pipe connectors?**

**A: No.** These products would be considered specialty fittings, due to their additional functionality, but still categorized under the larger “fitting” categorization. Fittings are defined as a material that joins pipes together or connects to a pipe (AWWA, The Drinking Water Dictionary, 2000). Therefore, these products must comply with the AIS requirements and be produced domestically.

### **6. Q: The AIS guidance does not appear to cover reused items (i.e. existing pipe fittings, used storage tanks, reusing existing valves). How should reused items be addressed?**

**A:** The AIS guidance does not address reuse of items. Reuse of items that would otherwise be covered by AIS is acceptable provided that the item(s) was originally purchased prior to January 17, 2014, the reused item(s) is not substantially altered from original form/function, and any iron or steel replacement parts. EPA recommends keeping

a log of these reused items by including them on the assistance recipient's de minimis list, and stating therein that these items are reused products. The donation of new items (such as a manufacturer waiving cost for certain delivered items because of concerns regarding the origin of a new product) is not, however, considered reuse.

**7. Q: If a product is not specifically included on the list of AIS covered products, must it comply with AIS?**

**A: Possibly.** The AIS requirements include a list of specifically covered products, one of which is construction materials, a broad category of potential products. For construction materials, EPA's AIS guidance included a set of example items that it considered construction materials composed primarily of iron and steel and covered by the Act. This example list in the guidance is not an all-inclusive list of potential construction materials. However, the guidance also includes a list of items that EPA specifically does not consider construction materials, generally those of electrical or complex-mechanical nature. If a product is similar to the ones in the non-construction material list (and it is also not specifically listed by the Act), it is not a construction material. For all other items specifically included in the Act, coverage is generally self-evident.

**8. Q: If a listed iron and steel product is used as a part for an assembled product that is non-domestic, do the AIS requirements apply?**

**A:** AIS requirements only apply to the final product as delivered to the work site and incorporated into the project. Other assemblies, such as a pumping assembly or a reverse osmosis package plant, are distinct products not listed and do not need to be made in the U.S. or composed of all U.S. parts. Therefore, for the case of a non-covered product used in a larger non-domestic assembly, the components, even if specifically listed in the Consolidated Appropriates Act, do not have to be domestically produced.

**9. Q: Is cast iron excluded from the AIS requirements?**

**A:** No. Cast iron products that fall under the definition of iron and steel products must comply with the AIS requirements.

**10. Q: The guidance states that "construction materials" do not include mechanical equipment, but then identifies ductwork as a construction material. Please clarify.**

**A:** Ductwork is not mechanical equipment, therefore it is considered a "construction material" and must comply with the AIS requirements.

**11. Q: Do "meters" mentioned in EPA's guidance as non-construction materials include both flow meters and water meters?**

**A: Yes.** "Meters" includes any type of meter, including: flow meters, wholesale meters, and water meters/service connections.

**12. Q: Can assistance recipients rely on a marking that reads, "Made in the USA," as evidence that all processes took place in the U.S.?**

**A: No.** This designation is not consistent with our requirements that all manufacturing processes of iron and steel products must take place in the U.S.

**13. Q: Are Sluice and Slide Gates considered valves?**

**A: No.** Valves are products that are generally encased/enclosed with a body, bonnet, and stem. Examples include butterfly, ball, globe, piston, check, wedge, and gate valves. Furthermore, "gates" (meaning sluice, slide or weir gates) are listed in EPA's guidance as non-construction materials.

**SECTION 01010**  
**SUMMARY OF WORK**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section contains a summary of the Work in this Contract and other known work in the vicinity of this Contract.
- B. The Work to be performed under this Contract shall consist of furnishing tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The Work shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work shall be provided by the Contractor as though originally so indicated.

**1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work of this Contract includes the following:
  - 1. Installation of water transmission and distribution piping and services within right-of-way and private property within the city of Mount Vernon and unincorporated Skagit County.
  - 2. The water transmission pipeline is 36 inches in diameter and is approximately 5.3 miles long.
  - 3. The Work will consist of the following elements:
    - a. Layout and staking of all features under this Contract.
    - b. Clearing and grubbing of the corridor.
    - c. Mobilization and preparation of site and supporting utilities for Contactor and District field office facilities. Includes removal of facilities and restoration of property.
    - d. Removal of structures.
    - e. Installation, maintenance, and removal of temporary erosion control measures.
    - f. Installation and removal of temporary bypass systems for streams.
    - g. Potholing of existing utilities.
    - h. Installation and maintenance of temporary traffic control measures.
    - i. Installation of approximately 5.3 miles of 36-inch-diameter water transmission pipeline. Of the approximately 5.3 miles of water transmission pipeline:
      - 1) Approximately 23,590 linear feet of 36-inch-diameter welded steel pipe and fittings (cement mortar lined and polyurethane coated) installed by open trench construction.
      - 2) Approximately 2,060 linear feet of 36-inch-diameter welded steel pipe and fittings (polyurethane lined and coated) installed by open trench construction.
      - 3) Approximately 1,920 linear feet of 36-inch-diameter welded steel pipe (polyurethane lined and coated) installed by horizontal directional drilling under the Nookachamps Creek.
      - 4) Approximately 230 linear feet of 36-inch-diameter welded steel pipe and fittings (polyurethane lined and coated) installed under the bridge for the East Fork Nookachamps Creek crossing.
      - 5) Approximately 150 linear feet of 36-inch-diameter welded steel pipe (cement mortar lined and polyurethane coated) installed within a 48-inch-diameter steel casing installed by bored and jacked casing methods under State Route 9.
    - j. Design and installation of dewatering and treatment systems to allow open trenching and pipe installation.
    - k. Handling of surface water.
    - l. Special crossings of roadways including bored and jacked cased crossings of State Route (SR) 9 and phased open cut crossing of SR 538.

- 1) Approximately 75 linear feet of 8-inch-diameter ductile iron pipe installed within an 18-inch-diameter steel casing installed by bored and jacked casing methods under State Route 9.
  - 2) Approximately 150 linear feet of 36-inch-diameter welded steel pipe (cement mortar lined and polyurethane coated) installed within a 48-inch-diameter steel casing installed by bored and jacked casing methods under State Route 9.
  - 3) Approximately 190 linear feet of 36-inch-diameter welded steel pipe (cement mortar lined and polyurethane coated) installed by open cut construction under State Route 9.
- m. Special crossing of Stream A involving a temporary stream bypass, the installation of a fish passable precast concrete box culvert.
  - n. Special crossing of Clear Lake Tributary involving a stream bypass and open trench construction.
  - o. Special crossing of the East Fork Nookachamps Creek constructing a new 220 lineal foot single span steel truss bridge.
  - p. Tapping into finished water line and installation of two (2) 36-inch-diameter flow meters in vaults, and associated electrical and SCADA at the Judy Reservoir Water Treatment Plant.
  - q. Installation of a 4-inch-diameter fiber optic conduit and handholes for the entire alignment of the 36-inch-diameter water transmission pipeline, including an approximate 1,930-foot-long HDD of the Nookachamps Creek.
  - r. Installation of new water distribution lines and pressure reducing valve stations.
  - s. Repair or replacement of existing water services.
  - t. Connections to the District's existing water distribution lines and services along the alignment.
  - u. Installation of pipeline appurtenances, including isolation valves, air valves, drains, manway access, anchor blocks, trench plugs, and drain pipes.
  - v. Installation of cathodic protection system with rectifier and deep well anode bed.
  - w. Flushing, disinfection, and pressure testing.
  - x. Protection of existing utilities.
  - y. Protection of existing 24-inch-diameter water transmission pipeline during construction.
  - z. Abandonment of existing 24-inch-diameter water transmission pipeline.
  - aa. Pavement restoration.
  - bb. Construction of approximately 2.3 miles of Service Road along pipeline including grading and installation of storm culverts and drain piping.
  - cc. Restoration of streams and riparian vegetation.
  - dd. Wetland restoration including plantings.
  - ee. Property restoration of various impacted parcels including landscaping, fence replacement, landscape gravity block wall construction, and asphalt/concrete surfacing.
  - ff. Decommissioning of existing groundwater monitoring wells.
  - gg. Watering and maintenance of the planting and other vegetation during the Warranty Period.
4. And other work as defined in the Contract Documents.
- B. The above description is not intended to be complete. The work to be completed is provided for in the Contract Documents. The summary in this Section is not intended to relieve the Contractor of the responsibility for reading and understanding the Contract Documents.
  - C. Federal, State and Local Laws, Statutes and Regulations are not individually referenced. This provision incorporates by reference the latest version of statutes, laws and regulations. In case of conflict between the requirements of the specifications and requirements of the statutes and regulations, the Contractor shall bring them to the attention of the District. Lacking a specific response, the more stringent shall control. In no case can this Contract be interpreted to override statutes and regulations of governing authorities.
  - D. National and industry codes cited, such as IBC, NEC, NFPA, shall include amendments and supplements by the Local Authority Having Jurisdiction whether stated or not.

### **1.3 WORK BY OTHERS**

- A. District will perform all final piping connections to existing District water distribution and service facilities and will operate all valves. (Contractor shall perform final piping connections to existing water transmission pipelines and provide all materials, excavation, excavation support system, dewatering, backfill, compaction, and restoration necessary for the District to perform final connections to existing District water distribution and service facilities.)
- B. Temporary relocation of overhead communication cables and poles at East Fork Nookachamps Creek to allow construction of the bridge. This will be completed before the contractor mobilizes.
- C. De-energizing and re-energizing of PSE overhead power during construction in vicinity of Fox Road to be completed by PSE. Relocating of guy wires if required in vicinity of Fox Road to be completed by PSE. Contractor required to coordinate with PSE, and PSE to bill the District directly for PSE costs.
- D. Cooperate and coordinate with all agencies, trades, and contractors involved in the execution of these as well as work of others not listed but requiring coordination.
- E. Placement of bituminous surface treatment at pipeline crossing of Skagit County roads.

### **1.4 OWNER-FURNISHED MATERIALS**

- A. Water for testing and flushing of water transmission pipeline and water distribution piping and services.

### **1.5 CONTRACT METHOD**

- A. The Work herein will be constructed under a single contract.

### **1.6 MAINTAINING WATER SERVICE TO CUSTOMERS**

- A. The existing 24-inch-diameter water transmission pipeline supplies water to the District's customers in the City of Mount Vernon and adjoining areas. Water service must be maintained at all times, and the existing 24-inch-diameter water transmission pipeline must be protected in place. Short duration shut downs of existing distribution piping are acceptable with District approval to facilitate connection to the new transmission pipeline. Shutdowns must be coordinated with the District.
- B. Individual services on the existing 24-inch-diameter water transmission pipeline must be avoided or repaired and replaced if in conflict with the Work.

### **1.7 SPECIFICATION LANGUAGE**

- A. Specifications are written mostly in imperative and streamlined form. Unless indicated otherwise, this imperative language is directed to the Contractor. Additionally, the words "shall be" shall be included by inference where a colon (:) is used within sentences or phrases.
  - 1. Examples:
    - a. Aggregate: ASTM C33.
    - b. Adhesive: spread with notched trowel.
- B. Whenever there is wording stating that an item is "as specified" or "as shown," the reference is to the Contract Documents. Stating "as specified", "as shown", "or as indicated" does not necessarily refer to a Drawing or Specification, but it refers to either.
- C. The words "Provide" and "Furnish" shall mean supplying, installing and incorporating into the Work including all labor, materials, supplies and equipment necessary to do so. The word "Supply" shall mean to acquire, deliver and transfer the item to the District as specified.
- D. Unless otherwise indicated, all materials and equipment incorporated into the Work shall be as specified and shall be new and free of defects.

### **1.8 DEFINITIONS**

- A. Drawing: means a Drawing that is an element of the Contract Documents.

- B. Acceptable Manufacturers: Manufacturers that may produce material or equipment that meet the requirements of the Contract Documents.

**1.9 REFERENCED SPECIFICATIONS**

- A. Whenever a Specification in this Contract references the specifications of WSDOT or Local Authority Having Jurisdiction, it is to define the technical standards to be met for this Contract. Only the technical standards are referenced. Administrative provisions such as Measurement and Payment of the referenced specifications shall not apply to this Contract in any instance.
- B. District reference documents, such as Standard Details, Water Policy Manual, Drawing Standards, can be found on the District's website at [www.skagitpud.org](http://www.skagitpud.org).

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01012**  
**REFERENCE MATERIAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section lists reference documents for the Contract. Reference documents are provided for informational purposes only and shall not to be considered Contract Documents.
- B. The documents are available on the Procurement Website for this project at Builders Exchange of Washington, <http://bxwa.com/>.

**1.2 REFERENCE DOCUMENTS**

- A. For the Work related to the Contract, the following are considered reference documents:
  - 1. Geotechnical Data Report (GDR) – Judy Reservoir to Mount Vernon Transmission Pipeline - Phase 2 Project. Skagit County, Washington. Shannon and Wilson Inc. November 27, 2018. This report presents results of the field investigations and geotechnical laboratory testing performed and gathered from explorations at the Nookachamps Creek and the East Fork Nookachamps Creek crossings. Locations of the borings are as indicated on the Drawings.
  - 2. Revised Geotechnical Data Report (GDR) – Judy Reservoir to Mount Vernon Transmission Pipeline - Phase 2 Project. Skagit County, Washington. GeoEngineers, Inc. August 12, 2020. This report presents results of the field investigations and geotechnical laboratory testing performed and gathered from explorations along the open trench segments of the pipeline alignment. Locations of the borings are as indicated on the Drawings.
  - 3. Environmental Soils Sampling Report – Judy Reservoir to Mount Vernon Transmission Pipeline Project; Skagit County, Washington. GeoTest Services, Inc. August 12, 2019. This report presents results of the field investigations and geotechnical laboratory and analytical testing performed and gathered from explorations along the abandoned railroad right of way.
  - 4. Record Drawing for Existing 36-inch-diameter Water Transmission Pipeline (Phase 1) at College Way, CO 4385 (dated 12/18/18).
  - 5. Record Drawing for Existing Water Treatment Plant (WTP) (dated 8/90).
  - 6. Record Drawing for Existing 30-inch-diameter Judy Reservoir Sedro Woolley (JRSW) Water Transmission Line, CO 2159 (dated 7/31/70).
  - 7. American Pipe and Construction Company Pipe Layout for Existing 30-inch-diameter JRSW Water Transmission Line (dated 8/15/69).
  - 8. American Pipe and Construction Company Individual Pipe Cut Sheets for Existing 30-inch-diameter JRSW Water Transmission Line (dated 8/4/69).
  - 9. Record Drawing for Existing 8-inch-diameter Waterline at Austin Road, CO 4140 (dated 7/8/02).
  - 10. Record Drawing for Existing Appurtenances at Austin Road, CO 1844 (dated 5/24/06).
  - 11. Record Drawing for Existing 8-inch-diameter Waterline at Beaver Lake and Fox Road, CO 3560 (dated 5/94).
  - 12. Record Drawing for Existing 2-inch-diameter Waterline at Fox Road, CO 3656 (dated 1/25/95).
  - 13. Record Drawing for Existing 12-inch-diameter Waterline at Beaver Lake Road, CO 3287 (dated 10/17/91).
  - 14. Record Drawing for Existing 8-inch-diameter Waterline at Wayward Way, CO 4409 (dated 9/11/06).
  - 15. Record Drawing for Existing 8-inch-diameter Waterline at Wayward Way, CO 4014 (dated 12/9/99).
  - 16. Record Drawing for Existing 8-inch-diameter Waterline at Great Western Lumber Co, CO 4787 (dated 7/24/14).
  - 17. Record Drawing for Existing 6-inch-diameter Asbestos Cement (AC) Waterline at Great Western Lumber Co, CO 2138 (dated 9/17/69).
  - 18. Record Drawing for Existing Service Lanes at Graber Lane, CO 3639 (dated 7/15/94).

19. Record Drawing for Existing 6-inch-diameter Waterline at Old Day Creek Road, CO 2725 (dated 1/78).
20. Record Drawing for Existing 4-inch-diameter Waterline at Timber Lane, CO 2621 (dated 2/6/78).
21. Record Drawing for Existing 8-inch-diameter Waterline at Morford Road, CO 4529 (dated 3/21/07).
22. Record Drawing for Existing 24-inch-diameter Waterline, CO 1569 (dated 5/16/61).

### **1.3 GEOTECHNICAL INFORMATION USE**

- A. The pipeline stationing shown in the GDRs represent a preliminary phase of the design that may have been superseded by the pipeline stationing presented in the Drawings. The location of subsurface exploration points, relative to the pipeline stationing, are visible on the Drawings.
- B. The GDRs are limited in scope and do not fully describe the subsurface conditions that will be encountered while performing the Work. The District's consultants warrant that the data represents, with reasonable accuracy, the conditions and materials found in the specific exploration locations at the time they were made. Neither the District nor the District's consultant can warrant that materials encountered at exploration sites have not been altered or disturbed since the time of exploration. The District and the District's consultants do not warrant the condition, materials, or proportions of materials between explorations.
- C. Depth to subsurface ground water, soil moisture conditions, groundwater gradients, groundwater flow rates, and surface water flow rates will vary seasonally and yearly; therefore, the surface and subsurface water and moisture conditions documented in the GDRs are not a complete description of the subsurface and surface water conditions that will be encountered during execution of the Work.
- D. The Contractor is solely responsible for making reasonable interpretations, deductions, and conclusions as to the nature of the materials to be excavated, difficulties of making and maintaining the required excavations, feasibility of processing on-site excavated soils, and difficulties dewatering surface and subsurface water and doing other Work affected by subsurface conditions, and accepts full responsibility for completing the work.
- E. The Contractor shall make own interpretations, evaluations and conclusions as to the nature of the geotechnical materials and conditions to determine the difficulties performing the Work affected by the geotechnical conditions.
- F. In making interpretations, evaluations, and conclusions, the Contractor shall use the Contract geotechnical documents and the available geotechnical information in a manner that includes a reasonable interpretation after consulting with a Professional Civil Engineer with geotechnical expertise or a Geologist with applicable expertise licensed in the state of Washington.
- G. Conduct other investigations and tests deemed appropriate. Any additional investigation and test information shall be shared with the District.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

### **END OF SECTION**

#### **REFERENCE MATERIAL**

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**SECTION 01025**  
**MEASUREMENT AND PAYMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Measurement is described under each bid item in this Section.
- B. Payment for the various items in the Bid Schedule, as further specified herein, shall include all compensation to be received by the Contractor for furnishing tools, equipment, supplies, and manufactured articles, and for labor, operations, and incidentals appurtenant to the items of work being described, as necessary to complete the various items of the Work, all in accordance with the requirements of the Contract Documents, including appurtenances thereto, and including costs of testing, permits, and cost of compliance with the regulations of public agencies having jurisdiction, including safety and health requirements of the Washington Industrial Safety and Health Act (WISHA) and the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA).
- C. No separate payment will be made for any item that is not specifically set forth in the Bid Schedule or in this Section 01025, and all costs therefore shall be included in the prices named in the Bid Schedule for the various appurtenant items of work.
- D. Indirect costs, such as supervision and overheads, profit, and the general conditions specified in the Contract, shall be allocated to each bid item as applicable for work defined in the bid item. No separate payment will be made to the Contractor for these items.
- E. Payment for the Work of this Contract is defined and included below. No other documents, referenced or otherwise, shall be considered for payment.

**1.2 DEFINITIONS**

- A. Unit Price: An amount of compensation to be paid to the Contractor for a specific unit measurement of material, products, and work.
- B. Lump Sum: The total amount of compensation to be paid to the Contractor for the described item material, products, and work.
- C. Bank cubic yards (BCY): In place volume of existing or compacted materials.
- D. Loose cubic yards (LCY): Volume of materials after excavation or prior to compaction.

**1.3 MEASUREMENT OF QUANTITIES**

- A. Measurement by weight:
  - 1. Weigh on commercial calibrated truck scale per 2021 WSDOT Standard Specifications Section 1-09.2. Weigh tickets must include time of weighing on standard printout.
  - 2. Contractor shall notify the District's Representative of proposed disposal sites for debris, objects, and soils removed from the construction corridor. Contractor shall obtain all permits required for disposal.
  - 3. Contractor shall submit weigh tickets to the District's Representative in a timely manner. Tickets submitted after pay date will not be accepted.
- B. Measurement by volume:
  - 1. Measurement by volume shall be measured by the average-end-area or neat line method depending on the material being measured. All or some computations may be based upon excavation measurements and other data measured at the point of loading (for excavated material) or delivery (for imported material.)
  - 2. Hauling vehicles may be of any size or type provided that the body is of such shape that the actual contents and volumes may be readily and accurately determined.

MEASUREMENT AND PAYMENT

3. If the District's Representative requires, the Contractor shall level loads to facilitate measurement.

#### **1.4 PAYMENT**

- A. Unit Price payment will be made at the unit price indicated on the Bid Schedule for the quantity of each item measured and incorporated into the Work. Payment will be the unit price multiplied by the measured quantity.
- B. Lump sum payment will be paid at the price indicated on the Bid Schedule using the methods specified herein. Payment will be based upon the percentage of completion for each appropriate line item in the Schedule of Values as agreed upon by both the Contractor and the District.
- C. All other work required to complete the work specified in the Contract Documents, but not indicated specifically as a pay item, shall be considered necessary and incidental work.

### **PART 2 - BID ITEMS – Schedule A – PUD work**

#### **ITEM 1. MOBILIZATION**

- A. This bid item shall include all work necessary for mobilization and demobilization.
- B. Measurement shall be in accordance with a reasonable apportionment of the work as established in the accepted Schedule of Values.
- C. Payment will be based upon the percentage of completion for each appropriate line item in the Schedule of Values.
- D. Payment shall be made according to the schedule of payments stated in 2021 WSDOT Standard Specifications Section 1-09.7. In calculating the partial payment due for mobilization, percent completion will be based on the sum of completed work. The partial payment will be the percentage stated in 2021 WSDOT Standard Specifications Section 1-09.7.
- E. Prior to earning 5 percent of the Contract amount as stated in the 2021 WSDOT Standard Specifications Section 1-09.7, partial payment will be made for the mobilization items as listed in Section 01505, plus bond and insurance costs, upon presentation of invoices for work completed.

#### **ITEM 2. FURNISH, INSTALL, MAINTAIN AND REMOVE DISTRICT FIELD OFFICE**

- A. This bid item shall include all work necessary for furnishing, installing, maintaining and removing the District Field Office as specified in section 01520. This bid item also includes restoring the field office site to pre-existing conditions.
- B. Measurement shall be in accordance with a reasonable apportionment of the work as established in the accepted Schedule of Values.
- C. Payment will be based upon the percentage of completion for each appropriate line item in the Schedule of Values.

#### **ITEM 3. SPCC, TESC, CONTRACTOR'S SAFETY PLAN, ACCIDENT PREVENTION PLAN, AND SITE SPECIFIC HEALTH AND SAFETY PLAN**

- A. Measurement for this item shall be per lump sum.
- B. Payment for SPCC, TESC, Contractor's Safety Plan, Accident Prevention Plan, and Site Specific Health and Safety Plan shall constitute full compensation to develop these plans. Payment shall be 20% upon receipt of the final submittal for all plans and the remaining 80% based upon the ratio of current project calendar days and the total project calendar days.

#### **ITEM 4. FURNISH AND MAINTAIN TRAFFIC CONTROL MEASURES**

### **MEASUREMENT AND PAYMENT**

- A. Measurement for traffic control measures shall be per lump sum.
- B. Payment for traffic control measures shall be at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing traffic control measures including but not limited to labor for setup, takedown and maintenance, signs, channelization devices, barriers, and all other traffic control equipment to implement to the traffic control plan. Labor for flagging shall not be included in this item.

**ITEM 5. FURNISH TRAFFIC CONTROL LABOR**

- A. Measurement for Furnish Traffic Control Labor shall be based on the number of labor hours flagging is actually taking place. Measurement shall not include setup and takedown of traffic control signs and devices.
- B. Payment for traffic control labor will be made at the hourly rate named in the Bid Schedule. Price shall constitute full compensation for traffic control labor for flagging and traffic control device setup and maintenance.

**ITEM 6. FURNISH TRAFFIC CONTROL SUPERVISOR (TCS)**

- A. Measurement for Traffic Control Supervisor shall be based on the number of days the Traffic Control Supervisor is present and performing supervisory work, which includes completion of Contractor's Daily Report of Traffic Control – Summary and Traffic Control Logs. A Traffic Control Supervisor is required to be present on site whenever traffic control measures are in place. No additional measure will be made for Traffic Control Supervisor performing work as a Flagger.
- B. Payment for Traffic Control Supervisor will be made at the daily rate named in the Bid Schedule. Price shall constitute full compensation for the Traffic Control Supervisor as identified in the traffic control plan and specifications.

**ITEM 7. FURNISH, INSTALL AND REMOVE EROSION CONTROL MEASURES PER SWPPP**

- A. No measurement will be made for this item.
- B. Payment for furnish, install and remove erosion control measures per SWPPP shall constitute full compensation to furnish, install and remove erosion control measures in accordance with the SWPPP. Payment shall be made at 20 percent upon notification of transfer of SWPPP, 40% upon installation and remaining 40% upon removal of the Erosion Control Measures per SWPPP.

**ITEM 8. MAINTAIN EROSION CONTROL MEASURES PER SWPPP BY EROSION AND SEDIMENT CONTROL LEAD (ESC)**

- A. Measurement will be made per day for this item.
- B. Payment for inspecting and maintaining erosion control measure per SWPPP by a Certified Erosion and Sediment Control Lead shall constitute full compensation for inspecting and maintaining erosion control measures in accordance with the SWPPP. Payment shall be made per day for each day than an inspection is made and a report is filed.

**ITEM 9. FURNISH, INSTALL AND REMOVE HIGH VISIBILITY/SILT FENCE**

- A. Measurement will be made per made per lineal foot for this item.
- B. Payment for furnish, install and remove high visibility/silt fence shall constitute full compensation for furnishing, installing and removing high visibility/silt fence in areas shown on

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the drawings. Any additional high visibility/silt fence included in the contractor's SWPPP will not be compensated via this pay item and shall be included in pay item titled "Furnish, Install and Remove Erosion Control Measures per SWPPP".

**ITEM 10. WETLAND PRE AND POST CONSTRUCTION SURVEY**

- A. No measurement shall be made for this item.
- B. Payment for wetland pre and post construction survey shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete a wetland asbuilt survey in accordance with the Contract Documents. 50% of payment will be made upon completion of the preconstruction survey and the remaining 50% upon the completion of the post construction survey.

**ITEM 11. SURVEY MONUMENT RESTORATION**

- A. Measurement for survey monument restoration shall be based on the individual survey control monuments restored in accordance with the Contract Documents.
- B. Payment shall be made at the unit price bid per each restored monument, including all labor, materials, equipment, and all other work necessary for a complete restoration per the Contract Documents.

**ITEM 12. FURNISH, INSTALL, AND REMOVE CONSTRUCTION ENTRANCE**

- A. Measurement for construction entrances shall be per each based upon the number of construction entrances placed.
- B. Payment for construction entrances shall be made at the unit price named in the Bid Schedule. Item includes quarry spalls, geotextile fabric, temporary culverts, and related work necessary to construct and maintain construction entrances and remove and restore the area.
- C. Payment will be made at 60 percent of the unit price after installation, and the remaining 40 percent of the unit price will be paid after removal.

**ITEM 13. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 1**

- A. Measurement for furnish, install and remove Construction Staging Area 1 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 1 shall constitute full compensation to furnish, install and remove Construction Staging Area 1. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 14. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 2**

- A. Measurement for furnish, install and remove Construction Staging Area 2 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 2 shall constitute full compensation to furnish, install and remove Construction Staging Area 2. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 15. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 3**

- A. Measurement for furnish, install and remove Construction Staging Area 3 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 3 shall constitute full compensation to furnish, install and remove Construction Staging Area 3. Payment shall include

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all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 16. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 4**

- A. Measurement for furnish, install and remove Construction Staging Area 4 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 4 shall constitute full compensation to furnish, install and remove Construction Staging Area 4. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 17. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 5**

- A. Measurement for furnish, install and remove Construction Staging Area 5 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 5 shall constitute full compensation to furnish, install and remove Construction Staging Area 5. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 18. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 6**

- A. Measurement for furnish, install and remove Construction Staging Area 6 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 6 shall constitute full compensation to furnish, install and remove Construction Staging Area 6. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 19. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 7**

- A. Measurement for furnish, install and remove Construction Staging Area 7 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 7 shall constitute full compensation to furnish, install and remove Construction Staging Area 7. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 20. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 8**

- A. Measurement for furnish, install and remove Construction Staging Area 8 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 8 shall constitute full compensation to furnish, install and remove Construction Staging Area 8. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 21. FURNISH, INSTALL AND REMOVE CONSTRUCTION STAGING AREA 9**

- A. Measurement for furnish, install and remove Construction Staging Area 9 shall be per lump sum.
- B. Payment for furnish, install, remove Construction Staging Area 9 shall constitute full compensation to furnish, install and remove Construction Staging Area 9. Payment shall include

all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 22. FURNISH, INSTALL AND REMOVE OPTIONAL CONSTRUCTION AREA 1**

- A. Measurement for furnish, install and remove Optional Construction Area(s) shall be per lump sum.
- B. Payment for furnish, install, and remove Optional Construction Area(s) shall constitute full compensation to furnish, install and remove the Optional Construction Area(s) the Contractor intends to utilize. Payment shall include all clearing, erosion control measures, temporary livestock fence installation/removal and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 23. FURNISH, INSTALL AND REMOVE OPTIONAL CONSTRUCTION AREA 2**

- A. Measurement for furnish, install and remove Optional Construction Area(s) shall be per lump sum.
- B. Payment for furnish, install, and remove Optional Construction Area(s) shall constitute full compensation to furnish, install and remove the Optional Construction Area(s) the Contractor intends to utilize. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 24. FURNISH, INSTALL AND REMOVE OPTIONAL CONSTRUCTION AREA 3**

- A. Measurement for furnish, install and remove Optional Construction Area(s) shall be per lump sum.
- B. Payment for furnish, install, and remove Optional Construction Area(s) shall constitute full compensation to furnish, install and remove the Optional Construction Area(s) the Contractor intends to utilize. Payment shall include all clearing, erosion control measures, and final restoration. Payment of 60% of the lump sum bid shall be made when staging area is cleared and erosion control measures are in place. Payment of 40% of the lump sum bid shall be made when final restoration is complete.

**ITEM 25. CLEARING LIMITS - BEGINNING OF PROJECT TO STATION 92+10**

- A. Measurement for clearing and grubbing between beginning of project and Station 92+10 shall be per lump sum.
- B. Payment for clearing and grubbing between beginning of project and Station 92+10 shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

**ITEM 26. CLEARING, GRUBBING AND STRIPPING WITHIN DESIGNATED CLEARING LIMITS – STATION 110+10 TO STATION 115+60**

- A. Measurement for clearing and grubbing between Station 110+10 and Station 115+60 shall be per lump sum.
- B. Payment for clearing and grubbing between Station 110+10 and Station 115+60 shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

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**ITEM 27. CLEARING, GRUBBING AND STRIPPING WITHIN DESIGNATED  
CLEARING LIMITS – STATION 115+60 TO STATION 174+80**

- A. Measurement for clearing and grubbing between Station 115+60 and Station 174+80 shall be per lump sum.
- B. Payment for clearing and grubbing between Station 115+60 and Station 174+80 shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

**ITEM 28. CLEARING, GRUBBING AND STRIPPING WITHIN DESIGNATED  
CLEARING LIMITS - STATION 174+80 TO STATION 213+20**

- A. Measurement for clearing and grubbing between Station 174+80 and Station 213+20 shall be per lump sum.
- B. Payment for clearing and grubbing between Station 174+80 and Station 213+20 shall be made at the unit price named in the Bid Schedule and shall include payment for clearing, grubbing, fencing removal. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

**ITEM 29. CLEARING, GRUBBING AND STRIPPING WITHIN DESIGNATED  
CLEARING LIMITS - STATION 213+20 TO STATION 279+00**

- A. Measurement for clearing and grubbing between Station 213+20 and Station 279+00 shall be per lump sum.
- B. Payment for clearing and grubbing between Station 213+20 and Station 279+00 shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

**ITEM 30. CLEARING, GRUBBING AND STRIPPING WITHIN DESIGNATED  
CLEARING LIMITS - STATION 279+00 TO STATION 339+20**

- A. Measurement for clearing and grubbing between Station 279+00 and Station 339+20 shall be per lump sum.
- B. Payment for clearing and grubbing between Station 279+00 and Station 339+20 shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

**ITEM 31. CLEARING, GRUBBING AND STRIPPING WITHIN DESIGNATED  
CLEARING LIMITS - STATION 339+20 TO 361+83**

- A. Measurement for clearing and grubbing between Station 339+20 and Station 361+83 shall be per lump sum.
- B. Payment for clearing and grubbing between Station 339+20 and Station 361+83 shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

**ITEM 32. FURNISH AND INSTALL ADEQUATE SITE AND TRENCH SAFETY  
SYSTEMS**

- A. Measurement for trench safety systems in accordance with WSDOT Standard Specifications 7-08.3(1)B shall be based on the number of linear feet of pipe installed in the trench as determined by measurement along the pipe centerline and through valves and fittings, as used.
- B. Payment for trench safety systems shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing trench safety systems.

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**ITEM 33. FURNISH AND INSTALL RIGID EXCAVATION SUPPORT SYSTEM  
STATIONS – 293+40 TO 294+60 AND 313+72 TO 314+20**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install rigid excavation support system Stations 293+40 to 294+60 and 313+72 to 314+20 shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment to furnish and install rigid excavation support system between Stations 293+40 to 294+60 and 313+72 to 314+20 per the requirements in Section 02160 of the contract documents.

**ITEM 34. FURNISH 36-INCH STEEL PIPE, 3/16" WALL WITH LINING AND COATING**

- A. Measurement for payment for furnishing 36-inch steel pipe, 3/16" wall with lining and coating shall be based upon the number of linear feet of said pipe actually furnished as determined by horizontal measurement along the pipe centerline.
- B. Payment for furnishing 36-inch steel pipe, 3/16" wall with lining and coating shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for furnishing pipe including linings and coatings, attached fittings, flanges, appurtenances, and are properly stored, protected, and insured against loss or damage, in accordance with the Contract Documents.
- C. The short segments of 30-inch 3/16" wall with lining and coating are included in bid items titled "Furnish and Install Tie-in #1 at Judy Reservoir" and "Furnish and Install Tie-in #2 at Judy Reservoir"

**ITEM 35. FURNISH 36-INCH STEEL PIPE, 1/4" WALL WITH LINING AND COATING**

- A. Measurement for payment for furnishing 36-inch steel pipe, 1/4" wall with lining and coating shall be based upon the number of linear feet of said pipe actually furnished as determined by horizontal measurement along the pipe centerline.
- B. Payment for furnishing 36-inch steel pipe, 1/4" wall with lining and coating shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for furnishing pipe including linings and coatings, attached fittings, flanges, appurtenances, and are properly stored, protected, and insured against loss or damage, in accordance with the Contract Documents.

**ITEM 36. FURNISH 36-INCH STEEL PIPE, 1/2" WALL WITH LINING AND COATING**

- C. Measurement for payment for furnishing 36-inch steel pipe, 1/2" wall with lining and coating shall be based upon the number of linear feet of said pipe actually furnished as determined by horizontal measurement along the pipe centerline.
- D. Payment for furnishing 36-inch steel pipe, 1/2" wall with lining and coating shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for furnishing pipe including linings and coatings, attached fittings, flanges, appurtenances, and are properly stored, protected, and insured against loss or damage, in accordance with the Contract Documents.

**ITEM 37. FURNISH 36-INCH STEEL PIPE, 3/8" WALL WITH LINING AND COATING**

- A. Measurement for payment for furnishing 36-inch steel pipe, 3/8" wall with lining and coating shall be based upon the number of linear feet of said pipe actually furnished as determined by horizontal measurement along the pipe centerline.
- B. Payment for furnishing 36-inch steel pipe, 3/8" wall with lining and coating shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for furnishing pipe including linings and coatings, attached fittings, flanges, appurtenances, and are

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properly stored, protected, and insured against loss or damage, in accordance with the Contract Documents.

**ITEM 38. FURNISH 36-INCH STEEL PIPE, 3/4" WALL WITH LINING AND COATING**

- A. Measurement for payment for furnishing 36-inch steel pipe, 3/4" wall with lining and coating shall be based upon the number of linear feet of said pipe actually furnished as determined by horizontal measurement along the pipe centerline.
- B. Payment for furnishing 36-inch steel pipe, 3/4" wall with lining and coating shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for furnishing pipe including linings and coatings, attached fittings, flanges, appurtenances, and are properly stored, protected, and insured against loss or damage, in accordance with the Contract Documents.

**ITEM 39. INSTALL 36" STEEL PIPE (CROSS COUNTRY)**

- A. Measurement for payment for install 36" steel pipe (cross country) shall be based upon the number of linear feet of pipe actually installed outside of road right-of-way as determined by horizontal measurement along the pipe centerline.
- B. Payment for installing 36-inch steel pipe shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required for pipeline alignment survey control, potholing, regrading, protection of existing water system, saw-cutting and asphalt removal, excavation, dewatering in the trench, pipe installation, joint assembly including passholes, lining and coating repair, pipe laying, trenching, furnishing and placing bedding, backfilling and compaction, in accordance with requirements of the Contract Documents. The item shall also include compensation for all labor, material and equipment required for the placement of stockpiled topsoil and to haul and dispose of excess soil.
- C. Payment for installation of Steel Pipe at Nookachamps Creek Crossing (Item #42), East Fork Nookachamps Creek (Item #77), SR 9 Crossing (Item #76), and Clear Lake Tributary Crossing (Item #82) are not included in this Item.

**ITEM 40. INSTALL 36" STEEL PIPE (ROAD RIGHT-OF-WAY)**

- A. Measurement for payment for install 36" steel pipe (road right-of-way) shall be based upon the number of linear feet of pipe actually installed within road Right-of-Way as determined by horizontal measurement along the pipe centerline.
- B. Payment for installing 36-inch steel pipe shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required for pipeline alignment survey control; surveying of pre-construction conditions to support restoration activities; potholing; regrading, protection of existing water system, incidental road sign, mailbox and guardrail removal and replacement; saw cutting and asphalt removal; excavation; regrading, dewatering in the trench; pipe installation; joint assembly including pass holes, lining and coating repair; pipe laying; trenching; furnishing and placing bedding; backfilling and compaction in accordance with requirements of the Contract Documents. The item shall also include compensation for all labor, material and equipment required for the placement of stockpiled topsoil and to haul and dispose of excess soil.
- C. Payment for installation of Steel Pipe at Nookachamps Creek Crossing (Item #42), East Fork Nookachamps Creek (Item #77), SR 9 Crossing (Item #76), and Clear Lake Tributary Crossing (Item #82) are not included in this Item.

**ITEM 41. INSTALL HDD CROSSING AT NOOKACHAMPS CREEK**

- A. No measurement shall be made for this item.

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- B. Payment for the HDD Crossing at Nookachamps Creek shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required for mobilizing, setup, operation and demobilizing of horizontal directional drilling (HDD) and associated site work for staging areas and installing the 3/4 inch wall thickness 36-inch steel pipe and fittings, from Station 91+89.08 to Station 111+04.08 in accordance with the requirements of the Contract Documents. The item shall also include compensation for all labor, material and equipment required for excavating, backfilling, compacting, site clean-up of the entry and exit pits and to haul and dispose of excess soil.

**ITEM 42. INSTALL 36" STEEL PIPE 3/8" & 1/2" WALL (SEISMIC PROVISION SEGMENTS STATIONS 149+40 TO 154+20 AND 197+80 TO 213+53 STATIONS)**

- A. Measurement for payment for installing seismic provision pipe segments Stations 149+40 to 154+20 and 197+80 to 213+53 shall be based upon the number of linear feet of pipe actually installed as determined by horizontal measurement along the pipe centerline.
- B. Payment for installing the seismic provision pipe segments Stations 149+40 to 154+20 and 197+80 to 213+53 shall be made at the unit price per linear foot named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required for pipeline alignment survey control, potholing, regrading, excavation, dewatering in the trench, pipe installation, fitting installation, joint assembly, pipe laying, trenching, furnishing and placing bedding, backfilling and compaction, in accordance with requirements of the Contract Documents. The item shall also include compensation for all labor, material and equipment required for the placement of stockpiled topsoil and to haul and dispose of excess soil.

**ITEM 43. FURNISH AND INSTALL 30" BUTTERFLY VALVES AND DISMANTLING JOINTS**

- A. Measurement for furnish and install butterfly valves shall be per each based on upon the number of valve assemblies installed. Valve assembly includes the butterfly and dismantling joints.
- B. Payment for furnish and install butterfly valves and dismantling joints shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for installing valves, dismantling joints, and valve boxes, complete, including repair of linings and coatings.

**ITEM 44. FURNISH AND INSTALL 36" BUTTERFLY VALVES AND DISMANTLING JOINTS**

- A. Measurement for furnish and install butterfly valves shall be per each based on upon the number of valve assemblies installed. Valve assembly includes the butterfly and dismantling joints.
- B. Payment for furnish and install butterfly valves and dismantling joints shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for installing valves, dismantling joints, and valve boxes, complete, including repair of linings and coatings.

**ITEM 45. FURNISH AND INSTALLATION WELD-O-LET ON EXISTING 24-IN CONCRETE CYLINDER TRANSMISSION LINE**

- A. Measurement and payment for furnish and install weld-o-let on existing 24-inch concrete cylinder transmission line to provide a source of water shall be made per each based on the number of weld-o-lets installed.
- B. Payment shall be made at the per each price named in the bid form. Payment shall constitute full compensation for furnishing and installing weld-o-lets on the existing 24-inch concrete cylinder transmission line including excavation, weld-o-let installation, and backfill.

**ITEM 46. SLOPE TRENCH DRAIN SYSTEM STATION 278+00 TO STATION 286+50**

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- A. Measurement for pipe slope drain shall be based on the number of linear feet of drain pipe placed.
- B. Payment for this item shall be based on linear feet of drain pipe placed as determined by measurement in the field. Price shall constitute full compensation for furnishing and installing this item, including necessary fittings, excavation, and backfill.

**ITEM 47. ENGINEER ORDERED OVER EXCAVATION**

- A. Measurement for payment shall be based upon the cubic yards of material removed from the excavated area as measured in the field.
- B. Payment of this item shall be made at the unit price per cubic yard named in the Bid Schedule. Price shall constitute full compensation for excavating and removing unsuitable material in accordance with the requirements of the Contract Documents.

**ITEM 48. FURNISH AND INSTALL TRENCH STABILIZATION MATERIAL**

- A. Measurement for payment for this item shall be based upon the number of tons of Engineer ordered trench stabilization material placed in the trench, based on truck scale ticket weights.
- B. Payment for this item shall be made at the unit price per ton named in the Bid Schedule. Price shall include full compensation for furnishing, placing, and compacting the imported trench stabilization materials, and for filter fabric below the bottom of trench in accordance with the requirements of the Contract Documents.

**ITEM 49. ROCK EXCAVATION**

- A. Measurement for rock excavation shall be per cubic yard based upon the District's Representative volume measurement of the excavated materials.
- B. Payment for rock excavation shall be per cubic yard as full compensation for all labor, equipment, including loading, hauling, stockpiling, removing, fees, permits, and all other incidental costs.

**ITEM 50. FURNISH AND PLACE CONTROLLED LOW STRENGTH MATERIAL**

- A. Measurement for payment for controlled low strength material (CDF) shall be based upon the number of cubic yards. Measurement shall not include CDF used for Trench Plugs.
- B. Payment for controlled low strength material shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing controlled low strength material as directed but the District.

**ITEM 51. FURNISH AND INSTALL TRENCH PLUGS**

- A. Measurement for trench plugs shall be per each based upon the number of trench plugs installed.
- B. Payment for trench plugs shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing trench plugs.

**ITEM 52. FURNISH AND INSTALL TRENCH PLUGS WITH DRAINS**

- A. Measurement for trench plugs with drains shall be per each based upon the number of trench plugs with drains installed.
- B. Payment for trench plugs with drains shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing trench plugs with drains.

**ITEM 53. FURNISH AND INSTALL SEISMIC RESISTANT HARNESS COUPLINGS  
STATIONS 198+05, 201+75, 205+50, & 209+25**

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- A. Measurement for trench plugs shall be per each based upon the number of seismic resistant harness couplings installed.
- B. Payment for trench plugs shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing each seismic resistant harness coupling.

**ITEM 54. FURNISH AND INSTALL SEISMIC RESISTANT DOUBLE BALL JOINT FITTINGS STATIONS 212+93 AND 213+53**

- A. Measurement for trench plugs shall be per each based upon the number of trench plugs installed.
- B. Payment for trench plugs shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing each seismic resistant double ball joint fitting.

**ITEM 55. DEWATERING SYSTEM STATION 88+60 TO 92+80**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, operation and removing temporary dewatering systems including, but not limited to, sumps, wells, pumping systems, conveyance facilities, and water treatment and sedimentation systems. The dewatering systems shall provide a dry trench as required by the Contract Documents, and clean effluent water suitable for discharge in accordance with NPDES.

**ITEM 56. DEWATERING SYSTEM STATION 110+10 TO 110+80**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, operation and removing temporary dewatering systems including, but not limited to, sumps, wells, pumping systems, conveyance facilities, and water treatment and sedimentation systems. The dewatering systems shall provide a dry trench as required by the Contract Documents, and clean effluent water suitable for discharge in accordance with NPDES.

**ITEM 57. DEWATERING SYSTEM STATION 207+00 TO 279+20**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, operation and removing temporary dewatering systems including, but not limited to, sumps, wells, pumping systems, conveyance facilities, and water treatment and sedimentation systems. The dewatering systems shall provide a dry trench as required by the Contract Documents, and clean effluent water suitable for discharge in accordance with NPDES.

**ITEM 58. FURNISH AND INSTALL KEYBLOCK ON 30" JRSW PIPELINE**

- A. No measurement shall be made for this item.
- B. Payment to furnish and install keyblock on 30" JRSW pipeline shall constitute full compensation for all labor, materials and equipment to furnish and install the keyblock including excavation and backfill to ex grade.

**ITEM 59. FURNISH AND INSTALL TIE-IN #1 AT JUDY RESERVOIR**

- A. No measurement shall be made for this item.

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- B. Payment to furnish and install tie-in #1 at Judy Reservoir shall constitute full compensation for all labor, materials and equipment to furnish and install the tie-in. Payment shall include excavation, backfill to existing grade, furnishing and installing 30" steel pipe, fittings and butterfly valves and dismantling joints, installing 36" steel pipe, fittings and butterfly valve and dismantling joint.
- C. Payment to furnish 36" steel pipe, and 36" butterfly valve and dismantling joint is not included in this item.

**ITEM 60. FURNISH AND INSTALL TIE-IN #2 AT JUDY RESERVOIR**

- A. No measurement shall be made for this item.
- B. Payment to furnish and install tie-in #2 at Judy Reservoir shall constitute full compensation for all labor, materials and equipment to furnish and install the tie-in. Payment shall include excavation, backfill to existing grade, furnishing and installing 30" steel pipe closure piece and install 36" pipe closure piece. Payment shall include all labor, material and equipment to cut and remove segment of the existing 30" JRSW pipeline and install the 30" butterfly valve, blind flange and thrust block. Payment shall include coordination with and assisting PUD crews in accordance with the Contract Documents.
- C. Payment to furnish 36" steel closure piece is not included in this item.

**ITEM 61. FURNISH AND INSTALL TIE-IN #3 AT JUDY RESERVOIR**

- A. No measurement shall be made for this item.
- B. Payment to furnish and install tie-in #3 at Judy Reservoir shall constitute full compensation for all labor, materials and equipment to furnish and install the tie-in. Payment shall include excavation, backfill to existing grade, and install 36" pipe closure piece. Payment shall include all labor, material and equipment to cut and remove segment of the existing 24" JRMV pipeline and install 24" blind flange and thrust block. Payment shall include coordination with and assisting PUD crews in accordance with the Contract Documents.
- C. Payment to furnish 36" steel closure piece is not included in this item.

**ITEM 62. REMOVE SEGMENT, TIE-IN AND CAP 24" TRANSMISSION PIPELINE – STATION 82+38**

- A. No measurement shall be made for this item.
- B. Payment for the removal of a segment, tying-in and capping of the existing 24-inch-diameter Water Transmission Pipeline at Station 82+38 shall constitute full compensation for all labor, materials and equipment to cut and cap the 24" pipeline including excavation, backfill to existing grade. Payment shall include coordination with and assisting PUD crews in accordance with the Contract Documents.

**ITEM 63. ISOLATE AND SECURE EXISTING 24-INCH AND 30-INCH TRANSMISSION PIPELINES AT JUDY RESERVOIR WITH THRUST BLOCKS**

- A. No measurement shall be made for this item.
- B. Payment for the isolation and securing of the existing 24-inch and 30-inch diameter Water Transmission Pipelines at Judy Reservoir shall constitute full compensation for all labor, materials and equipment to provide and install blind flanges to isolate the transmission lines and provide thrust blocks to secure them as indicated in the drawings. Payment shall include coordination with and assisting PUD crews in accordance with the Contract Documents.

**ITEM 64. FURNISH AND INSTALL 8" DISTRIBUTION LINE AND WATER METER CONNECTIONS STATION 899+35.66 TO STATION 921+34 ON OLD DAY CREEK RD.**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8" distribution line and water meter connections at Stations 899+35.66 to Station 921+34 shall constitute full compensation for all labor, material and equipment to furnish and install 8" water distribution piping, 2" water services and casings, meter vaults, fittings, valves, and appurtenances from Station 899+35.66 to 921+34. Item shall include all pavement removal, saw-cutting, potholing, dewatering, excavation, backfill to existing grade, and connection of distribution piping to the flanged outlet on transmission pipeline. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 65. FURNISH AND INSTALL 8" DISTRIBUTION LINE ON TIMBER LANE**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8" distribution line on Timber Lane shall constitute full compensation for all labor, material and equipment to install 8" water distribution piping in the vicinity of Timber Lane. Item shall include all pavement removal, potholing, dewatering, excavation, backfill to existing grade, valving, and connection of distribution piping to existing distribution piping. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 66. FURNISH AND INSTALL 8" DISTRIBUTION LINE CONNECTION AT STATION 322+61**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8" distribution line tie-in at Station 322+61 shall constitute full compensation for all labor, material and equipment to install 8" water distribution piping in the vicinity of Station 322+61. Item shall include all potholing, dewatering, excavation, backfill to existing grade, valving, and connection of distribution piping to existing distribution piping and to the flanged outlet on transmission pipeline. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 67. FURNISH AND INSTALL 8" DISTRIBUTION LINE AND WATER METER CONNECTIONS AT STATION 314+90 (GRABER LANE)**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8" distribution line and water meter connections at Station 314+90 shall constitute full compensation for all labor, material and equipment to install 8" water distribution piping and to serve existing water meters in the vicinity of Station 314+90. Item shall include all potholing, dewatering, excavation, backfill to existing grade, valving, and connection of distribution piping to existing distribution piping and to the flanged outlet on transmission pipeline. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 68. FURNISH AND INSTALL 8" DISTRIBUTION LINE AND WATER METER CONNECTIONS AT STATION 305+92.25 (MERRIFIELD RD.)**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8" distribution line and water meter connections at Station 305+92.25 shall constitute full compensation for all labor, material and equipment to install 8" water distribution piping and to serve existing water meters in the vicinity of Station 305+92.25. Item shall include all potholing, dewatering, excavation, backfill to existing grade, valving, and

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connection of distribution piping to existing distribution piping and to the flanged outlet on transmission pipeline. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 69. FURNISH AND INSTALL MODIFICATIONS TO DISTRIBUTION SYSTEM AND VALVING AT STATION 296+39 (WAYWARD WY)**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8” distribution line and water meter connections at Station 296+39 shall constitute full compensation for all labor, material and equipment to install 8” water distribution piping and to serve existing water meters in the vicinity of Station 296+39. Item shall include all potholing, dewatering, excavation, backfill to existing grade, valving, and connection of distribution piping to existing distribution piping and to the flanged outlet on transmission pipeline. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 70. FURNISH AND INSTALL 8”, 12”, AND 18” DISTRIBUTION PIPING AND METER AND PRV STATIONS IN BEAVER LAKE ROAD**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8”, 12”, and 18” distribution piping and meters and PRV stations in Beaver Lake Road shall constitute full compensation for all labor, material and equipment to install water distribution piping and meter and PRV stations in Beaver Lake Road. Item shall include all pavement removal, saw-cutting, potholing, dewatering, excavation, backfill to existing grade, compaction, valving, vaults, and connection of distribution piping to existing distribution piping and to the flanged outlet on transmission pipeline and electrical and I&C for the meters and PRV stations. Direct utility connection charges are not included and shall be submitted to the District for payment. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 71. FURNISH AND INSTALL 8” DISTRIBUTION LINE ON AUSTIN ROAD**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8” distribution line on Austin Road shall constitute full compensation for all labor, material and equipment to install 8” water distribution piping and install new water meter on Austin Road. Item shall include all pavement removal, potholing, dewatering, excavation, backfill to existing grade, valving, abandonment of existing distribution piping and connection of distribution piping to existing distribution piping and to the flanged outlet on transmission pipeline. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 72. FURNISH AND INSTALL 2” DISTRIBUTION LINE AND SERVICE CONNECTIONS FROM STATION 173+50 TO 197+00 (S. OF SR-9)**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 2” distribution line from Station 173+50 to 197+00 shall constitute full compensation for all labor, material and equipment to install 2” water distribution piping from Station 173+60 to 197+00 including service lines from the 2” main to the point of connection of the existing dwellings as shown at Stations 183+12, 183+50, 190+80 and 196+97. Item shall include all potholing, dewatering, excavation, backfill to existing grade, valving, distribution line appurtenances and connection of distribution piping to the flanged outlet on transmission pipeline. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

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**ITEM 73. FURNISH AND INSTALL 8” AND 2” DISTRIBUTION LINES AND SERVICE CONNECTIONS AT STATION 160+95 (E. OF SR-9)**

- A. No measurement shall be made for this item.
- B. Payment for furnish and install 8” distribution line at Station 160+95 shall constitute full compensation for all labor, material and equipment to install water distribution piping at Station 161+00 to serve existing water services. Item shall include all potholing, dewatering, excavation, backfill to existing grade, valving, 2” PRV station, and connection to the flanged outlet on transmission pipeline. Price to include the installation of water distribution piping within casing pipe. Price for casing pipe installation is not covered in this item. Price includes coordination with and assisting District maintenance/operations staff for final cutover.

**ITEM 74. FURNISH AND INSTALL CULVERT CROSSING AT STREAM A**

- A. No measurement shall be made for this item.
- B. Payment for the Culvert Crossing at Stream A shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials, equipment required for the stream bypassing, trench dewatering, streambed grading, furnishing and installing precast concrete box culvert, streambed restoration and backfilling to tie into grade of existing embankment. The price shall also include the cost to haul excess materials. Payment for the installation of the 36-inch-diameter water transmission pipeline and fiber conduit is not included in this item.

**ITEM 75. FURNISH AND INSTALL 18” TRENCHLESS CROSSING AT SR 9**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required for cased trenchless crossing including furnishing and installing casing pipe, all horizontal and vertical carrier pipe, construction of launching and receiving pits, including excavation, dewatering, sheeting or other wall structures, backfill and compaction, haul and dispose excess soil in accordance with requirements of the Contract Documents.

**ITEM 76. FURNISH AND INSTALL BRIDGE STRUCTURE AND PIPING**

- A. No measurement shall be made for this item.
- B. Payment for Bridge Crossing at East Fork Nookachamps shall be at the lump sum price in the Bid Schedule. Price shall constitute full payment for all labor, materials and equipment for the bridge crossing. Price includes site preparation, construction surveying, abutment construction, superstructure construction including all optional, temporary structures between Stations 169+96 to 172+24. Superstructure construction includes fabrication and erection of a welded, steel truss bridge including bridge bearings, bridge railing, underlying maintenance deck, maintenance railing, compression seal, maintenance access pad, fencing, and gates according to specifications and plan details. Piping installation includes all labor, materials and equipment to install the 36-inch-diameter steel transmission pipeline including coating to match the weathered steel of the bridge and fiber optic conduit including all appurtenances and utility hangers.
- C. Price does not include labor, materials, and equipment for steel piling, pile driving, bridge decking, bridge rails and approach wall items outside of cast-in-place Concrete wingwalls. Price does not include furnishing the 36” diameter steel transmission pipeline.

**ITEM 77. FURNISH AND INSTALL BRIDGE PILES**

- A. Measurement for steel piling shall be based on the number of linear feet of piles placed below cutoff.

- B. Payment for this item shall be based on linear feet of steel piling below cutoff as determined by measurement in the field plus steel pile tips (shoes) for each pile. Price shall constitute full compensation for furnishing and installing this item.

**ITEM 78. FURNISH, INSTALL AND REMOVE PRELOAD AT BRIDGE APPROACHES**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be at the lump sum price in the Bid Schedule. Price shall constitute full payment for all labor, materials, and equipment for placement and removal of preload soils and confinement structure.

**ITEM 79. FURNISH AND INSTALL GEOGRID STABILIZATION RAFT AT ABUTMENT NO. 1**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be at the lump sum price in the Bid Schedule. Price shall constitute full payment for all labor, materials, and equipment for over excavation, placement of geogrid, and imported fill.

**ITEM 80. FURNISH AND INSTALL 48" TRENCHLESS CROSSING AT SR 9**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required for cased trenchless crossing including furnishing and installing casing pipe, install all horizontal and vertical carrier pipe, construction of launching and receiving pits, including excavation, dewatering, sheeting or other wall structures, backfill and compaction, haul and dispose excess soil in accordance with requirements of the Contract Documents.

**ITEM 81. FURNISH AND INSTALL OPEN CUT CROSSING AT CLEAR LAKE TRIBUTARY**

- A. No measurement shall be made for this item.
- B. Payment for the Open Cut Crossing at Clear Lake tributary shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials, equipment required for the pipeline survey control, stream bypassing, fish exclusion, furnishing and installing steel pipe, backfilling, compacting and streambed restoration. The price shall also include the cost to haul excess materials.

**ITEM 82. FURNISH AND INSTALL DRAIN ASSEMBLY**

- A. Measurement for Drain Assembly shall be based on the individual assemblies installed, complete and tested in accordance with the Contract Documents.
- B. Payment shall be made at the unit price bid per each assembly, including all labor, materials, equipment, vaults, piping, and all other work necessary for a complete installation per the Contract Documents.

**ITEM 83. FURNISH AND INSTALL 1" AVAR ASSEMBLY**

- A. Measurement for 1" AVAR assembly shall be based on the individual assemblies installed, complete and tested in accordance with the contract documents.
- B. Payment shall be made at the unit price bid per each assembly, including all labor, materials, equipment, valves, vaults, piping, and all other work necessary for a complete installation per the contract documents.

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**ITEM 84. FURNISH AND INSTALL 2" AVAR ASSEMBLY**

- A. Measurement for 2" AVAR assembly shall be based on the individual assemblies installed, complete and tested in accordance with the contract documents.
- B. Payment shall be made at the unit price bid per each assembly, including all labor, materials, equipment, valves, vaults, piping, and all other work necessary for a complete installation per the contract documents.

**ITEM 85. FURNISH AND INSTALL 4" AVAR ASSEMBLY**

- A. Measurement for combination air-vacuum/air release valve assembly shall be based on the individual assemblies installed, complete and tested in accordance with the Contract Documents.
- B. Payment shall be made at the unit price bid per each assembly, including all labor, materials, equipment, valves, vaults, piping, and all other work necessary for a complete installation per the contract documents.

**ITEM 86. FURNISH AND INSTALL MANWAY**

- A. Measurement for payment for manways shall be based upon the number of manways constructed in place.
- B. Payment for shall be made at the unit price, each, named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing pipe, flanges and appurtenances, including excavation, and backfill in accordance with requirements of the Contract Documents.

**ITEM 87. FURNISH AND INSTALL FLOWMETERS AND VAULTS**

- A. Measurement for payment for flowmeter vaults shall be lump sum.
- B. Payment for furnish and install flowmeters and vaults shall be made at the lump sum price in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required to install the flow meters and vaults. Price shall include excavation, backfill, valves, vaults, flowmeters, piping, electrical improvements and other work necessary to complete installation per the contract documents.

**ITEM 88. WATERLINE FLUSHING, PRESSURE TESTING, DISINFECTION, DECHLORINATION AND BACTERIOLOGICAL TESTING**

- A. Measurement for waterline flushing, pressure testing, disinfection, dechlorination, and bacteriological testing shall be per lump sum.
- B. Payment for waterline pressure testing, flushing, disinfection, dechlorination and bacteria testing shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for waterline pressure testing, flushing and disinfection, dechlorination and bacteria testing, including temporary blocking and connections and other appurtenant work, in accordance with the requirements of the Contact Documents.

**ITEM 89. REMOVE AND REPLACE CULVERT PIPE 12" DIAMETER AND SMALLER**

- A. Measurement for payment for removing and replacing culvert shall be based upon the number of culverts actually placed, assuming an average length of 50-feet for each culvert.
- B. Payment for removing and replacing culvert shall be made at the unit price named in the Bid Schedule assuming an average length of 50-feet for each culvert and 3 feet of cover. Price shall constitute full compensation for all labor, materials and equipment required to remove and reinstall the culvert, in accordance with requirements of the Contract Documents.

**ITEM 90. REMOVE AND REPLACE CULVERT PIPE 12" TO 24" DIAMETER**

MEASUREMENT AND PAYMENT

- A. Measurement for payment for removing and replacing culvert shall be based upon the number of culverts actually placed, assuming an average length of 50-feet for each culvert.
- B. Payment for removing and replacing culvert shall be made at the unit price named in the Bid Schedule assuming an average length of 50-feet for each culvert and 3 feet of cover. Price shall constitute full compensation for all labor, materials and equipment required to remove and reinstall the culvert, in accordance with requirements of the Contract Documents.

**ITEM 91. REMOVE AND REPLACE 36” DIAMETER CULVERT**

- A. No measurement shall be made for this item.
- B. Payment for removing and replacing culvert shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required to remove and reinstall the culvert at Station 163+28, in accordance with requirements of the Contract Documents.

**ITEM 92. FINE GRADING AND FILLING – STATION 500+80 TO STATION 568+00**

- A. Measurement for fine grading and filling shall be per the lump sum price named in the Bid Schedule.
- B. Payment for fine grading and filling shall constitute full compensation for all labor, equipment, and materials, to cut, fill, haul, import, and grade service road prism to the finished grade, and all other incidental costs.

**ITEM 93. FINE GRADING AND FILLING – STATION 583+50 TO STATION 598+00**

- A. Measurement for fine grading and filling shall be per the lump sum price named in the Bid Schedule.
- B. Payment for fine grading and filling shall constitute full compensation for all labor, equipment, and materials, to cut, fill, haul, import, and grade service road prism to the finished grade, and all other incidental costs.

**ITEM 94. PLANING BITUMINOUS PAVEMENT**

- A. Measurement for payment of planing bituminous pavement shall be based upon the number of square yards of pavement grinding as determined by horizontal measurement within the designated limits.
- B. Payment for planing bituminous pavement shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for grinding permanent pavement in accordance with requirements of the Contract Documents.

**ITEM 95. FURNISH, PLACE, COMPACT HOT MIX ASPHALT CONCRETE FOR FINAL TRENCH PATCH AND DRIVEWAY RESTORATION**

- A. Measurement for payment of furnish, place, compact hot mix asphalt concrete for final trench patch and driveway restoration shall be based upon the number of tons placed as determined by truck scale ticket weights.
- B. Payment for furnish, place, compact hot mix asphalt concrete for final trench patch and driveway restoration shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to furnish, place and compact hot mix asphalt for final trench patching in accordance with requirements of the Contract Documents.

**ITEM 96. FURNISH, PLACE, COMPACT HOT MIX ASPAHLT PAVEMENT FOR OVERLAY**

MEASUREMENT AND PAYMENT

- A. Measurement for furnish, place, compact hot mix asphalt pavement for overlay shall be based upon the number of tons placed as determined by truck scale ticket weights.
- B. Payment for furnish, place, compact hot mix asphalt pavement for overlay shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to furnish, place and compact hot mix asphalt overlay in accordance with requirements of the Contract Documents.

**ITEM 97. PAVEMENT MARKING**

- A. Measurement for pavement markings shall be in accordance with WSDOT Standard Specifications shall be based on the number of linear feet installed.
- B. Payment for pavement marking shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and installing pavement marking.

**ITEM 98. FURNISH AND INSTALL SHOULDER BALLAST**

- A. Measurement for payment of shoulder ballast shall be based upon the number of tons placed as determined by truck scale ticket weights.
- B. Payment for shoulder ballast shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for furnishing and placing shoulder ballast in accordance with requirements of the Contract Documents.

**ITEM 99. DRIVEWAY RESTORATION - CSTC**

- A. Measurement for payment for driveway restoration shall be based on the number of tons of CSTC placed at the driveway crossings as determined by truck scale ticket weights.
- B. Payment for driveway restoration shall be made at the unit price per ton named in the Bid Schedule. Price shall constitute full compensation for furnishing, placing and compacting gravel at the driveway crossings in accordance with requirements of the Contract Documents.

**ITEM 100. FURNISH AND INSTALL LANDSCAPE RESTORATION – SCHULBERG AND CANN**

- A. No measurement shall be made for this item.
- B. Payment for landscape restoration shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete landscape restoration on Parcels P125923, and P125924 in accordance with the Contract Documents.

**ITEM 101. FURNISH AND INSTALL LANDSCAPE RESTORATION – JOHNSON**

- A. No measurement shall be made for this item.
- B. Payment for landscape restoration shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete landscape restoration on Parcels P30164 in accordance with the Contract Documents.

**ITEM 102. FURNISH AND INSTALL LANDSCAPE RESTORATION – CANNON**

- A. No measurement shall be made for this item.
- B. Payment for landscape restoration shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete landscape restoration on Parcels P30056 in accordance with the Contract Documents.

**ITEM 103. FURNISH AND INSTALL LANDSCAPE RESTORATION – THOMSON**

MEASUREMENT AND PAYMENT

- A. No measurement shall be made for this item.
- B. Payment for landscape restoration shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete landscape restoration on Parcel P30058 in accordance with the Contract Documents. Landscape restoration to include gravity block walls and drainage improvements.

**ITEM 104. FURNISH AND INSTALL TEMPORARY ACCESS, LANDSCAPING AND RESTORATION – SEVENTH DAY ADVENTIST CHURCH**

- A. No measurement shall be made for this item.
- B. Payment for landscape restoration shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete furnish and install landscape restoration and furnish, install and remove temporary access to Parcel P24796 in accordance with the Contract Documents.

**ITEM 105. FURNISH AND INSTALL DRAINAGE IMPROVEMENTS - LEMLEY**

- A. No measurement shall be made for this item.
- B. Payment for landscape restoration shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete furnish and install landscape restoration and furnish, install and remove temporary access to Parcel P30059 in accordance with the Contract Documents.

**ITEM 106. FURNISH AND INSTALL LANDSCAPE RESTORATION – ALL OTHER PARCELS**

- A. No measurement shall be made for this item.
- B. Payment for landscape restoration shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, material and equipment to complete landscape restoration on all parcels other than P125923, P125924, P30164, P30056, P30058, and P24796 in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 107. FURNISH AND PLACE WETLAND FOREST MIX**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 108. FURNISH AND PLACE SHRUB-SHRUB PLANTING**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period

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**ITEM 109. FURNISH AND PLACE WETLAND SEED MIX 1**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period

**ITEM 110. FURNISH AND PLACE WETLAND SEED MIX 2 (PASTURE)**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 111. FURNISH AND PLACE UPLAND FOREST MIX 1**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 112. FURNISH AND PLACE UPLAND FOREST MIX 1 WITH EROSION CONTROL MATTING**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 113. FURNISH AND PLACE UPLAND SHRUB MIX**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 114. FURNISH AND PLACE UPLAND SHRUB MIX WITH EROSION CONTROL MATTING**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including care, watering & replacement through the warranty period.

**ITEM 115. FURNISH AND PLACE UPLAND SEED MIX**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 116. FURNISH AND PLACE PASTURE SEED MIX**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 117. FURNISH AND PLACE PASTURE SEED MIX WITH EROSION CONTROL MATTING**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 118. FURNISH AND PLACE SOD LAWN SEED MIX**

- A. No measurement shall be made for this item. See plan sheet 04C004 for quantities & descriptions
- B. Payment for this item shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for furnishing, installing and maintaining plantings and seedings in accordance with the Contract Documents, including placement of 4-inches of stockpiled or three-way topsoil (Compost, sand & sandy loam soil), care, watering & reseeding through the warranty period.

**ITEM 119. FURNISH AND INSTALL FENCE TYPE A**

- A. Measurement for furnish and install Fence Type A shall be made based on the linear feet of fence actually installed.

- B. Payment for Fence Type A shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor and equipment required to install fencing, including gates.

**ITEM 120. FURNISH AND INSTALL FENCE TYPE B**

- A. Measurement for furnish and install Fence Type B shall be made based on the linear feet of fence actually installed.
- B. Payment for Fence Type B shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor and equipment required to install fencing, including gates.

**ITEM 121. FURNISH AND INSTALL FENCE TYPE C**

- A. Measurement for furnish and install Fence Type C shall be made based on the linear feet of fence actually installed.
- B. Payment for Fence Type C, shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor and equipment required to install fencing, including gates. Payment shall be 60 percent upon installation and 40% upon removal of fencing.

**ITEM 122. FURNISH AND INSTALL FENCE TYPE D**

- A. Measurement for furnish and install Fence Type D shall be made based on the linear feet of fence actually installed.
- B. Payment for Fence Type D, shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor and equipment required to install fencing, including gates.

**ITEM 123. FURNISH AND INSTALL FENCE TYPE E**

- A. Measurement for furnish and install Fence Type E shall be made based on the linear feet of fence actually installed.
- B. Payment for Fence Type E shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor and equipment required to install fencing, including gates.

**ITEM 124. FURNISH AND INSTALL STANDARD HEAVY-DUTY GATES**

- A. Measurement for furnish and install Standard Heavy-Duty Gates shall be made based on the linear feet of gate actually installed.
- B. Payment for Standard Heavy-Duty Gates shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor and equipment required to install gates.

**ITEM 125. FURNISH AND INSTALL FIBER OPTIC CONDUIT**

- A. Measurement for furnish and install fiber optic conduit shall be made based on the linear feet of conduit actually installed based on horizontal measurement.
- B. Payment for furnish and install fiber optic conduit shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor, and equipment required to install fiber optic conduit including pull string, excavation, bedding and backfill.

**ITEM 126. FURNISH AND INSTALL FIBER OPTIC HANDHOLE**

- A. Measurement for furnish and install fiber optic handhole shall be made based on the number of handholes actually installed.
- B. Payment for furnish and install fiber optic handhole shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for material, labor, and equipment required to install fiber optic handhole including excavation, bedding and backfill.

**ITEM 127. FURNISH AND INSTALL FIBER OPTIC CONDUIT HDD CROSSING  
NOOKACHAMPS CREEK**

- A. No measurement shall be made for this item.
- B. Payment for the furnish and install Fiber Optic Conduit HDD Crossing at Nookachamps Creek shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, materials and equipment required for setup and operation of horizontal directional drilling (HDD) and associated site work for staging areas, furnishing and installing 4-inch conduit and fittings, from Station 91+74.22 to Station 111+19.79 in accordance with the requirements of the Contact Documents.

**ITEM 128. FURNISH AND INSTALL CATHODIC PROTECTION TEST STATIONS**

- A. Measurement of payment for furnish and install cathodic protection test stations shall be made based on the number of test stations actually installed.
- B. Payment for the cathodic protection test stations system shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for all labor, equipment and materials required for the installation of cathodic protection test stations, in accordance with the requirements of the Contact Documents.

**ITEM 129. FURNISH AND INSTALL CATHODIC DEEP WELL ANODE**

- A. No measurement shall be made for this item.
- B. Payment for the cathodic deep well anode shall be made at the lump sum price named in the Bid Schedule. Price shall constitute full compensation for all labor, equipment and materials required for the installation of a complete cathodic deep well anode, in accordance with the requirements of the Contact Documents.

**ITEM 130. FURNISH AND INSTALL LOCKABLE/REMOVEABLE BOLLARDS (NOT  
ALONG TL ROUTE – SEE SCHEDULE B)**

- A. Measurement of payment for furnish and install lockable/removeable bollards (not along transmission line (TL) route – see schedule B) shall be made based on the number of lockable/removeable bollards installed other than those shown along the service road/future trail along the TL route.
- B. Payment for furnish and install lockable/removeable bollards (not along transmission line route – see schedule B) shall be made at the unit price named in the Bid Schedule. Price shall constitute full compensation for all labor, equipment and materials required for the installation of lockable/removeable bollards (not along transmission line route – see schedule B), in accordance with the requirements of the Contact Documents.

**ITEM 131. RECORD DRAWINGS**

- A. No measurement shall be made for this item.
- B. Payment for Record Drawings shall be made at the lump sum price named on the Bid Schedule. It shall constitute full compensation to maintain and submit a detailed set of Record Drawings. Payment shall be made upon the approved submittal of the Record Drawings.

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**ITEM 132. SPARE PARTS**

- A. No measurement shall be made for this item.
- B. Payment for Spare Parts shall be made at the lump sum price named on the Bid Schedule. It shall constitute full compensation to furnish spare parts. Payment shall be made upon the delivery of the spare parts.

**ITEM 133. OPERATIONS AND MAINTENANCE MANUALS**

- A. No measurement shall be made for this item.
- B. Payment for Operations and Maintenance (O&M) Manuals shall be made at the lump sum price named on the Bid Schedule. It shall constitute full compensation to provide Operations and Maintenance Manuals. Payment shall be made upon the delivery of final O&M Manuals.

**ITEM 134. MINOR CHANGE – DISTRICT ORDERED RESTORATION**

- A. Measure is an Allowance.
- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Work related to restoration determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**ITEM 135. MINOR CHANGE – TRANSMISSION LINE INSTALLATION**

- A. Measure is an Allowance.
- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Work related to transmission main installation determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**ITEM 136. MINOR CHANGE – DISTRIBUTION MAIN INSTALLATION**

- A. Measure is an Allowance.
- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Work related to distribution main installation determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**ITEM 137. MINOR CHANGE – BRIDGE INSTALLATION**

- A. Measure is an Allowance.
- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Work related to bridge installation determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**ITEM 138. MINOR CHANGE – BORE AND JACK**

- A. Measure is an Allowance.

- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Bore and Jack work determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**ITEM 139. MINOR CHANGE – HDD INSTALLATION**

- A. Measure is an Allowance.
- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Work related to HDD installation of transmission main determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**ITEM 140. MINOR CHANGE – STORM SEWER/CULVERT INSTALLATION**

- A. Measure is an Allowance.
- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Work related to storm sewer/culvert installation determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**ITEM 141. MINOR CHANGE – DEWATERING**

- A. Measure is an Allowance.
- B. Payment, if any, shall be as authorized by written Field Order prepared by the District. Field Orders shall be prepared to compensate the Contractor for additional Dewatering Work determined by the District as (a) necessary for completion of the project, and (b) Work not covered by existing Bid Items. Payment will be based on prices determined in accordance with WSDOT Section 1-09.4, Equitable Adjustment, as authorized by the District.

**PART 3 - BID ITEMS – Schedule B – Bridge/Service Rd. Improvements**

**ITEM 1. MOBILIZATION**

- A. This bid item shall include all work necessary for mobilization and demobilization for all work included in Bid Schedule B items only.
- B. Measurement shall be in accordance with a reasonable apportionment of the work as established in the accepted Schedule of Values.
- C. Payment will be based upon the percentage of completion for each appropriate line item in the Schedule of Values.
- D. Payment shall be made according to the schedule of payments stated in 2021 WSDOT Standard Specifications Section 1-09.7. In calculating the partial payment due for mobilization, percent completion will be based on the sum of completed work. The partial payment will be the percentage stated in 2021 WSDOT Standard Specifications Section 1-09.7.
- E. Prior to earning 5 percent of the Contract amount as stated in the 2021 WSDOT Standard Specifications Section 1-09.7, partial payment will be made for the mobilization items as listed

MEASUREMENT AND PAYMENT

in Section 01505, plus bond and insurance costs, upon presentation of invoices for work completed.

**ITEM 2. CLEARING, GRUBBING AND STRIPPING WITHIN DESIGNATED CLEARING LIMITS - STATION 598+00 TO STA 623+95.54**

- A. Measurement for clearing and grubbing between Station 598+00 and Station 623+95.54 shall be per lump sum.
- B. Payment for clearing and grubbing between Station 598+00 and Station 623+95.54 shall be made at the unit price named in the Bid Schedule and shall include payment for clearing, grubbing, fencing removal, and disposal between Station 598+00 and 623+95.54. Price shall constitute full compensation for clearing, grubbing, fencing removal, and disposal of debris including grinding of woody material.

**ITEM 3. FURNISH AND INSTALL PRECAST BRIDGE DECK AND ANCHORAGE**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be at the lump sum price in the Bid Schedule. Price shall constitute full payment for all labor, materials, and equipment to furnish and install the precast bridge deck panels including all anchorage.

**ITEM 4. FURNISH AND INSTALL PRECAST BRIDGE RAILING AND APPROACH RAILINGS**

- A. No measurement shall be made for this item.
- B. Payment for this item shall be at the lump sum price in the Bid Schedule. Price shall constitute full payment for all labor, materials, and equipment for the bridge railings and approach railing including footings or installation on walls.

**ITEM 5. FURNISH AND INSTALL PRECAST APPROACH WALLS AND BACKFILL**

- A. Measurement for approach walls shall be per square foot.
- B. Payment for this item shall be per square foot of completed wall in place. Price shall constitute full payment for all labor, materials, and equipment for the bridge crossing approach walls from Station 168+81.29 to 169+88.75 and 172+31.25 to 173+16.25 including contractor wall design; site preparation including all excavation, temporary shoring, and temporary dewatering; and furnishing, placing, and installing gravity blocks, gravel backfill for walls, leveling pads or base course, underdrain, and pigmented sealer.

**ITEM 6. FINE GRADING AND FILLING – STATION 568+00 TO STATION 583+50**

- A. Measurement for fine grading and filling shall be per the lump sum price named in the Bid Schedule.
- B. Payment for fine grading and filling shall constitute full compensation for all labor, equipment, and materials, to cut, fill, haul, import, and grade service road prism to the finished grade, and all other incidental costs.

**ITEM 7. FINE GRADING AND FILLING – STATION 598+00 TO STATION 623+95.54**

- A. Measurement for fine grading and filling shall be per the lump sum price named in the Bid Schedule.
- B. Payment for fine grading and filling shall constitute full compensation for all labor, equipment, and materials, to cut, fill, haul, import, and grade service road prism to the finished grade, and all other incidental costs.

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**ITEM 8. BRIDGE WEIGHT LIMIT SIGNS**

- A. Measurement for Furnishing and Installing Bridge weight limit signs shall be per each named in the Bid Schedule.
- B. Payment for Furnishing and Installing Bridge weight limit signs shall constitute full compensation for all labor, equipment, and materials, to install the bridge weight limit warning signs on each side of the E. Fork Nookachamps Creek Bridge as indicated the contract documents.

**ITEM 9. FURNISH & INSTALL LOCKABLE/REMOVEABLE BOLLARDS ALONG TL ROUTE**

- A. Measurement for Furnishing and Installing Lockable/Removeable Bollards along TL route shall be per each named in the Bid Schedule.
- B. Payment for Furnishing and Installing Lockable/Removeable Bollards along TL route shall constitute full compensation for all labor, equipment, and materials, to install the bollards as per the details along the TL/service road and future trail including but not limited to embedded sleeves and lockable hardware.

**PART 4 - PRODUCTS (NOT USED)**

**PART 5 - EXECUTION (NOT USED)**

**END OF SECTION**

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## SECTION 01060

### PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section specifies permit and easement acquisition, private access agreements, utility consent agreements, and related requirements, and conditions.
- B. Copies of District-obtained permits are included in Appendix A.
- C. Copies of District-obtained easements and private access agreements are included in Appendix B.
- D. Copies of District-obtained utility consent agreements are included in Appendix C.

##### 1.2 SUBMITTALS

- A. Procedures: Section 01300.
- B. Permits obtained by the Contractor.
- C. Washington Department of Ecology, NPDES Construction Stormwater General Permit (WAR308653):
  - 1. Copy of permit that indicates that it has been transferred into the Contractor's name prior to commencing any work that is subject to the conditions stated within the permit.
  - 2. Copy of permit that indicates that it has been transferred back into the District's name prior to Substantial Completion.
- D. Williams Utility Consent Agreement:
  - 1. Copy of Williams Utility Consent Agreement that indicates that it has been transferred into the Contractor's name prior to commencing any work that is subject to the conditions stated within the agreement.
  - 2. Copy of William Utility Consent Agreement that indicates that it has been transferred back into the District's name prior to Substantial Completion.
- E. Easements and private access agreements obtained by the Contractor.
- F. 'Permit Complete' approvals when work is complete and accepted by the Local Authority Having Jurisdiction (LAHJ) whether permits were obtained by the Contractor or the District. Include records of permit documentation and testing results during construction.
- G. Owner Release Forms.

##### 1.3 PERMITS

- A. The District has acquired permits listed in Table A attached to the end of this Section. Comply with and be responsible for all terms and conditions and permit requirements contained in such permits unless indicated otherwise.
- B. The District will provide and pay all fees for the permits listed in Table A unless indicated otherwise. Copies of the District-obtained permits are included in Appendix A.
- C. Washington Department of Ecology, NPDES Construction Stormwater General Permit (WAR308653):
  - 1. Coordinate with Washington Department of Ecology to transfer the Construction Stormwater General Permit into the Contractor's name prior to commencing any work that is subject to the conditions stated within the permit.
  - 2. Coordinate with Washington Department of Ecology to transfer the Construction Stormwater General Permit back into the District's name prior to Substantial Completion.
- D. The following lists permit conditions which are not the responsibility of the Contractor:
  - 1. General:

- a. Any necessary extension of permit deadline will be applied for (and permit fees paid) by the District. Notify the District a minimum of 30 days prior to an extension being necessary.
2. U.S. Army Corps of Engineers Section 10/404 Permit:
  - a. The permittee shall obtain from the Skagit Environmental Bank sponsor documentation of the completed mitigation bank transaction and submittal to the U.S. Army Corps of Engineers, Seattle District, and Regulatory Branch prior to performing work in waters of the U.S. authorized by this permit. *This was completed on September 10, 2020 via a letter from Clear Valley Env. Farm, LLC to US Army COE.*
  - b. Before proceeding with work authorized by this NWP, contact Ecology regarding WQC or CZM requirements. *Per letter dated August 4, 2020 from DOE to George Sidhu, P.E. no individual water quality certificate is required and the project may proceed as directed by the Corps. Any changes that would impact water quality should be submitted in writing to Ecology before work begins for additional review.*
  - c. Request for jurisdictional determination (if believed Corps does not have jurisdiction over all or portions of project).
  - d. Upon completing authorized work, the permittee shall fill out and return Certificate of Compliance with Department of the Army Permit.
  - e. Completing customer service survey.
  - f. Contact district engineer if contractor discovers any previously unknown historic, cultural, or archeological remains and artifacts.
  - g. (NWP Condition 23) Mitigation; however, Contractor shall be responsible for any additional mitigation required based on any design changes proposed.
  - h. (NWP Condition 30) Compliance Certification.
  - i. (NWP Condition 32) Pre-Construction Notification.
3. Washington Department of Fish and Wildlife, Hydraulic Project Approval (2020-4-213+01):
  - a. The owner(s) must maintain the culvert to ensure it provides continued, unimpeded fish passage. If the culvert becomes a hindrance to fish passage, the owner must obtain a Hydraulic Project Approval and provide prompt repair.
  - b. The bridge design and placement must not conflict with future plans to correct the constraining infrastructure of the East Fork Nookachamps watershed.
  - c. Design and construct the bridge to pass water, ice, large wood, and associated woody material and sediment likely to move under the bridge during the 100-year flood flows.
  - d. Plantings must be monitored and maintained for five years to ensure at least 80 percent survival as measured each subsequent September. Reporting must occur on an annual basis to the HB listed. Contractor is required to monitor and maintain plantings per the following below but is not responsible for time frame beyond these durations:
    - 1) Areas Located Outside of Wetlands: Provide maintenance for at least one year (plant establishment period) after Initial Acceptance of Planting.
    - 2) Wetlands: Provide maintenance for the plant establishment period and at least two years after Substantial Completion.
4. Washington Department of Ecology, NPDES Construction Stormwater General Permit (WAR308653):
  - a. Submittal of the Notice of Termination form.
5. City of Mount Vernon, Critical Area Permit (PLAN19-0180):
  - a. The 5-year monitoring and maintenance period for wetlands, wetland buffers, streams, and stream buffers after the plant establishment period and 2-year maintenance period (maintenance required per Section 02900).
  - b. Preparation of the mitigation monitoring report.
6. Washington State Department of Transportation, Utility Franchise Amendment UF 11248C AM 2 for Waterline Installation on SR 9 at MP 51.21 – MP 51.23 (UF 11248C AM 2):
  - a. WSDOT costs for investigating, handling, and granting the Permit or Franchise, including, but not limited to, basic overhead charges and for providing an inspector during construction and/or maintenance of the Utility's facilities.
  - b. WSDOT expended direct and indirect costs associated with applicable provisions of the Permit or Franchise.

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

- c. Modifications or relocations of facilities within WSDOT right-of-way if WSDOT, at its sole discretion, determines that any or all of the Utility's facilities must be modified, removed from, or relocated within the state-owned highway right of way.
    - d. Maintenance of facilities in a condition satisfactory to WSDOT.
  - 7. Washington State Department of Transportation, Utility Franchise Amendment UF 11248C AM 3 for 8-inch-diameter Water Distribution Line on SR 9 at MP 51.00 (UF 11248C AM 3):
    - a. WSDOT costs for investigating, handling, and granting the Permit or Franchise, including, but not limited to, basic overhead charges and for providing an inspector during construction and/or maintenance of the Utility's facilities.
    - b. WSDOT expended direct and indirect costs associated with applicable provisions of the Permit or Franchise.
    - c. Modifications or relocations of facilities within WSDOT right-of-way if WSDOT, at its sole discretion, determines that any or all of the Utility's facilities must be modified, removed from, or relocated within the state-owned highway right of way.
    - d. Maintenance of facilities in a condition satisfactory to WSDOT.
- E. The District will acquire the following permits:
  - 1. Skagit County Right-of-Way/Utility Permit.
  - 2. Skagit County Floodplain Development Permit.
  - 3. Skagit County Building Permit.
  - 4. Skagit County Clearing and Grading Permit.
  - 5. Skagit County Building Permit for District Field Office and Contractor's Field Office. *(Included in Appendix A)*
  - 6. WSDOT SR 9 and SR 538 Construction Access Permit; MP 2.75 to MP 2.79.
- F. Secure and pay for all inspection fees necessary for prosecution and completion of the Work for permits obtained by the Contractor.
- G. Keep fully informed of all local ordinances, as well as state and federal laws, which in any manner affect the work herein specified. At all times comply with said ordinances, laws, and regulations, and protect and indemnify the District and its officers and agents against any claim or liability arising from or based on the violation of such laws, ordinances, or regulations.

**1.4 PERMITS TO BE OBTAINED BY CONTRACTOR**

- A. Obtain all other permits and agreements required to perform the Work not listed as acquired by the District. At a minimum, obtain the following permits:
  - 1. Well drilling permit in accordance with Chapter 173-160 WAC and Chapter 183-162 WAC.
  - 2. Electrical Permit from the Washington State Department of Labor and Industries.
- B. Prepare and submit to the proper LAHJ information required for the issuance of such permits. Pay all costs thereof including agency inspections unless otherwise indicated in the Contract.
- C. Submit a copy of each permit to the District prior to pursuing any work covered by the permit.
- D. When required by the permit and during work progress covered by the permit, the work shall be inspected by the issuing agency. If the District requests access to the work or area, access shall be provided immediately.
- E. Work performed shall be subject to rules and regulations of LAHJ.
- F. Submit a copy of the completed permit with the issuing agency indicating acceptance.

**1.5 POSTING PERMITS**

- A. Post permits, including those obtained by the Contractor, at the Site of the Work as required. Protected permits from the elements.

**1.6 EASEMENTS AND PRIVATE ACCESS AGREEMENTS**

- A. The District has acquired the following easements and private access agreements:

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

Parcel Number	Property Owner (when Easement was Recorded)	Easement/Agreement Type	Easement Recording Number	Expiration Date
No Parcel Number (Wayward Way)	Thomas D. Kassler	Wayward Way Permanent Access	9603180066	Not Applicable (NA)
P24516	Beatrice Lee Johnson	Permanent	606228	NA
P24533	Aurora Le Compte	Permanent	604947	NA
P24533	Clear Valley Environmental Farm, LLC	Permanent	201909250067	NA
P24545	Dalmiro B. and Helen E. Farias	Permanent	610340	NA
P24549	George O. and Eva Wilcox	Permanent	604946	NA
P24559	Charles R. and Kathryn M. Tewalt	Permanent	604623	NA
P24559 P24599 P24601 P24603 P109262	Kathryn M. Tewalt	Permanent	201801180056	NA
P24559 P24599 P24601 P24603 P109262	Kathryn M. Tewalt	Temporary	202002210018	12/31/2024
P24577	Ralph M Bradley	Permanent	605988	NA
P24578	George W. Marchant	Permanent	606229	NA
P24614	Stephen B. and Jillian C. Reynolds	Permanent	201804230114	NA
P24625	Paul O. Wilcox and Marie Wilcox	Permanent	604624	NA
P24692	Aurora Le Compte	Permanent	604945	NA
P24692 P109225	Clear Valley Environmental Farm, LLC	Permanent	201909250066	NA
P24734 P24742	Dorothy M. Lundvall	Temporary	202004060126	12/31/2023
P24743 P24890	Clear Valley Environmental Farm, LLC	Permanent	201909250065	NA

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

Parcel Number	Property Owner (when Easement was Recorded)	Easement/Agreement Type	Easement Recording Number	Expiration Date
P24892 P313295 P131296	Skagit Land Trust	Amendment of Easement/Confirmation Agreement	202008250115	NA
P24804 P24892 P131295 P131296	Skagit Land Trust	Temporary Construction Easement		12/31/27
P24790	Faith Community Fellowship	Temporary	202004150070	12/31/2023
P24796 P24892	Lloyd E. and Hulda E. K. Nelson	Permanent	608565	NA
P24796	Western Washington Corporation of Seventh-Day Adventists	Temporary	201912270111	12/31/2024
P30053 P30072 P105833	Leo J. Pinter and Edith E. Pinter, Nana V. Sherrill, Executrix of the Estate of JM Sherrill	Permanent	611066	NA
P30053 P30072	Daniel D. Taylor and Dorothy L. Tenderholt	Temporary	202004290092	12/31/2024
P30054 P30056 P30057 P30058 P30059 P30060 P30061	Elin Boyd, Willard M. Hendrickson, Ida M. Hendrickson, George J. Theodoratus, and Luis M. Theodoratus	Covenant	794508	NA
P30054 P30056 P30057 P30058 P30059 P30060 P30061	Daric A. and Linda M. Mohler (P30054), James E. and Bertha D. Cannon (P30056), Harlan D. and Robin G. Shinn (P30057), Keith L. and Kathleen A. Thomson (P30058),	Amendment of Covenant	202003060162	NA

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

Parcel Number	Property Owner (when Easement was Recorded)	Easement/Agreement Type	Easement Recording Number	Expiration Date
	Matthew D. Lemley (P30059), Daric A. and Linda M. Mohler (P30060), Sergey I. and Oksana Natekin (P30061)			
P30056	James E. and Bertha D. Cannon	Permanent	201811210075	NA
P30058	Keith L. and Kathleen A. Thomson	Permanent	202003060163	NA
P30058	Keith L. and Kathleen A. Thomson	Temporary	202003060164	12/31/2024
P30059	Matthew D. Lemley	Permanent	201712220072	NA
P30059	Matthew D. Lemley	Timber Lane Permanent Access	201912270110	NA
P30059	Matthew D. Lemley	Temporary	201912270109	12/31/2024
P30074	Dwayne A. and Dorothy H. Kester	Permanent	604620	NA
P30074	Ralph and Myrtle E. Merrifield	Permanent	729304	NA
P30123 P30175 P30201	Cultus View, LLC	Temporary	202002060017	12/31/2024
P30123 P30201	Dorothy Fox	Permanent	605250	NA
P30156 P30163 P30164	Herb and Agnes Johnson	Permanent	607098	NA
P30156	Tamara L. Mayo	Temporary	202007020116	12/31/2023
P30156	Tamara L. Mayo	Merrifield Road and Graber Lane Permanent Access	202007020115	NA

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

Parcel Number	Property Owner (when Easement was Recorded)	Easement/Agreement Type	Easement Recording Number	Expiration Date
P30156 P30157 P104616 P104617	Dale Otto Boyd	Permanent	610341	NA
P30163	Cindy Sue Wise	Merrifield Road and Graber Lane Permanent Access	201912270108	NA
P30163	Cindy Sue Wise	Temporary	201912270105	12/31/2024
P30164	Eric and Deanna Johnson	Temporary	202007140135	12/31/2024
P30164	Eric and Deanna Johnson	Merrifield Road Permanent Access	202007140136	NA
P30169	Robert Boyd	Permanent	201912160170	NA
P30169	Robert Boyd	Temporary	201912160171	12/31/2024
P30170	Robert and Linda Larrabee	Permanent	201707200047	NA
P30170	Tybalt Quale and Deirdra Dong	Temporary	202002210017	12/31/2024
P30175 P30201	Cultus View, LLC	Permanent	202002060016	NA
P30176	William and Marcy Ludemann	Temporary	201912160169	12/31/2024
P30177 P30180	Ronald S. and Dorothy L. Walt	Permanent	202002030041	NA
P30177 P30180	Ronald S. and Dorothy L. Walt	Temporary	202002030040	12/31/2024
P30180	Frank E. Parker	Permanent	604359	NA
P105833	Daniel L. and Stephanie C. Cann	Temporary	201912270107	12/31/2024
P119522 P125921 P125923 P125924 P125930 P125931	Anna Hasler	Permanent	604619	NA
P125921	James S. and Linda J. Martindale	Temporary	201912160167	12/31/2024

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

Parcel Number	Property Owner (when Easement was Recorded)	Easement/Agreement Type	Easement Recording Number	Expiration Date
P125924	Michal D. and Susan E. Cann	Temporary	201912270106	12/31/2024
P125930	Ron and Lora Cork	Temporary	201912160168	12/31/2024
P125931	Chuck Dralle	Permanent	200005160023	NA
P126738	Raymond L. Sundstrom and Vicki M. Tisdel	Permanent	201903150085	NA
P126738	Raymond L. Sundstrom and Vicki M. Tisdel	Temporary	201908220113	12/31/2023

- B. Copies of the easement and private access agreements obtained by the District are included in Appendix B. Unless otherwise indicated, comply with and be responsible for terms and conditions contained in the easements and private access agreements. Comply with additional requirements below:

Parcel Number	Property Owner	Requirements
P24559 P24599 P24601 P24603 P109262	Kathryn M. Tewalt	Provide temporary electric livestock fence to maintain fencing for animals during construction. Coordinate with property owner and the District for location of temporary electric livestock fence.  All merchantable timber within the construction limits on the Tewalt properties are owned by the Contractor. Provide all non-merchantable timber to the property owner to be used as firewood by stockpiling at the location indicated in the Drawings.
P24796	Western Washington Corporation of Seventh-Day Adventists	Work on this property shall not occur on Saturdays or Sundays.  Contractor shall notify the District two weeks before work on this property, so District can notify neighbors within ¼ mile.
P30058	Keith L. and Kathleen A. Thomson	All merchantable timber within the construction limits on the Thomson property are owned by the Contractor. Provide all non-merchantable timber to the property owner to be used as firewood by stockpiling at the location indicated in the Drawings.
P30059	Matthew D. Lemley	Property includes buried invisible fencing. Property owner will reroute invisible fencing prior to construction and reinstall after construction. Coordinate with property owner.  For all trees cleared and grubbed within construction limits on the Lemley property, provide timber to property owner.
P30123 P30175 P30201	Cultus View, LLC	Provide temporary livestock fence to maintain fencing for sheep during construction. Coordinate with property owner and the District for location of temporary livestock fence.  All trees within construction limits on Cultus View LLC properties are to be cleared by property owner prior to construction. Area within construction limits shall be grubbed by the Contractor.

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

Parcel Number	Property Owner	Requirements
P30156	Tamara L. Mayo	Provide temporary electric livestock fence to maintain fencing for animals during construction. Coordinate with property owner and the District for location of temporary electric livestock fence.  Coordinate with the property owner to relocate horse to the upper field prior to accessing and removing existing fencing.
P30169	Robert Boyd	For all trees cleared and grubbed within construction limits on the Boyd property, provide timber to the property owner.
P30170	Tybalt Quale and Deirdra Dong	Provide temporary livestock fence to maintain fencing for animals during construction. Coordinate with property owner and the District for location of temporary livestock fence.
P30177 P30180	Ronald S. and Dorothy L. Walt	Transport 18 horses from the Walt property to the Lundvall property located at 22340 Gunderson Road. Coordinate with the property owners and the District a minimum of 5 working days prior to transport. Upon re-establishment of the Walt property to mature pasture grass, District will coordinate for the horses to be transported back to the Walt property.
P105833	Daniel L. and Stephanie C. Cann	For all trees cleared and grubbed within construction limits on the Cann property, provide timber to the property owner.
P125921	James S. and Linda J. Martindale	Provide temporary livestock fence to maintain fencing for horses during construction. Coordinate with property owner and the District for location of temporary livestock fence.  Protect buried drain pipes within property.  Protect and save existing 6-foot-tall willow tree and replant.
P125930	Ron and Lora Cork	Provide temporary livestock fence to maintain fencing for horses during construction. Coordinate with property owner and the District for location of temporary livestock fence.

- C. The following lists easement and private access agreement terms and conditions which are not the responsibility of the Contractor:
1. Parcels P24743 and P24742 (Dorothy M. Lundvall):
    - a. Removal of briars and installation of fencing.
    - b. Cutting and mulching all existing encroaching blackberry vines and brush.
    - c. Installation of property-owner furnished fencing.
- D. The District will acquire the following easements and private access agreements:
1. Skagit County Parcels P24500, P24539, P24540, P24693, P109241, and P109916.
- E. Unless otherwise indicated in easements or private access agreements, provide a minimum of 30 working days written notice to the District providing the access date before starting work on each of the properties. Notify the property owners before starting work on each of the properties.

#### **1.7 EASEMENTS AND PRIVATE ACCESS AGREEMENTS OBTAINED BY CONTRACTOR**

- A. Be responsible for and obtain easements and private access agreements required to perform the Work not listed as acquired by the District.
- B. Be responsible for and obtain right-of-entry agreements required to perform pre- and post-construction condition inspections of structures and settlement monitoring; see Sections 01601 and 02212.

#### PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

- C. Prepare and submit to the property owner information required for the acquisition of easements and private access agreements. Pay all costs thereof including easement costs unless otherwise indicated in the Contract.
- D. Submit a copy of each easement and private access agreement to the District prior to pursuing any work covered by the easement or private access agreement.
- E. Work performed shall be subject to rules and regulations of LAHJ.
- F. Submit a copy of the completed easement indicating easement owner release.

#### **1.8 UTILITY CONSENT AGREEMENTS**

- A. The Contractor will acquire the following utility consent agreements:
  - 1. Bonneville Power Administration.
- B. The District has acquired the following utility consent agreement included in Appendix C:
  - 1. Williams Northwest Pipeline Co (Williams).
  - 2. Puget Sound Energy (PSE)
- C. Comply with and be responsible for all terms and conditions and requirements contained in such agreements unless indicated otherwise.
- D. The District will provide and pay all fees for the utility consent agreements unless indicated otherwise. Copies of the District-obtained utility consent agreements are included in Appendix C.
- E. Williams Utility Consent Agreement:
  - 1. Coordinate with Williams to transfer the Williams Utility Consent Agreement into the Contractor's name prior to commencing any work that is subject to the conditions stated within the agreement.
  - 2. Coordinate with Williams to transfer the Williams Consent Agreement back into the District's name prior to Substantial Completion.

#### **1.9 RESTORATION OF PROPERTY**

- A. General:
  - 1. Comply with all property restoration requirements contained in permits, easements, and private access agreements to complete the Work.
- B. Owner Release Form:
  - 1. Whenever work is performed on property other than street right of way, submit an Owner Release Form from the easement grantor or easement grantors agent for each property, parcel, or area certifying that the restoration of structures and surfaces have been completed to the satisfaction of the property owner, and that the property owner has no claims for damages on account of such restoration.
  - 2. The agreement or easement restoration acceptance shall comply with the requirements as set forth in the form provided by the District. If, in the opinion of the District, the release is unreasonably withheld by the property owner, the District may, at its sole discretion, not require the Owner Release Form be completed.
  - 3. Owner Release Form is attached to the end of this Section.

#### **1.10 LICENSES**

- A. The Contractor is responsible for obtaining all required licenses including all required business licenses.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

### **END OF SECTION**

#### PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

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Table A– Permits Obtained (or to be Obtained) by the District

Agency/Jurisdiction	Permit Name	Permit #	Issued Date	Effective Date	Expiration Date
U.S. Army Corps of Engineers	Section 10/404 Permit	NWS-2018-573	05/27/2020	05/27/2020	05/27/2025
Washington Dept. of Fish and Wildlife	Hydraulic Project Approval	2020-4-213+01	03/26/2020	06/15/2021	09/30/2022
Washington Dept. of Ecology	Section 401 Water Quality Certification	NWS-2018-573	08/04/2020	08/04/2020	05/27/2025
	NPDES Construction Stormwater General Permit	WAR308653	12/19/2019	12/19/2019	12/31/2020
Skagit County	Administrative Special Use Permit	PL19-0248	06/11/2020	07/31/2020	07/31/2025
	Shoreline Substantial Development Permit	PL19-0249	06/11/2020	07/31/2020	07/31/2025
	Shoreline Conditional Use Permit	PL19-0249	06/11/2020	07/31/2020	07/31/2025
	Right-of-Way/Utility Permit - Skagit County Public Works	PW20-0142			
	Trail Permit	PW19-0230	09/24/2019		
	Floodplain Development Permit				
	Building Permit - Bridge				
	Building Permit – Temp Office	BP20-0503			10/23/2023
	Clearing and Grading Permit	BP20-0254			
City of Mount Vernon	Critical Area Permit	PLAN19-0180	11/2019	11/2019	11/2022
	Right of Way Permit – Type A	ENGR19-0327	02/12/2020	02/12/2020	08/10/2021
Washington State Dept. of Transportation	Utility Franchise Amendment UF 11248C AM 2 for Waterline Installation on SR 9 at MP 51.21 – MP 51.23	UF 11248C AM 2	09/17/2019	09/17/2019	3/14/2023
	SR 9 (MP2.78 to MP2.80) and SR 538 (MP2.78 to MP2.80) Construction Access;	MBA-1409-PUD (JZ0503)	11/19/20	11/19/20	12/31/2022
	Utility Franchise Amendment UF 11248C AM 3 for 8-inch-diameter Water Distribution Line on SR 9 at MP 51.00	11248C AM 3	01/02/2020	01/02/2020	03/14/2023

PERMITS AND REGULATORY REQUIREMENTS AND EASEMENTS

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# Owner Release Form

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Construction Contract: Public Utility District No. 1 of Skagit County, Judy Reservoir to Mount Vernon Transmission Pipeline – Phase 2

Easement Name and Parcel Number: \_\_\_\_\_

Easement Grantor: \_\_\_\_\_

Easement Authorized Representative: \_\_\_\_\_

Date Contractor On Site: \_\_\_\_\_

Date Contractor Off Site: \_\_\_\_\_

We (I), the undersigned Owner(s) or Representative(s) of said property accept as complete the restoration work pursuant to the Easement requirements.

\_\_\_\_\_  
(Owner)

\_\_\_\_\_  
(Owner)

Address: \_\_\_\_\_  
\_\_\_\_\_

Date: \_\_\_\_\_ 20\_\_\_\_

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**SECTION 01070**  
**ABBREVIATIONS OF INSTITUTIONS**

**PART 1 - GENERAL**

**1.1 GENERAL**

- A. Wherever in these Specifications references are made to the standards, specifications, or other published data of the various international, national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user of these Specifications, the following acronyms or abbreviations, which may appear in these Specifications, shall have the meanings indicated herein.

**1.2 ABBREVIATIONS**

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute, Inc.
API	American Petroleum Institute
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
CRSI	Concrete Reinforcing Steel Institute
District	Public Utility District No. 1 of Skagit County (Owner)
ETL	Electrical Test Laboratories
EPA	Environmental Protection Agency
IAPMO	International Association of Plumbing and Mechanical Officials
IBC	International Building Code
ICBO	International Conference of Building Officials
ICC	International Code Council
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MSS	Manufacturers Standardization Society
NACE	National Association of Corrosion Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
RCRA	Resource Conservation and Recovery Act
RWMA	Resistance Welder Manufacturer's Association
SPFA	Steel Plate Fabricators Association
SSPC	Steel Structures Painting Council
UL	Underwriters Laboratories, Inc.
WCRSI	Western Concrete Reinforcing Steel Institute
WISHA	Washington Industrial Safety and Health Administration

WRI                      Wire Reinforcement Institute, Inc.  
WSDOT                  Washington State Department of Transportation

Other acronyms or abbreviations may appear and shall be determined by the context in which they are used.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01090**  
**REFERENCE STANDARDS**

**PART 1 - GENERAL**

**1.1 GENERAL**

- A. Titles of Sections and Paragraphs: Captions accompanying specification sections and paragraphs are for convenience of reference only and do not form a part of the Specifications.
- B. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings or described in the Specifications shall be waived because of any provision of, or omission from, said standards or requirements.
- C. Specialists, Assignments: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work. Also, they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of contract requirements remains with the Contractor.

**1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS**

- A. Without limiting the generality of other requirements of the Specifications, all work specified herein shall conform to or exceed the requirements of applicable codes and the applicable requirements of the referenced codes and standards.
- B. References herein to "Building Code" or "International Building Code" shall mean International Code Council (ICC). Similarly, references to "Mechanical Code" or "Plumbing Code" shall mean Mechanical, Plumbing and Fuel Gas Code of the International Code Council. "Electric Code" or "National Electric Code (NEC)" shall mean the National Electric Code of the National Fire Protection Association (NFPA). The latest edition of the codes as approved by the Municipal Code and used by the local agency as of the date that the Work is advertised for bids, as adopted by the agency having jurisdiction, shall apply to the Work herein, including all Addenda, modifications, amendments, or other lawful changes thereto.
- C. In case of conflict between codes, reference standards, Drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the District for clarification and directions prior to ordering or providing any materials or furnishing labor. The Contractor shall prepare bid based on the most stringent requirements.
- D. Construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and specifications listed herein.
- E. Applicable Standard Specifications: References in the Contract Documents to Standard Specifications shall mean the Standard Specifications for Road, Bridge, and Municipal Construction of the Washington State Department of Transportation and Washington State Chapter of American Public Works Association, 2020 edition, which applicable parts are incorporated herein and made a part of these Documents by specific reference thereto. If requirements contained in the Standard Specifications are

modified by or are in conflict with supplemental information in these Contract Documents, the requirements of these Contract Documents shall prevail.

- F. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- G. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- H. References herein to "WISHA Standards" shall mean Chapter 296 - 24 WAC, General Safety and Health Standard, State of Washington, Division of Industrial Safety and Health, (WISHA) including all changes and amendments thereto.
- I. References herein to "WISHA Standards for Construction" shall mean Chapter 296 - 155 WAC, Safety Standards for Construction Work, State of Washington, Division of Industrial Safety and Health, (WISHA) including all changes and amendments thereto.

### **1.3 REGULATIONS RELATED TO HAZARDOUS MATERIALS**

- A. The Contractor is responsible that all work included in the Contract Documents, regardless if shown or not, shall comply with all EPA, OSHA, RCRA, NFPA, WISHA and any other federal, state, and local regulations governing the storage and conveyance of hazardous materials, including petroleum products and regulated building materials such as asbestos. Where requirements differ between regulations, the more stringent shall apply.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01195**  
**PROTECTION AND MAINTENANCE OF EXISTING FACILITIES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies protection and maintenance of underground and aboveground utilities, structures, fences, sidewalks, curbs, driveways, streets, and other existing improvements which may be affected by the Work.
- B. Utility interferences with the proposed 36-inch-diameter water transmission pipeline and water distribution lines and services are indicated in the Drawings. Interfering utilities will need to be relocated or abandoned, cut, and plugged.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Potholing:
  - 1. Schedule and locations for all utilities to be potholed. List by station and offset from the proposed Facility.
  - 2. Results of the potholing identifying depth, diameter, material, and offset of the utility to the proposed Facility.
  - 3. Results of the potholing where connection to existing utility will be made identifying depth, diameter, material, slope, alignment, and joints.
- C. Notification Schedule for water system shutdowns, including addresses of affected business/property owners and estimated dates and durations that water service will be interrupted: Submit 30 days prior to service interruption.
- D. Existing Transmission Pipeline Protection Plan.

**1.3 DEFINITIONS**

- A. Facility: A real property entity consisting of one or more of the following: an underground or aboveground utility system or structure, pavement, or other improvement.
- B. Major Underground Utility: A transmission, collection, or distribution line where it would be customary to expect that drawings would exist for the line, and the utility owner would be aware of the line.
- C. Minor Underground Utility: Services from a collection or distribution line such as irrigation lines less than four inches, water service lines, side sewers, gas service lines, traffic signal wiring, building drainage pipes, and direct burial cable.

**1.4 GENERAL**

- A. Protect all existing utilities and improvements not designated for removal or relocation and restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation.
- B. It shall be the Contractor's responsibility to make whatever notifications and applications as may be necessary in coordinating utility and Contractor work. Directly inform individual owners or household residents at least two working days in advance of beginning the work to minimize or eliminate inconveniences to the public. Inform owners of work which blocks the use of the property in any way by construction or equipment or which interferes with water or sewer service.
- C. In the event any existing utility lines are cut or otherwise disrupted per requirements of the Work, or unintentionally cut or disrupted, the Contractor shall coordinate directly with the utility affected to restore service as quickly as possible without delay. Contractor shall bear all costs associated with removal and

replacement of interfering utilities, which Contractor intentionally or unintentionally cuts, damages, or disrupts, that are not required to be cut and replaced as part of Work.

### **1.5 POTHOLE INFORMATION**

- A. Potholing has occurred of certain existing utilities in the proposed water transmission pipeline corridor to align the pipe to avoid conflicts. Pothole locations and elevations are indicated in the Drawings.
- B. Contractor shall provide additional potholing as indicated in the Drawings.
- C. Potholing:
  - 1. Where indicated in the Drawings (typically noted as “verify depth and location” or similar), be responsible to excavate and expose existing Major and Minor Underground Utilities and facilities prior to new construction to determine utility elevations, diameters, materials, and locations in relation to the proposed Facility. Contractor shall use Surveyor per Section 02212 to survey utility elevations and locations of all potholes.
  - 2. Connections to Existing Utilities:
    - a. Prior to construction, work with utility owner and Local Authority Having Jurisdiction to determine the location and working condition of existing water transmission pipelines, water distribution pipelines, and water services that will be impacted by the Work.
    - b. Field verify existing piping, materials, joints, dimensions, slopes, alignments, and elevations prior to ordering materials for connections to existing water mains or services.
  - 3. Pothole at each location indicated in the Drawings in advance of the pipeline layout drawings submittal and a minimum of 60 days prior to work in the vicinity of the proposed Facility. Be responsible for impacts as a result of failure to meet submittal requirement and the 60-day minimum requirement.
  - 4. Submit listing of all potholing required by this Section including schedule for completion of the work.
  - 5. Submit results of the potholing.
  - 6. Examine and repair utilities and facilities prior to being buried.
  - 7. Unless otherwise indicated, restore pothole area as required by the Local Authority Having Jurisdiction.
- D. Potholing shall be performed as soon as practicable after award of the Contract and a sufficient time in advance of construction to avoid possible delays to the schedule due to conflict. When such potholing shows the utility location to be different than as indicated in the Drawings, notify the District.

### **1.6 RIGHTS-OF-WAY**

- A. No work shall occur that would affect any oil, gas, sewer, water pipeline, telephone, cable, electric transmission line, fence, or any other structure, nor enter upon the rights-of-way involved until authority from the proper parties has been provided and submitted to the District or District’s representative for approval. After authority has been obtained and approved, the Contractor shall give said party due notice of its intention to begin work and shall remove, shore, support or otherwise protect such facilities or structures or replace the same.

### **1.7 PROTECTION OF ROADWAY MARKERS AND SURVEY MONUMENTS**

- A. Do not destroy, remove, or disturb existing survey markers, monuments, property corners or other existing roadway markers without proper authorization.
- B. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced. All survey markers or points disturbed by the Contractor shall be accurately restored by the Surveyor after all street or roadway resurfacing has been completed per Section 02212.

### **1.8 RESTORATION OF PAVEMENT**

- A. General:
  - 1. All road surfaces cut or damaged during construction shall be replaced with similar materials and of equal or greater thickness to match the existing adjacent undisturbed areas, except where specific

#### **PROTECTION AND MAINTENANCE OF EXISTING FACILITIES**

resurfacing requirements have been indicated in the Contract Documents or in the requirements of an agency issuing a permit.

2. All temporary and permanent pavement shall conform to the requirements of the pavement owner. All pavements which are subject to partial removal shall be neatly saw cut in straight lines.

B. Temporary Resurfacing:

1. Wherever required by the Local Authority Having Jurisdiction, place temporary surfacing promptly after backfilling and maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing:

1. In order to obtain a satisfactory seam with adjacent surfaces, saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of new pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines.
2. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

## 1.9 EXISTING UTILITIES AND IMPROVEMENTS

A. General:

1. Protect all underground utilities and other improvements which may be impaired during construction operations.
2. Be responsible for all damage to the existing water distribution lines and the existing 24-inch-diameter water transmission pipeline by the Contractor, including District costs. Contractor's responsibility includes all labor, material, and equipment necessary for the repair of the existing pipelines, including but not limited to, the valves, draining, outage notification, repair couplings, transition materials, and cost of water that is lost.
3. Be responsible to ascertain the actual location of all existing utilities and other improvements that will be encountered in construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations.
4. Take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.
5. Protect, modify, and relocate all existing utilities and facilities required to accommodate Contractor's means and methods. Specific means and methods to be utilized by the Contractor are not known to the District. Therefore, the District will not be liable for utility protection, modification, and relocation not indicated in the Drawings required by the Contractor due to its means and methods. It is the Contractor's responsibility to determine the requirements of the work required by the Contract Documents and make provisions for protection, modification, and relocation required to perform the work. Coordinate all protection, modification, and relocation work through the affected utility. Work shall be completed to the utility owners' requirements and standards.
6. Where the proper completion of the Work requires the temporary or permanent removal or relocation of an existing utility or other improvement which is indicated, remove and temporarily replace or relocate such utility or improvement in a manner satisfactory to the District and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former location and to as good or better condition than found prior to removal.
7. See Section 01060 for utility consent agreements.

B. District's Right of Access:

1. The right is reserved to the District and the owners of utilities, or their authorized agents, to enter upon the Contractor's work area for the purpose of making changes, connections, or repairs to their facilities. The Contractor shall cooperate with forces engaged in this work and shall avoid any unnecessary delay or hindrance to work being performed by other forces.

C. Underground Utilities Indicated:

1. The locations indicated in the Drawings for existing utilities are in accordance with available information obtained, without uncovering, measuring or other verification. It is the Contractor's

### PROTECTION AND MAINTENANCE OF EXISTING FACILITIES

responsibility to call the Utilities Underground Location Center and make every effort to identify the location of existing utilities before digging. The Contractor shall make necessary arrangements for removal and replacement or repair of these utilities as necessary to facilitate pipeline construction, and the Contractor shall bear all related costs.

2. The locations of the high pressure gas pipelines, abandoned gas lines, and the oil pipelines are indicated in the Drawings after consultation with the utility owners, without uncovering, measuring or other verification.
3. Existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavation and that are to be retained and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the Contractor at the Contractor's expense.

D. Underground Utilities Not Indicated:

1. Attention is directed to the possible existence of underground facilities, such as below-grade vaults, which are not indicated in the Drawings. When the removal and/or relocation of these facilities is necessary to accommodate the Work, the District will provide for this additional work by other forces, or this additional work shall be performed by the Contractor as extra work pursuant to a Change Order.
2. Notify the District if utilities not indicated in the Drawings are encountered.
3. In the event that the Contractor damages any existing utility lines that are not indicated or the locations of which are not made known to the Contractor prior to excavation, a written report thereof shall be made immediately to the District. If directed by the District, repairs shall be made by the Contractor under the provisions for changes and extra work.

E. Aboveground Electrical, Cable, and Communication Facilities:

1. Overhead items include power and communication lines, pole anchors, temporary traffic signals, traffic signal mast arms, overhead sign bridges, sign support span wires, signs, and street lights.
2. Observe the location of these overhead facilities and plan and conduct work operations accordingly.
3. Protect and avoid damage to all overhead facilities.
4. Relocate facilities as required to meet the means and methods to be utilized. Be responsible to meet the requirements of the utility owner for relocation and protection.
5. Observe and investigate the presence of facilities that may be affected by the work. Consult with and rely on the information given by utility owners and operators to determine the extent of any hazards and measures required. Determine the extent of any hazard created by facilities in all areas and follow approved safety procedures during the work.
6. Support poles at risk of being undermined by the work.
7. Follow the requirements of WAC 296-24-960 for all energized primary conductors.
8. See Section 01060 for the utility consent agreements with Puget Sound Energy and Bonneville Power Administration.

F. Water:

1. Arrange with the utility owner to protect, maintain, support in place, or relocate all water pipelines affected by the work.
2. Maintain water service along the alignment of work at all times unless otherwise indicated.
3. Maintain facility operations per Section 01601.
4. Waterline replacement shall conform to Section 7-09 of the 2020 WSDOT Standard Specifications, including the requirements of the hydrostatic testing and disinfection, except that trench excavation, bedding, and backfill shall conform to the Drawings and Specifications.
  - a. Backfill materials at the location of the utility crossing shall be as specified for the adjacent trench condition identified in the Drawings for the new water transmission pipeline or water distribution line.
5. Water system shutdowns:
  - a. Request and obtain written approval from the District, Fire Marshall, and Local Authority Having Jurisdiction before interrupting water service and prepare notification schedule.
  - b. Prepare notification schedule and submit. Notification schedule shall include addresses of affected property owners and the estimated dates and durations that water service will be interrupted. Update as necessary for progress meetings.

PROTECTION AND MAINTENANCE OF EXISTING FACILITIES

- c. Initial notification of the property owners adjacent to the work shall be provided by the Contractor in advance of the construction in the area of work. Coordinate and provide 30 days advance notification to the property owners prior to anticipated water system shutdown.
  - d. Place door hangers to directly inform individual property owners at least two working days in advance of beginning the work to minimize or eliminate inconveniences to the public.
  - e. Contractor's notifications regarding work performed shall be in such detail as to give the time of commencement and completion of the work.
  - f. On the day that water service is interrupted, notify in person, each property owner served by the water service. The occupant(s) shall be advised that water service will be interrupted. The notification shall provide the estimated time of service restoration. Maintain a record of the property owners that were visited, the time of the visit, and whether or not personal contact was made with the occupant(s).
  - g. Operational Restrictions:
    - 1) The only time it is permissible for the Judy Reservoir to Mount Vernon Transmission Pipeline and the Judy Reservoir to Sedro Woolley Transmission Pipeline to be offline at the same time is for the initial "wye" connection at approximate Station 361+83 and the 30-inch-diameter tee at approximate Station 401+36. Contractor shall notify the District's operation personnel a minimum of 7 working days in advance of shutdown. Maximum allowable outage is 10 hours.
  - 6. Thrust blocks are not indicated in the Drawings and shall be assumed to be present at all existing water line deflections of 11.25 degrees or greater. Existing thrust blocks shall not be disturbed.
  - 7. Notify the District immediately of any damage. Begin repairs immediately, and work continuously until water service is restored. Repairs and reconnections shall be made under the supervision of the utility owner and Local Authority Having Jurisdiction.
- G. Storm and Sewer:
- 1. Install replacement storm drains, culverts, storm sewers, sanitary sewers, and side sewers in accordance with Sections 7-01, 7-02, 7-04, 7-08, 7-17, and 7-18 of the 2020 WSDOT Standard Specifications, except that trench excavation, bedding, and backfill shall conform to the Drawings and Specifications.
  - 2. Backfill materials at the location of the utility crossing shall be as specified for the adjacent trench condition identified in the Drawings for the new water transmission pipeline or water distribution line.
  - 3. The Contractor shall provide temporary pumps and piping as required to maintain storm and sanitary sewer flows beyond reaches of sewers temporarily interrupted by the water transmission pipeline or water distribution line construction.
- H. Roadways:
- 1. Protect existing sidewalks, curbs, pavements, parking lots, utilities, adjoining property, structures, and mailboxes and avoid damage thereto; replace if damaged.
  - 2. Protect and replace traffic signage, paint striping, and channelization.
  - 3. Maintain the existing illumination pattern for signs and roads at all times unless otherwise indicated.
  - 4. Install temporary roadway lighting as necessary.
  - 5. Maintain access for emergency crews and equipment.
  - 6. Install temporary mailboxes or temporarily relocate existing mailboxes as necessary to maintain mail service for residences adjacent to the Work.
- I. Approval of Repairs:
- 1. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.
- J. Maintaining in Service:
- 1. All oil and gasoline pipelines, power, and telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and cables encountered along the line of the Work shall remain continuously in service during all the operations under the Contract, unless other arrangements, satisfactory to the District, are made with the owner of said utilities. Be responsible for and repair all damage due to operations. The

PROTECTION AND MAINTENANCE OF EXISTING FACILITIES

provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

**K. Minimum Clearances:**

1. Where possible, minimum clearance between the new water transmission pipeline and water distribution line and existing utilities shall be 12 inches.
2. Separation between the new water transmission pipeline and water distribution lines and storm culverts shall be 6 inches minimum.
3. Where grades of existing gravity sewers or storm drains must be maintained, resulting in a clearance of less than 12 inches, notify the District for direction.
4. Where the proposed Facility is above an existing or replaced utility, and the clearance is less than 12 inches, fill the space between the proposed Facility and the existing or replaced utility with polyethylene plastic foam before backfilling.
  - a. Polyethylene plastic foam shall comply with the Federal Specification Cid A-A 59136 Type 1, Class 1, Grade A (Ethafoam).
  - b. Place an O.D. x O.D x 2.5-inch thick polyethylene plastic foam pad between the pipes centered at the crossing (O.D. is equal to the outside diameter of the larger pipe).
5. Where the proposed Facility is below an existing utility, and the clearance is less than 12 inches, provide underground utility support per Detail 4/07C009 at crossing locations indicated by the District. Underground utility support shall be centered on the proposed Facility and shall be provided 6 feet on each side of the crossing along the proposed Facility.

**L. Dissimilar Pipe Ends:**

1. Where cut ends of existing sewer or storm drain pipes will not fit the standard factory integral fitting of the replacement pipe, Contractor shall join pipe with a factory-fabricated adapter coupling or a rubber sleeve type coupling (Fernco, Calder, or approved equal).
2. Similarly, in the case of waterline replacement, Contractor shall use an appropriately sized transition coupling.

**1.10 EXISTING TRANSMISSION PIPELINE PROTECTION PLAN**

- A. Prepare an Existing Transmission Pipeline Protection Plan for work over or adjacent to the existing 24-inch-diameter water transmission pipeline. Submit plan a minimum of 30 days prior to work commencing in area of the existing 24-inch-diameter water transmission pipeline.
- B. The existing 24-inch-diameter water transmission pipeline is a vital water supply to Mount Vernon and surrounding areas. Due to its importance and recent failures, the pipeline shall be protected from construction loadings that may cause damage and rupture of the pipeline.
- C. At a minimum, the Existing Transmission Pipeline Protection Plan shall include the following:
  1. Construction planning for work to protect the existing 24-inch-diameter water transmission pipeline when work crosses or parallels the existing 24-inch-diameter water transmission pipeline, including design of support and protection system and materials and equipment recommended to protect the pipeline. Pipeline protection shall include, at a minimum, the following:
    - a. Pipe Protection Zone (indicated in the Drawings) shall be delineated in the field with markers; markers shall be at a minimum T-posts every 50 feet with flagging.
    - b. Pipe Protection Zone shall be limited to storage of pipe and spoils. No other uses allowed within Pipe Protection Zone unless approved by the District.
    - c. The existing 24-inch-diameter water transmission pipeline may have shallow cover (less than 3 feet). If crossing the existing 24-inch-diameter water transmission pipeline is required, pipeline shall be protected using traffic-rated steel plates. Steel plates shall extend a minimum of 4 feet from centerline of the existing 24-inch-diameter water transmission pipeline.
  2. Contingency Plan if the existing 24-inch-diameter water transmission pipeline is damaged during construction. Contingency Plan shall, at a minimum, include the following:
    - a. Name and phone number for 24-hour emergency contacts if pipeline is damaged during construction:
      - 1) Contractor's 24-hour contact.
      - 2) District's 24-hour contact.

**PROTECTION AND MAINTENANCE OF EXISTING FACILITIES**

- b. Step-by-step description of planned operations and procedures for repair of the damaged water transmission pipeline, including notifications to the District.

### **1.11 PROTECTION OF TEMPORARY FIBER RELOCATION**

- A. Temporary fiber has been placed in vicinity of the East Fork Nookachamps Creek crossing between approximate Stations 169+00 to 171+00. Protect the existing temporary fiber.
- B. Notify Frontier Communications (Bret Murdock) at (425) 417-0641 at least 10 working days prior to work in area of temporary fiber.
- C. When work is complete in this area, notify Frontier Communications (Bret Murdock) at (425) 417-0641. This is to inform Frontier Communications that they can relocate fiber back to overhead poles.
- D. Frontier Communications will bill the District directly for Frontier Communications costs.

### **1.12 DE-ENERGIZING AND RE-ENERGIZING OF PUGET SOUND ENERGY POWER AND RELOCATING GUY WIRES**

- A. General:
  - 1. Where trenching is close to power poles or if guys must be removed temporarily during construction, the Contractor shall coordinate with Puget Sound Energy (PSE) to provide temporary supports, as necessary, to support electric power poles during construction. Replace permanent guys in original locations unless directed otherwise by PSE or the District. All costs for temporary supports and guy relocation will be paid for by the District.
  - 2. If the Contractor is unable to maintain minimum clearances from PSE high voltage transmission lines, contact PSE at 1-888-225-5773 to coordinate a temporary outage. PSE will bill the District directly for PSE costs.
  - 3. Contact PSE's First Response Engineer at 1-888-321-7779 at least 7 days prior to beginning any construction activities within high voltage overhead power lines.
  - 4. See Section 01060 for the utility consent agreements with Puget Sound Energy.
- B. Coordinate with PSE to de-energize power, relocate guy wires, and re-energize power between approximate Stations 252+00 to 272+00 (Fox Road).
  - 1. Notify PSE at least 10 working days prior to work in this area.
  - 2. When work is complete in this area, notify PSE. This is to inform PSE that they can energize power.
  - 3. PSE will bill the District directly for PSE costs.
- C. If Contractor elects to have PSE de-energize power in vicinity of Nookachamps Creek crossing, coordinate with PSE to de-energize power between approximate Stations 89+00 to 116+00 for the Nookachamps Creek crossing.
  - 1. Notify PSE at least 10 working days prior to work in this area.
  - 2. When work is complete in this area, notify PSE. This is to inform PSE that they can energize power.
  - 3. PSE will bill the District directly for PSE costs.
  - 4. Overhead power cannot be de-energized between October 15th and April 15th.

### **1.13 PROTECTION OF EXISTING OIL AND GAS LINES**

- A. Special considerations shall be provided by the Contractor before excavation and crossing of the oil and gas pipelines indicated in the Drawings. The following is a list of the personnel that shall be contacted a minimum of 10 working days prior to working within 100 feet of the oil and gas pipelines:
  - 1. Williams Northwest Pipeline Company  
Contact: Michael Tsiporenko  
(360) 296-9287 – Cell
  - 2. Cascade Natural Gas Corporation  
Contact: Addam Sad  
(360) 336-3866
- B. See Section 01060 for the utility consent agreements with Williams Northwest Pipeline and Cascade Natural Gas.
- C. Williams Northwest Pipeline (near approximate Stations 313+83 and 314+08):

#### **PROTECTION AND MAINTENANCE OF EXISTING FACILITIES**

1. Notify Williams Northwest Pipeline (Williams) at least 72 hours in advance of any excavation work performed within a 100-foot radius of Williams infrastructure.
2. Expose the Williams pipelines within right-of-way (Stations 313+83 and 314+08), prior to any trench excavation allowing a Williams representative access to the pipelines.
3. In addition to the provisions contained with the 2020 Williams Developers' Handbook, the following is a list of provisions that the Contractor shall comply with when working within the Williams right-of-way:
  - a. Excavator bucket shall not cross over the existing gas lines when trenching. Contractor shall dig from each side of the Williams right-of-way up to the existing gas lines. Contractor is allowed to side dig between the two pipelines.
  - b. Excavator teeth shall be barred when working near or within the Williams right-of-way until the bottom of the excavation is below the gas lines.
  - c. The clear zone around the gas lines is 24 inches in all directions and to the ground surface. Excavation shall be by hand within the clear zone.
  - d. Heavy equipment shall be placed on mats or steel plates while working over gas lines.
  - e. No hoepac or large vibratory equipment is allowed to operate within the Williams right-of-way. Compaction shall be achieved by the use of plate compactors, jumping jacks or pneumatic tampers within the Williams right-of-way.
  - f. Maximum unsupported span of gas lines is 20 feet.
  - g. If haul road crosses the Williams right-of-way, the dedicated crossing shall be defined and plated or reinforced as approved by the District.
  - h. Hand-operated pneumatic equipment may be permitted by the Williams on-site representative within the clear zone of the gas lines. The Williams on-site representative may require a metal plate/physical barrier be placed in between the gas line and equipment.
  - i. If welding is required in the ditch line and within the Williams right-of-way, the Williams on-site representative will monitor for gas in the trench during the welding process. Joints shall be welded as far away as possible from the gas lines.

D. Cascade Natural Gas:

1. Notify Cascade Natural Gas (CNG, Cascade) at least 10 days in advance of any excavation work performed within a 100-foot radius of Cascade infrastructure.  
Contact: Addam Sad, Supervisor – Construction Services (360) 336-3866  
(Addam.Sad@cngc.com)
2. Expose Cascade pipelines within right-of-way (Stations 115+24 and 115+32, prior to any trench excavation allowing a Cascade representative access to the pipelines. The following is a list of provisions that the Contractor shall comply with when working in close proximity to Cascade pipelines at approximate Stations 115+24 and 115+32:
  - a. Clear zone for excavating bucket around the gas lines is 10 feet. Excavation shall be by hand within the clear zone.
  - b. Equipment shall be placed on mats or steel plates over gas lines.
  - c. Maximum unsupported span of gas lines is up to 10 feet.
  - d. Protect existing gas lines with rock shield during construction.

#### 1.14 TREES OUTSIDE OF CONSTRUCTION LIMITS

A. General:

1. Exercise all necessary precautions to avoid damaging or destroying trees or shrubs lying outside the construction limits.
2. Do not trim or remove trees unless such trees are within the construction limits and have been approved for trimming or removal by the District.
3. All existing trees and shrubs which are damaged during construction shall be trimmed or replaced by a certified tree company under permit from the jurisdictional agency and/or the District.

B. Trimming:

1. Symmetry of the tree shall be presented; no stubs or splits or torn branches left; clean cuts shall be made close to the trunk or large branch.
2. Spikes shall not be used for climbing live trees.
3. All cuts over 1-1/2 inches in diameter shall be coated with an asphaltic emulsion material.

#### PROTECTION AND MAINTENANCE OF EXISTING FACILITIES

- C. Replacement:
  - 1. Immediately notify the jurisdictional agency and/or the District if any tree is damaged by the Contractor's operations.
  - 2. If, in the opinion of said agency or the District, the damage is such that replacement is necessary, replace the tree at Contractor's expense. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the Contractor shall pay to the tree owner a compensatory payment acceptable to the tree owner, subject to the approval of the jurisdictional agency or District. The size of the trees shall not be less than 2-inch diameter nor less than 8 feet in height.

**1.15 NOTIFICATION BY THE CONTRACTOR**

- A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried or aboveground electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way, notify the respective authorities representing the owners or agencies responsible for such facilities not less than 7 days nor more than 14 days prior to excavation so that a representative of said owners or agencies can be present during such work if they so desire. Promptly notify the District prior to any work in the area of a utility/facility where a utility/facility owner fails to meet its obligations under Chapter 19.122 RCW.
- B. More restrictive notification requirements may be listed elsewhere in the Contract Documents.
- C. Call the Utilities Underground Location Center (One-Call) at 811 at least 2 working days, but no more than 10 working days, prior to excavation. In the case of the high pressure gas pipelines and the oil pipelines that are indicated in the Drawings, provide a minimum of 10 days advance notice before excavation and crossing of the pipeline.

**PART 2 - PRODUCTS**

**2.1 UTILITY REPLACEMENT WIRING AND PIPING**

- A. Utility pipes or wires that are cut or otherwise damaged during installation of the new water pipeline shall be replaced with new wire or pipe of the same type material (e.g., reinforced concrete, ductile iron, cable, copper, etc.) as that removed unless otherwise indicated in the Drawings or as otherwise specified herein.

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

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**SECTION 01200**  
**COORDINATION AND MEETINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes coordination, the preconstruction conference, and progress meetings.

**1.2 COORDINATION**

- A. Coordinate scheduling, submittals, and Work to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate work of various sections having interdependent responsibilities for fabrication, installation, connecting to, and placing in service such equipment.
- C. Coordinate completion and cleanup of Work in preparation for Substantial and Final Completion.
- D. After District's partial or full use of facilities, coordinate access to Site for continued contract work, correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of District's activities.

**1.3 PRECONSTRUCTION CONFERENCE**

- A. Prior to the commencement of Work, an initial preconstruction conference will be held at a mutually agreed time and place. This initial preconstruction conference shall be held within four (4) days of Notice of Award and will include issuance of Notice to Proceed. The preconstruction conference shall be attended by the Contractor's Project Manager and Project Field Superintendent. The conference shall be attended by the Contractor's key subcontractors as the Contractor deems appropriate. Other attendees will be:
1. Engineer and Engineer's consultants.
  2. Representatives of the District.
  3. Governmental representatives as appropriate.
  4. Others as requested by Contractor, District, or Engineer.
- B. The Contractor shall bring to the preconstruction conference submittals in accordance with Section 01300.
- C. The purpose of the preconstruction conference is to designate responsible personnel and establish working relationships. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the Contractor prior to the meeting date. However, the Contractor should be prepared to discuss all of the items listed below:
1. Status of Contractor's insurance and bonds.
  2. Status of National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit transfer.
  3. Contractor's tentative schedule and critical work sequencing.
  4. Transmittal, review, and distribution of Contractor's submittals.
  5. Processing applications for payment.
  6. Maintaining record documents.
  7. Field decisions and Change Orders.
  8. Use of Project Site, office and storage areas, security, housekeeping and District's needs.
  9. Major equipment and material deliveries and priorities.
  10. Contractor's assignments for safety and first aid.
  11. Contractor's Daily Report Form and daily mutually agreed upon Bid Item Quantity Form.
  12. Contractor's Submittal Transmittal Form and agreed upon numbering system format for individual submittal items.
  13. Request for Information (RFI) Form.
  14. Deviation Request Form.

15. Review of the Drawings and Specifications.
  16. Haul Routes.
  17. Work Hours.
- D. The District will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.
  - E. The Contractor and its subcontractors should plan on the conference taking approximately 3 to 4 hours.
  - F. Other specification sections may require similar preconstruction meetings for work-specific tasks such as pipe connections, traffic control, etc.

#### **1.4 PROGRESS MEETINGS**

- A. Schedule and hold regular on-site progress meetings at least weekly and at other times as requested by District or as required by progress of the Work. Progress meetings will be held at a mutually agreed time and place. The Contractor, District, Engineer and key subcontractors active on the site shall attend each meeting. Contractor may at its discretion request attendance by representatives of its suppliers, manufacturers, and other subcontractors.
- B. District's representative will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within three days to Engineer, District, participants, and those affected by decisions made.
- C. Attendance Required: Contractor, District, Engineer, and others as appropriate to agenda topics for each meeting.
- D. Agenda:
  1. Review minutes of previous meetings.
  2. Review of Work progress.
  3. Progress Schedule Update (3-week look ahead for upcoming activities).
  4. Corrective measures to regain projected schedules.
  5. Planned progress during succeeding work period.
  6. Field observations, problems, and decisions.
  7. Identification of problems which impede planned schedules.
  8. Review of submittals schedule and status of submittals.
  9. Review of RFIs and status.
  10. Review of off-site fabrication and delivery schedules.
  11. Maintenance of quality, work standards and deficient work.
  12. Effect of proposed changes on progress schedule and coordination.
  13. Other business relating to the Work.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01300**  
**SUBMITTALS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies procedures and requirements for all submittals and deviations required by the Specifications.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Master Submittal List:
1. Prepare and submit within 20 days after the effective date of the Notice to Proceed, a Master Submittal List listing of items for which submittals are required by the Specifications. Organize the Master Submittal List by Specification Section number and include the following information for listed items:
    - a. Item identification.
    - b. Specification Section number.
    - c. Planned submittal date.
    - d. Identification of those items that contain deviations from the Specifications.
    - e. Identification of those items that require other jurisdictional agency review and approval.
    - f. List shall include columns for future use as information becomes available and shall be provided for the following items:
      - 1) Trade name, model, and catalog designation.
      - 2) Scheduled need dates for control purposes.
      - 3) Date submitted.
      - 4) Date approval.
      - 5) Date on which material is needed.

**1.3 GENERAL**

- A. Wherever submittals are required, all such submittals by the Contractor shall be submitted to the District on the District-provided Contractor's Submittal Transmittal Form filled out completely. The form is attached to the end of this Section.
- B. In addition to submittals required by individual sections, submit information on Contractor chosen items to be included in the work, including items indicated in the Drawings but not specified.
- C. Submit information on all repair and corrective work required of or generated by the Contractor such that the acceptability of the quality of the repair or correction can be assessed before it is performed.
- D. Submit descriptive information that will enable the District to assess whether the proposed materials, equipment, or methods of work are in general conformance with the work and in compliance with the Contract.
- E. Specifically identify and annotate any deviations in the submittal. If deviations are not clearly identified or annotated, the original Contract provisions shall prevail; if the item has been installed without specific acceptance of the deviation, it shall be removed and the Contract required item installed in its place.
- F. No fabrication or construction work shall occur on a specific submittal item without a submittal Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED. Any procurement or construction activity undertaken by the Contractor absent such a submittal Review Action will not be acknowledged on project schedule or schedule of values.
- G. Unless specified otherwise in this Contract, preparation, and revisions of submittals is to be an incidental expense and not a pay item.

SUBMITTALS

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- H. See Section 01600 for "Or Approved Equal" Item requirements.
- I. See blank forms at the end of this Section for Deviation Requests and Request for Information.

#### **1.4 DEFINITIONS**

- A. Shop Drawings:
  - 1. Product data and samples are Shop Drawing information.
  - 2. Manufacturer Certification.
- B. Miscellaneous Submittals:
  - 1. Submittals other than Shop Drawings and O&M Manuals.
  - 2. Representative types of miscellaneous submittal items include but are not limited to:
    - a. Construction schedule.
    - b. Cost breakdown (Schedule of Values) for lump sum bid items.
    - c. Construction Stormwater Pollution Prevention Plan (SWPPP) (if different/changes from SWPPP provided in Appendix D).
    - d. Spill Prevention Control and Countermeasure Plan.
    - e. Accident Prevention Plan and Site Specific Health and Safety Plan.
    - f. Traffic Control Plan (if different/changes from plan provided).
    - g. Dewatering Plan.
    - h. Concrete, soil compaction, and pressure test reports.
    - i. Installed equipment and systems performance test reports.
    - j. Manufacturer's installation certification letters.
    - k. Warranties.
    - l. Survey data.
- C. Approved Equal:
  - 1. Definition: An item of material or equipment proposed by the Contractor that has the same function, quality, durability, appearance, strength, and design characteristics equal to that named, that meets the requirements of the Specification, and is sufficiently similar so that no change in related work is required. The item of material or equipment shall reliably perform at least equally well for the function imposed by the design concept of the completed work as a functioning whole. In general, Approved Equal applies to manufactured items.
  - 2. Clearly note on the Contractor's Submittal Transmittal Form if any items are submitted as an equal.
  - 3. Acceptance is at the District's sole discretion and the decision regarding acceptance or rejection shall be final. If the Contractor disagrees, a Request for a Change Order shall be filed in accordance with Contract provisions. Do not assume acceptance at any time prior to the rendering of decision by the District.
- D. Deviations:
  - 1. Definition: A minor change or omission to a specified material, procedure or product proposed by the Contractor that does not fully conform to the requirements specified, but conforms to dimensional, operational, and maintenance requirements and can be shown to accomplish the functional and operational and maintenance performance of the specified item.
  - 2. Annotate in the Contractor's Submittal Transmittal Form if there are any deviations from requirements in the Contract or submit the Deviation Request form (the form is attached to this Section). Any deviation not identified on the submittal is not accepted or approved regardless of any subsequent action on the submittal by the District. Failure of the District to comment on the deviation shall not relieve the Contractor from complying with the original Contract requirements.
  - 3. Acceptance is at the District's sole discretion and the decision regarding acceptance or rejection shall be final. Do not assume acceptance at any time prior to the rendering of a decision by the District.

#### **1.5 CONTRACTOR RESPONSIBILITIES**

- A. Be responsible for the accuracy and completeness of the information contained in each submittal. The cost to review the initial submittal and the first revised submittal shall be borne by the District. The cost to review additional revised submittals shall be charged to the Contractor.

#### **SUBMITTALS**

- B. Verify that the material and equipment described in each submittal conforms to the requirements of the Contract prior to submittal.
- C. Ensure that the material, equipment and methods of work used are described in the submittal.
- D. Coordinate and integrate submittal dates with the schedule.
- E. Annotate on the Contractor's Submittal Transmittal Form if the submittal conflicts or may affect the work with other submittals.
- F. Ensure coordination of submittals among the suppliers, related crafts, subcontractors, and with the planned work. The Contractor will be held responsible for any cost or schedule impact caused by a submittal coordination failure.
- G. Request deviations from the Contract on the Deviation Request form attached at the end of this Section.

## 1.6 PRECONSTRUCTION CONFERENCE SUBMITTALS

- A. The Contractor shall submit the following items for review prior to the preconstruction conference:
  1. A preliminary schedule of Shop Drawings, Samples, and proposed deviations and Or-Equal requests.
  2. A list of all submittals that will be prepared and a schedule for submission to the District.
  3. A list of all permits and licenses the Contractor is obtaining per the requirements of the Contract Documents indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.
  4. A Draft Project Schedule in accordance with Section 01311.
  5. Erosion Control Plan for proposed areas impacted by construction operations.
  6. A copy of the below District-obtained permit that indicates that it has been transferred into the Contractor's name prior to commencing any work that is subject to the conditions stated within the permit:
    - Washington Department of Ecology
    - Construction Stormwater General Permit
    - Permit Number: WAR308653**
    - Effective Date: December 19, 2019
  7. Alternative traffic control plans if different than the District-provided plans in the Contract. These will have to be reviewed and accepted by the local road jurisdiction.
  8. Accident Prevention Plan and Site Specific Health and Safety Plan.

## 1.7 SUBMITTAL PROCEDURE

- A. Submittal Transmittal:
  1. Submittals shall be accompanied by the Contractor's Submittal Transmittal Form (attached to the end of this Section). Any submittal not accompanied by such a form, or where all applicable items on the form are not completed, will be returned for resubmittal.
  2. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate, discrete sections for which a submittal is required. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package, or are so functionally related that expediency indicates checking or review the group or package as a whole. No multiple-Section submittals will be allowed except where previously approved by the District.
  3. If a data sheet contains more than one piece of equipment or material or information on more than one size of a piece of equipment or materials, cross off all information that does not apply. Failure to so mark a data sheet is grounds for rejection of the submittal.
  4. The mutually agreed upon numbering system shall be used to differentiate each submittal and resubmittal.
  5. Submit proposed approved equals per Section 01600.
  6. Submit proposed deviations using the Deviation Request form attached to the end of this Section.
  7. All submittals from Subcontractors and Supplier shall be submitted by the Contractor. All submittals shall be carefully verified by an authorized representative of the Contractor prior to submission. Each submittal shall be dated, signed, and verified by the Contractor, as being correct and in conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so

### SUBMITTALS

dated, signed, and verified. No consideration for review by the District of any Contractor submittals will be made for any items which have not been so verified by the Contractor. All non-verified submittals will be returned to the Contractor without action taken by the District, and any delays caused thereby shall be the total responsibility of the Contractor.

**B. Submittal Review:**

1. Except as may otherwise be indicated herein, the District will return each submittal to the Contractor with its comments noted thereon within 20 working days following their receipt by the District. The District's maximum review period for each submittal, including all resubmittals, will be 20 working days per submittal. In other words, for a submittal that requires two resubmittals before it is complete, the maximum review period for that submittal could be up to 40 working days.
2. Submittals will be stamped or annotated with a review status for Contractor action. The disposition of submittals will be noted as follows:
  - a. If submittal is returned marked "NO EXCEPTIONS TAKEN," formal revision and resubmission of said submittal will not be required.
  - b. If submittal is returned marked "MAKE CORRECTIONS NOTED," formal revision and resubmission of said submittal will not be required.
  - c. If submittal is returned marked "AMEND/RESUBMIT," revise submittal and resubmit.
  - d. If submittal is returned marked "REJECTED/RESUBMIT," revise submittal and resubmit.
3. The District's review of Contractor submittals shall not relieve the Contractor of the responsibility for the correctness of details and dimensions. The Contractor shall assume all responsibility and risk for any misfits due to any errors in Contractor submittals. The Contractor shall be responsible for the dimensions and the design of adequate connections and details.
4. Fabrication or purchase of an item shall be commenced only after the District has reviewed the submittal and returned copies to the Contractor marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis for changes to the Contract requirements.

**1.8 SAMPLES**

- A. Whenever samples are required, submit not less than two samples of each item or material.
- B. Samples shall be submitted for acceptance a minimum of 7 working days prior to ordering material for delivery to the Site and shall be submitted in an orderly sequence so that dependent materials or equipment can be assembled and reviewed without causing delays in the Work.
- C. All samples shall be individually and indelibly labeled or tagged, indicating manufacturer's name for identification. Upon receiving acceptance by the District, one set of the samples will be stamped and dated by the District and returned to the Contractor, and one set of samples will be retained by the District.
- D. Unless indicated otherwise, all materials shall be the manufacturer's standard materials, products, or equipment lines. If the samples represent non-standard materials, products, or equipment lines and their selection will require an increase in Contract Time or Price, clearly indicate same on the Contractor's Submittal Transmittal Form. Include a Deviation Request form to accompany the Contractor's Submittal Transmittal Form for those items. The Deviation Request form is attached to the end of this Section.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SUBMITTALS**



# Contractor's Submittal Transmittal Form

For all contractor submittals, including shop drawings, samples calculation, data, or other

Date	Transmittal No.
------	-----------------

Project Name: <b>Judy Reservoir to Mount Vernon Transmission Pipeline - Phase 2</b>	Contractor: Address:  Attention:
Owner: Public Utility District No. 1 of Skagit County 1415 Freeway Drive PO Box 1436 Mount Vernon, WA 98273  Attention: Mike Benton	This is: <span style="float: right;">Check one</span>  <div style="text-align: right; margin-right: 20px;"> <input type="checkbox"/> an original submittal   <input type="checkbox"/> a 2nd submittal   <input type="checkbox"/> a ____ submittal         </div>
A. No Exceptions Taken. B. Make Corrections Noted. C. Amend/Resubmit. D. Rejected/Resubmit E. Other	

Item No.	Subject of Submittal	Spec Section or Drawing No.	Action Taken

District Reviewer: \_\_\_\_\_

Complete either (a) or (b), following:

(a) We have verified that the materials or equipment contained in this submittal meets all the requirements specified or shown (no exceptions)

(b) We have verified that the material or equipment contained in this submittal meets all the requirements specified or shown, except for the following deviations (List Deviations):


Contractor's Authorized Representative \_\_\_\_\_

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# Deviation Request

File No. \_\_\_\_\_

Owner: Public Utility District No. 1 of Skagit County Contractor \_\_\_\_\_

Project: Judy Reservoir to Mount Vernon Transmission Pipeline – Phase 2 Project No. \_\_\_\_\_

Date _____	
Subject _____	
Sheet No. _____	Specification _____
Original Contract Requirements:	
Reason for Deviation Request:	
Proposed Deviation:	
Any change in contract time or cost? _____	
Proposed:	Accepted <input type="checkbox"/> Not Accepted <input type="checkbox"/>
_____	_____
Contractor's Signature	District's Signature

- Distribution:**
1. Contractor
  2. District
  3. Engineer
  4. Construction Manager
  5. District's Project Files

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**SECTION 01311**  
**SCHEDULING AND REPORTING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies requirements and procedures for preparing project schedules and reports.
- B. Incorporate milestones and constraints including those indicated in the Drawings, Section 01060, and Section 01313.
- C. Purpose:
  - 1. Project Schedule:
    - a. To assure planning to execute the work in the required Contract Time and avoid conflicts with other concurrent construction.
    - b. To establish and monitor the scheduling and progress of Contract work activities.
    - c. To assist the District in monitoring progress and for the assessment of Contract change impacts.
    - d. To assist the District and Contractor in determining the completed work for processing of the payment requests.
  - 2. Schedule of Values: To provide an allocation of the Contract Price for measurement of monthly progress and payment for lump sum bid items.
  - 3. Reports: To provide a qualitative and quantitative record of work progress, planned progress, project schedule changes, and payment requests.
- D. It is understood by the Contractor that its failure to properly schedule the project and provide the required reports as set forth in this Section will adversely impact the ability of the District to manage its responsibility regarding time and cost management.
- E. Use the scheduling technique known as the Critical Path Method (CPM). Use the Precedence Diagramming Method (PDM) in preparing the CPM diagrams and calculations.
- F. Use the scheduling software Microsoft Project.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Schedules:
  - 1. General:
    - a. Submit schedules in PDF format and accessible electronic data files in the software format in which it was created.
    - b. At a minimum, the data files shall provide the CPM Network Diagram; tabular report listing of each activity by Early Start and Total Float sorts; logic tie report providing the predecessor and successor for each activity; precedence diagram; and earned value projections.
  - 2. Project Schedule:
    - a. Submit Draft Project Schedule prior to the Preconstruction Conference per Section 01300.
    - b. The District and Contractor shall meet to review and discuss the Draft Project Schedule within 7 working days after the Contractor submitted.
    - c. Within 10 working days of receipt of District comments, revise and resubmit Project Schedule to address all review comments.
    - d. Within 5 working days from when the Contractor submitted the revised Project Schedule, the District will either (1) accept the schedule as submitted, or (2) advise the Contractor to review any part or parts of the schedule which either do not meet the Contract requirements or are unsatisfactory for the District to monitor the project's progress and status or evaluate monthly payment requests by the Contractor.
  - 3. Monthly Schedule Updates: Submit with each monthly payment request.

4. Progress Schedule Updates (3-week look ahead): Submit during each progress meeting per Section 01200.
- C. Schedule of Values:
1. Submit the initial Schedule of Values with the submission of the draft Project Schedule for lump sum bid items.
  2. Submit the final Schedule of Values with the submission of the revised Project Schedule for lump sum bid items.
  3. Submit Schedule of Values with each monthly payment request with percent complete for each activity.
- D. Project Status Report:
1. Submit to the District with each monthly payment request.

### **1.3 SCHEDULES AND REPORT PREPARATION**

- A. General:
1. The District reserves the right to require that the Contractor adjust, add to, or clarify any portion of the Project Schedule which may later be insufficient for the monitoring of the Work or approval of partial payment requests.
  2. The schedule shall incorporate milestones and constraints including those indicated in the Drawings, Section 01060, and Section 01313.
  3. The acceptance of the Contractor's Project Schedule by the District will be based solely upon the schedule's compliance with the Contract requirements. Contractor shall utilize sufficient and necessary management and other resources to perform the Work in accordance with the accepted schedule. Upon acceptance of a schedule update, the updated schedule shall be considered the current project schedule.
  4. Submission of the Contractor's Monthly Schedule Updates or Progress Schedule Updates shall not relieve the Contractor of responsibility for scheduling, sequencing, and pursuing the Work to comply with the requirements of the Contract Documents, including adverse effects such as delays resulting from ill-timed work.
  5. The District's review of schedules shall be limited to Contract conformance with the construction and schedule constraints as stated in Section 01313. Make corrections to the schedules necessary to comply with the Contract requirements and adjust the schedules to incorporate any missing information requested by the District.
  6. Neither the submission nor the updating of the Contractor's Project Schedule submittal nor the submission, updating, change or revision of any other report, curve, schedule, or narrative submitted to the District by the Contractor, nor the District's review or acceptance of any such report, curve, schedule, or narrative shall have the effect of amending or modifying, in any way, the Contract completion date or milestone dates or of modifying or limiting, in any way, the Contractor's obligations under this Contract. Only a signed, fully executed change order can modify these contractual obligations.
- B. Project Schedule:
1. The Gantt chart shall include the Contractor's early activities (mobilization, permits, submittals necessary for early material and equipment procurement, submittals necessary for long lead equipment procurement, initial site work and other submittals and activities required in the first 30 days).
  2. The Gantt chart shall indicate the major components of the project work and the sequence relations between major components and subdivisions of major components. The Gantt chart shall indicate the relationships and timeframes in which the various components of the Work will be substantially complete and placed into service in order to meet the project milestones. Sufficient detail shall be included for the identification of subdivisions of major components and activities such as:
    - a. Procurement of major materials.
    - b. Required milestones, if any.
    - c. Listed constraints, including permitting.
    - d. Shutdowns of water systems.

#### **SCHEDULING AND REPORTING**

- e. Preparation and submittal of material and equipment.
- f. Submittal review per Section 01300.
- g. Mobilization.
- h. Erosion control.
- i. Site access (construction entrances and haul road improvements).
- j. Site preparation and clearing and grubbing.
- k. Stripping and stockpiling of wetland topsoils.
- l. Dewatering system set-up and operation.
- m. Utility relocates.
- n. Trench excavation, pipe installation, and backfill (Station to Station).
- o. Preload for bridge across East Fork Nookachamps Creek.
- p. Bridge at East Fork Nookachamps Creek.
- q. Trenchless crossings.
- r. Appurtenance installation.
- s. Distribution line installation.
- t. Pipeline testing, disinfection, and startup.
- u. Final connections to existing pipe.
- v. Start up and final checks.
- w. Pipeline Completion.
- x. Cathodic protection system.
- y. Connection at distribution lines.
- z. Decommissioning of existing 24-inch-diameter water transmission pipeline.
- aa. Final grading.
- bb. Service Road installation.
- cc. Surface restoration including pavement and revegetation.
- dd. Inspections and punchlist (Substantial Completion).
- ee. Record drawings and O&M Manual.
- ff. Demobilization.
- gg. Final Completion.

C. Monthly Schedule Updates:

- 1. Following the acceptance of the Project Schedule, monitor the progress of the Work and adjust the schedule each month to reflect actual progress and any changes in planned future activities.
- 2. Each schedule update submitted must be complete including all information requested in the original schedule submittal.
- 3. Each update shall continue to show all work activities including those already completed. These completed activities shall accurately reflect the "as built" information by indicating when the work was actually started and completed.
- 4. The status of the Work will be determined by the percent completion of each activity shown on the schedule for lump sum bid items.

D. Progress Schedule Updates (3-week look ahead):

- 1. Progress Schedule Updates will be reviewed with the Contractor during the progress meetings.

#### 1.4 SCHEDULE OF VALUES

- A. Schedule of Values identifies the various activities of the Contract work and their values and quantities including the overhead and profit of each activity for lump sum bid items. Cost information shall be presented in a tabular Microsoft Excel 2010 or newer format to be used as a tool to track status of each lump sum bid item activity on a monthly basis.
- B. Submit Schedule of Values in a tabular Microsoft Excel 2010 or newer format for lump sum bid items, including the following:
  - 1. Contract Price allocated as specified in this Section. This is the activity value determined in this Section.
  - 2. Dollars earned and percent complete for prior month.
  - 3. Dollars earned and percent complete for current month.

#### SCHEDULING AND REPORTING

4. Dollars earned and percent complete-to-date.
  5. Balance Remaining.
- C. Schedule of Values breakdown shall be taken from the task activities in the cost loaded schedule.
- D. Certain Items in this Contract need to be identified for special purposes, such as grant conditions. Identify these costs on the Schedule of Values and the Progress Schedule breakdown.
- E. The total value of the activities shall be equal to the Contract Price.
- F. Monthly Update Cost:
1. Submit with the monthly payment request as a condition precedent to receiving payment for work accomplished each month.
  2. Update cost loading to reflect added activities in the new Monthly Schedule Update.

### **1.5 CHANGE ORDERS**

- A. Upon approval of a change order, or upon receipt by the Contractor of authorization to proceed with additional work, the change shall be reflected in the next submittal of the schedule.

### **1.6 PROJECT STATUS REPORT**

- A. Prepare monthly written narrative reports of the status of the project and submit with the monthly payment request.
1. Written status reports shall include:
    - a. The status of major project components (percent complete, amount of time ahead or behind schedule) and an explanation of how the Project will be brought back on schedule if delays have occurred.
    - b. The progress made on critical path activities.
    - c. Explanations for any work scheduled but not completed on critical path activities during the previous month.
    - d. Explanations for any schedule changes.
    - e. A list of the critical activities scheduled to be performed in the next one month period.
    - f. The status of major material and equipment procurement.
    - g. The value of materials and equipment properly stored at the site, but not yet incorporated into the Work.
    - h. Any delays encountered during the reporting period.
  2. Contractor may include any other information pertinent to the status of the Project. The Contractor shall include additional status information requested by the District.

### **1.7 MONTHLY PAYMENT REQUESTS:**

- A. Include the following with monthly payment requests:
1. Project Status Report.
  2. Monthly Schedule Update.
  3. Schedule of Values.

### **PART 2 - PRODUCTS (NOT USED)**

### **PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

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**SECTION 01313**  
**CONSTRUCTION AND SCHEDULE CONSTRAINTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies milestones, hours of work, and identifies constraints on the construction schedule imposed by easements and permits, environmental regulations, and other agency requirements. The Contractor is expected to use this information in preparing construction schedules and planning the Work.
- B. The purpose of this Section is to ensure adequate planning and performance of the Work by the Contractor in compliance with easements, permits, and other regulatory constraints.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Incorporate construction and schedule constraints into Project Schedule and updates per Section 01311.

**1.3 DEFINITIONS**

- A. Pipeline Completion:
  - 1. Completion of the following activities:
    - a. Pipeline installation for the 36-inch-diameter water transmission pipeline.
    - b. Testing.
    - c. Disinfection.
    - d. Demonstrated capable of conveying full flows.
- B. Substantial Completion:
  - 1. Completion of the following activities, in addition to Pipeline Completion:
    - a. Decommissioning of existing 24-inch-diameter water transmission pipeline.
    - b. Final connection of distribution system.
    - c. Completion of cathodic protection system.
    - d. Surface restoration and final stabilization.
    - e. Stream restoration.
    - f. Site clean-up and demobilization completed.
- C. Final Completion:
  - 1. Completion of the following activities, in addition to Substantial Completion:
    - a. Punchlist.
    - b. O&M manuals.
    - c. Record drawings.

**1.4 MILESTONES**

- A. Interim Milestones: None.

**1.5 CONSTRAINTS**

- A. General:
  - 1. The Project Schedule shall incorporate any schedule information indicated in the Drawings and listed in this Section. These constraints have been identified here for the convenience of the Contractor; however, all schedule constraints identified in easements, permits, regulations, or elsewhere in the Specifications or Drawings shall be incorporated into the Contractor's schedule, even if not listed in this Section.
- B. Permits:
  - 1. Some permits may have specific restrictions on construction timing, work hours, and type of construction activity allowed; see Section 01060. Abide by all restrictions imposed by the permits.

2. Comply with Skagit County Noise Ordinance Restrictions.
- C. Operational Restriction:
1. The only time it is permissible for the Judy Reservoir to Mount Vernon Transmission Pipeline and the Judy Reservoir to Sedro Woolley Transmission Pipeline to be offline at the same time is for the initial “weye” connection at approximate Station 361+83 and the 30-inch-diameter tee at approximate Station 401+36. Contractor shall notify the District’s operation personnel a minimum of 7 working days in advance of shutdown. Maximum allowable outage is 10 hours.
- D. Waterways and Fish Window Restrictions:
1. Work within the ordinary high water mark of the Nookachamps Creek, Stream A, and Clear Lake Tributary is allowed between June 15, 2021 and September 30, 2021 and June 15, 2022 and September 30, 2022; excavation or trenchless construction under any stream within the ordinary high water mark is not to be conducted on or between October 1, 2021 and June 14, 2022.
  2. Work within the ordinary high water mark of the East Fork Nookachamps Creek is allowed between June 15, 2021 and September 30, 2021 and July 15, 2022 and September 30, 2022; work overhead on the bridge may occur outside of the restricted period. Excavation and other ground-disturbing activities within the ordinary high water mark is not to be conducted on or between October 1, 2021 and June 14, 2022. The temporary support for the bridge within the ordinary high water mark may be installed at low flows. During this time, weather reports must be heeded so the support can be protected or removed before high flows commence.
- E. Property/Easement Constraints:
1. The project is contained within easements with private landowners. These easements are included in Appendix B. Specific timing restrictions are as follows:
    - a. Temporary construction easements terminate on either December 31, 2023 or December 31, 2024; see Section 01060.
    - b. Work within the permanent easement area and the northern temporary construction easement area on Parcel P30156 (Mayo property) is limited to 12 consecutive months. Comply with easement requirements.
    - c. Work on Parcel P24796 (Western Washington Corporation of Seventh-Day Adventists property) shall not occur on Saturdays or Sundays.
- F. Landscape Restoration Constraints:
1. Planting: Section 02900.
  2. Seeding: Section 02935.
- G. Traffic Control Constraints:
1. Closure of Old Day Creek Road will be allowed with detour using Morford Road. The road may be closed with detour on a daily basis from 7 AM to 7 PM. The road must be open to one lane of traffic at night with temporary traffic signals.
  2. All work on Old Day Creek Road and Morford Road (within the roadway prism) shall be completed 45 calendar days after road closure begins, including pavement restoration.
- H. Water Quality Constraints:
1. All new pipeline must be cleaned, flushed, tested, and disinfected prior to tying into existing system in accordance with Section 02643.

## 1.6 HOURS OF WORK

- A. Unless otherwise specified, conform to applicable jurisdictions and other pertinent ordinances regarding limitations on work hours or specific parts of the work. Request work hour variations in writing and obtain written approval from Local Authority Having Jurisdiction and the District prior to initiating work hours outside of the hours allowed by this Contract.
1. Unless otherwise indicated, work hours in the City of Mount Vernon are the following:
    - a. 7am to 9pm, Monday through Friday.
    - b. 8am to 9pm, Sunday and Saturday.
  2. Unless otherwise indicated, work hours in unincorporated Skagit County are the following:
    - a. 7am to 9pm, Monday through Friday.

### CONSTRUCTION AND SCHEDULE CONSTRAINTS

- b. 8am to 9pm, Saturday and Sunday.
- B. Be responsible for hours of work and related restrictions modified by Section 01060.
- C. Work outside of the scheduled work hours shall be submitted for review per Section 01300 prior to the start of such work.
- D. If the Contractor works unscheduled hours or if the Contractor has not obtained District approval prior to the start of unscheduled work, the Contractor shall be liable for the costs of District's overtime inspection at the rate of \$TBD per hour for each person performing such inspection for the District.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

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**SECTION 01352**  
**CONSTRUCTION SITE HEALTH AND SAFETY**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section lists basic safety measures for the work.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Accident Prevention Plan (APP).
- C. Site Specific Health and Safety Plan (HSP).
- D. Weekly documentation relating to Contractor's safety compliance, identification of hazards or safety violations, actions taken to correct them, disciplinary action taken and safety training undertaken.

**1.3 ACCIDENT PREVENTION PLAN**

- A. Accident Prevention Plan (APP) shall be prepared for the Contractor and each subcontractor which identifies anticipated job safety hazards within the scope of the Contractor's and subcontractor's work for all phases of the Contract, including the specific means used to address each hazard prior to starting the job.
- B. APP shall conform to the requirements of the Washington Industrial Safety and Health Act (WISHA).
- C. A copy of the APP shall be furnished prior to starting the job.

**1.4 SITE SPECIFIC HEALTH AND SAFETY PLAN**

- A. Site Specific Health and Safety Plan (HSP), including COVID-19 provisions, shall be prepared for the Contractor and each subcontractor which identifies anticipated job safety hazards within the scope of the Contractor's and subcontractor's work for all phases of the Contract, including the specific means used to address each hazard prior to starting the job.
- B. HSP shall conform to the requirements of the WISHA.
- C. A copy of the HSP shall be furnished prior to starting the job.

**1.5 SAFETY**

- A. Before starting the job, the Contractor shall develop and furnish the District with a copy of its written APP and Site Specific HSP, which identifies anticipated job safety hazards within the scope of its contract and for all phases of its contract and which addresses the specific means it will use to address each hazard.
- B. Contractor shall ensure that its employees follow all APPs, HSPs and work rules. Contractor shall communicate all work rules to its employees and shall have a disciplinary plan for safety or work rule violations which it consistently enforces and will continue to enforce throughout the length of this Contract, no matter who discovers the violation.
- C. Contractor shall select and furnish to its employees all appropriate safety equipment and participate fully in coordination of all safety issues among all contractors/subcontractors on the job.
- D. Contractor shall make its APP and HSP available and accessible at the site to all of its employees.
- E. Contractor shall have available in its job file weekly documentation relating to Contractor's safety compliance, identification of hazards or safety violations, actions taken to correct them, disciplinary action taken, and safety training undertaken.

- F. Contractor shall provide safety training on a regular basis to all workers as required by WISHA, conduct safety inspections as required by WISHA, and conduct job hazard analysis and correct all hazards found.
- G. Contractor and its employees shall comply with all rules and regulations relating to safety, including but not limited to, the WISHA regulations.
- H. Contractor shall undertake any abatement actions required as a result of the discovery of violations.
- I. Contractor shall require each subcontractor to have its own APP and site specific HSP.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 SAFETY**

- A. Select all appropriate safety equipment required to do the job and furnish it to workers.
- B. Participate in coordination of all safety issues among all contractors on the job.
- C. Make APPs and HSPs available and accessible to workers at the site.
- D. Communicate to workers the work rules and requirements to abide by said rules. Implement a progressive disciplinary plan for safety or work rule violations that is consistently enforced, no matter who discovers the violations.
- E. Provide weekly documentation relating to your safety compliance, identification of hazards or safety violations, actions taken to correct them, disciplinary action taken and safety training undertaken.
- F. Provide safety training on a regular basis to all workers as required by WISHA.
- G. Conduct safety inspections as required by WISHA and report all identified hazards.

**END OF SECTION**

**SECTION 01400**  
**QUALITY CONTROL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Specific quality control requirements for the Work are indicated throughout the Contract Documents. The requirements of this Section are primarily related to performance of the Work beyond furnishing of manufactured products. The term "Quality Control" includes inspection, sampling and testing, and associated requirements.
- B. Inspections performed by the District or other agencies do not relieve the Contractor of any testing, inspection, and documentation requirements.

**1.2 INSPECTION AT PLACE OF MANUFACTURE**

- A. Unless otherwise indicated, all products, materials, and equipment shall be subject to inspection by the District or Engineer at the place of manufacture.
- B. The presence of the District or Engineer at the place of manufacture, however, shall not relieve the Contractor of the responsibility for furnishing products, materials, and equipment which comply with all requirements of the Contract Documents. Compliance is a duty of the Contractor and said duty shall not be avoided by any act or omission on the part of the District or Engineer.

**1.3 SAMPLING AND TESTING**

- A. Unless otherwise indicated, all sampling and testing shall be in accordance with the methods prescribed in the current standards as applicable to the class and nature of the article or materials considered; however, the District reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the Engineer, will assure the District that the quality of the workmanship is in full accordance with the Contract Documents.
- B. Any waiver by the District or Engineer of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any requirements of the Contract Documents.
- C. Notwithstanding the existence of such waiver, the District reserves the right to make independent investigations and tests, and failure of any portion of the Work to meet any of the requirements of the Contract Documents, shall be reasonable cause for the District to require the removal or correction and reconstruction of any such work in accordance with the Contract Documents.

**1.4 TESTING LABORATORY SERVICE**

- A. Testing laboratory service shall comply with the following:
  - 1. District will select, employ, and pay for services of a qualified independent testing firm or firms (Testing Firm) to perform testing and inspection or will perform inspection and testing itself.
  - 2. The District or Testing Firm will perform testing and other related services specified in individual specification sections and as required by the District.
  - 3. Testing and inspection reports will be submitted to the District, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. District will communicate non-compliance to Contractor.
  - 4. Contractor shall cooperate with the District or Testing Firm and furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
  - 5. Contractor shall provide Testing Firm access to off-site material source pits for furnishing samples of materials, design mix, and will make workspace available to Testing Firm.

6. Contractor shall notify District 24 hours prior to the expected time for operations requiring inspection and laboratory testing services.
7. Retesting required because of non-conformance to specified requirements shall be performed by the same Testing Firm on instructions by the District or Engineer. Contractor shall bear all costs for such retesting at no additional cost to the District.
8. Where the District or Engineer request retesting because of suspected non-conformance to specified requirements and the retesting determines that the work was in conformance with the specified requirements, Contractor shall not be responsible for the direct costs of the Testing Firm for retesting.
9. The cost of sampling and testing for the Contractor's own use shall be included in the Contract Price.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Inspection: Inspect materials or equipment upon the arrival on the jobsite and immediately prior to installation, and reject damaged and defective items.
- B. Measurements: Verify measurements and dimensions of the Work as an integral step of starting each installation.
- C. Manufacturer's Instructions: Where installations include manufactured products, comply with manufacturer's applicable instructions and recommendations for installation, to whatever extent these are more explicit or more stringent than applicable requirements indicated in Contract Documents.

**END OF SECTION**

**SECTION 01505**  
**MOBILIZATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

A. This Section specifies mobilization requirements.

**1.2 GENERAL**

A. Mobilization shall include the initial activities in preparation for starting the field work; moving equipment onto the site; furnishing and erecting equipment, temporary buildings, and other construction facilities; and implementing security requirements. Mobilization shall include the following principal items:

1. Moving Contractor's and District's field office and equipment required for first month operations on to the site.
2. Submittals for ordering long lead time materials and major equipment within ten days of Notice to Proceed.
3. Installing temporary construction power, wiring, and lighting facilities.
4. Developing initial construction water supply.
5. Providing all on-site communication facilities including telephones.
6. Providing on-site sanitary facilities and potable water facilities.
7. Arranging for and erection of Contractor's staging and storage yards.
8. Obtaining all required permits and easements to be obtained by the Contractor.
9. Posting all OSHA and WISHA required notices and establishment of safety programs.
10. Having the Contractor's superintendent at the job site full time.
11. Preparation of initial submittals.

B. Mobilization shall include demobilization of all equipment and facilities from the site and the restoration thereof.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

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**SECTION 01520**  
**DISTRICT FIELD OFFICE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies the requirements for the District's field office. The field office is to be placed at 22340 Gunderson Road per the attached plan. A second field office for the Contractor's use can be located at this location as shown per the plan as well. Both of these field offices have been included in approved building permit included in Appendix A.
- B. The District's field office shall be the property of the Contractor and upon Final Acceptance of the Contract, the Contractor shall be responsible for its removal and disposition. The disturbed area(s) are to be restored to pre-construction condition as approved by the property owner.
- C. The use of the site shall be in accordance with the temporary construction easement provisions as recorded under Skagit County Auditor File No. 202004060126; see Section 01060. All fencing and briar removal included in the temporary construction easement will be performed by the District crews and are not the responsibility of the Contractor. All references to Exhibits A and B within the recorded document shall be amended as follows: Exhibit A is the Lundvall parcel North of Gunderson Road (P24734); Exhibit B is the Lundvall parcel South of Gunderson Road (P24742). Any use of Lundvall property for the temporary office trailers, material storage and staging, 75% of the available covered area of the existing outbuildings and the pasture less that protected as per the restrictions as included in Auditor File No. 200901220076 is limited to occur only on parcel (P24742) (the parcel south of Gunderson Road and East of SR-9).
- D. The District's field office is not for the use of the Contractor.
- E. The District's field office shall be installed per the approved building permit provisions and operational no later than 45 days after Notice to Proceed.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Scaled floor plan drawing for field office including furnishing and equipment layout.
- C. Product data for field office, furnishing, and equipment.
- D. Field office site location and site layout.

**1.3 FIELD OFFICE**

- A. Portable facility capable of being moved via public roadways with a manufacturing date of 2015 or newer that hasn't been smoked in. Any required moving permits shall be the responsibility of the contractor.
- B. Field office requirements:
  - 1. Double section portable facility with a minimum of 1,152 square feet (24 feet by 48 feet). Any substitution to this will need to be submitted and approved by the District.
  - 2. At a minimum the office shall include two enclosed offices, one bathroom with a lavatory & water closet and necessary appurtenances, two work-stations in a central common area located in the remaining open portion of the office arranged to where this space can also double as a conference/meeting room. Each workstation shall each include: one desk, one computer table, one ergonomically adjustable office chair, one stationary chair, and one waste basket. The common area conference/meeting area shall have a conference table min. size (10' x 4') with eight ergonomically adjustable office chairs.

3. A coffee station including a table, electrical receptacle, and bottled water dispenser that includes both hot and cold water.
  4. A standard size refrigerator min. 18 cu ft.
  5. Minimum of three windows with Venetian-type blinds.
  6. Connection for electrical service, internet service with a minimum of 200 mbs, communication and data backbone cabling to each workstation along with one additional location to be determined for the conference/meeting area, weekly water service, garbage and sanitation pumping service.
  7. Seismic tie-downs and skirting.
- C. Obtain all other required permits and comply with all federal, state, and local requirements.

#### **1.4 POWER**

- A. Procure all necessary L&I electrical permits required to connect the District's field office to the existing 100 AMP metered power service as shown per the attached plan. The service and associated monthly fees shall be transferred into the Contractor's name and paid by the Contractor. If the Contractor chooses to utilize this site to locate their field office and the existing 100 AMP service is not adequate to serve both offices, the Contractor shall coordinate with the power company and Labor & Industries to upgrade the existing overhead power service from 100-amp to a 200-amp service. All costs to provide power to the field office(s) will be included in the bid and paid for by the Contractor including any PSE installation charges.
- B. Provide power per IBC requirements and including an extra outlet for one copier.
- C. Meet all current electrical code requirements.
- D. Provide connections for computers (desktop) at each workstation and at the printer/fax area along with one additional location to be determined to serve the conference/meeting area.

#### **1.5 HEATING, AIR CONDITIONING, AND VENTILATION**

- A. Provide a quiet, functioning climate control system that provides heating, air conditioning, and ventilation. The system shall include the appropriate number of vents and return air ducts to provide an even distribution of air to all areas of the office space. At a minimum, each office space shall contain one HVAC air vent with adjustable damper.
- B. Per Skagit County Building Permit requirements, the HVAC unit must be an economizer unless the unit meets 21 seer.

#### **1.6 COMMUNICATION AND TELEPHONE SERVICE**

- A. Provide and install Local Area Network (LAN) and data Backbone and Horizontal cabling that meets the following requirements:
  1. Provide LAN System backbone cabling circuits between the data/LAN closet and all outlet jacks as directed by the District. Provide and install two (2) circuits for each LAN outlet jack in the trailer. Cabling and terminations shall meet the requirements of EIA/TIA-568, Category 5.
  2. LAN system hardware to be provided and installed, complete with all terminations in the closet, shall include the following:
    - a. One (1) wall mounted 48 port Patch Panel, Category 5, approximately 6" H x 19" W Modular RJ45 to CAT 5 Connections.
    - b. One (1) sturdy shelf sufficient to support a portable computer and monitor.
    - c. Quadplex (4 jacks) Modular RJ45 at each workstation and printer/fax area and one additional area to be determined to serve the conference/meeting room area, with wall jacks color-coded to designate two data, one phone, and one spare.
    - d. All wiring clearly labeled with a numbering system at patch panel and wall jack.
  3. All equipment and installation work shall meet or exceed the requirements and recommended wiring practices of the EIA/TIA-568 Standard.

4. Provide wiring and data jacks for each office work station and copier/printer/scanner as directed by the District. The District will provide telephones with voice mail service, the workstation computers, and the copier/printer/scanner.

#### **1.7 WATER SERVICE**

- A. Provide hot and cold drinking water dispenser and weekly replacement service of water bottles for all potable water use.
- B. Connect existing piping feeding the existing frostless yard hydrant as shown per the attached to the temporary office(s). This is to be used solely for hand washing and the restroom.

#### **1.8 SANITARY FACILITIES**

- A. Provide portable sanitary facility with hand wash outside of the office trailer in addition to the sanitary holding tank sized to serve the four workstations inside the office trailer. Comply with applicable laws, ordinances, and regulations including ADA pertaining to public health, sanitation and access.

#### **1.9 SECURITY**

- A. Provide on all exterior doors keyed lock sets and cylinder deadbolt locks that are keyed alike. Provide 3 sets of keys. The District field office is to be keyed separately from the Contractor's offices.
- B. All exterior doors shall provide suitable and appropriate security.
- C. All exterior office space windows shall correctly operate with a secure locking system.
- D. Exterior windows shall be secured with bars to prevent entry from the outside.

#### **1.10 SITE PREPARATION**

- A. Prepare level foundation site for placement of field office per the attached structural foundation drawings.
- B. Relocate existing fencing materials and miscellaneous debris including two non-operating vehicles to other location on same property.

#### **1.11 LOCATION**

- A. Locate the District's field office and the Contractor's field office within the temporary construction easement on Parcel P24742 (22340 Gunderson Road per the attached plan.)
- B. Comply with easement requirements per Section 01060.

#### **1.12 ROADS AND PARKING**

- A. Maintain safe, open, and non-congested access at all times.
- B. Provide parking for a minimum of 5 vehicles.

#### **1.13 CLEANING AND MAINTENANCE**

- A. Provide cleaning and maintenance including:
  1. Twice weekly vacuuming, wet mopping, trash removal, and recycle removal.
  2. Twice weekly cleaning and pumping of sanitary holding tank(s) and provide restroom supplies on an as-needed basis.
  3. HVAC, water service, electrical, and communication line maintenance as required.
  4. Service and maintenance of all Contractor supplied office equipment.
- B. Maintain the area free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition, including vegetation and landscape areas.

## **1.14 OFFICE EQUIPMENT AND FURNISHINGS**

- A. Provide and maintain office equipment and furnishings as follows:
  - 1. Provide 4 desks, 4 ergonomically adjustable computer tables, 4 ergonomically adjustable office chairs, 4 stationary chairs, and 4 waste baskets.
  - 2. One 48" x 120" folding tables with Formica top and 8 stacking metal chairs with cushioned vinyl or fabric pads for the conference room.
  - 3. One (1) four-drawer legal size filing cabinet and one (1) two-shelf bookcase.
  - 4. One drawing layout table and a plan rack.
  - 5. Evenly distributed, quality office lighting.
  - 6. Bottled drinking water service with hot and cold-water dispenser.
  - 7. Counter or table next to the owner-supplied printer, scanner, and copier.
  - 8. Owner-supplied Printer/Copier/Scanner: Ricoh MPC2003 or Approved Equal.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 PARKING LOT**

- A. Maintain the existing graveled areas by installing and rolling a minimum of 4 inches of 1-1/4" clean crushed rock to maintain a hard, permeable parking area. Skagit County Stormwater Code considers graveled areas as being impervious. Any increase in imperious area above and beyond the existing graveled areas triggers a Skagit County Stormwater Permit. If Skagit County Stormwater Permit is necessary, it will be the Contractor's responsibility to procure.
- B. Maintain traffic and parking areas in sound condition, free of excavated material, construction equipment, mud, debris and construction materials. Repair deficiencies including potholes and low areas which collect standing water.

### **3.2 ON-GOING COSTS**

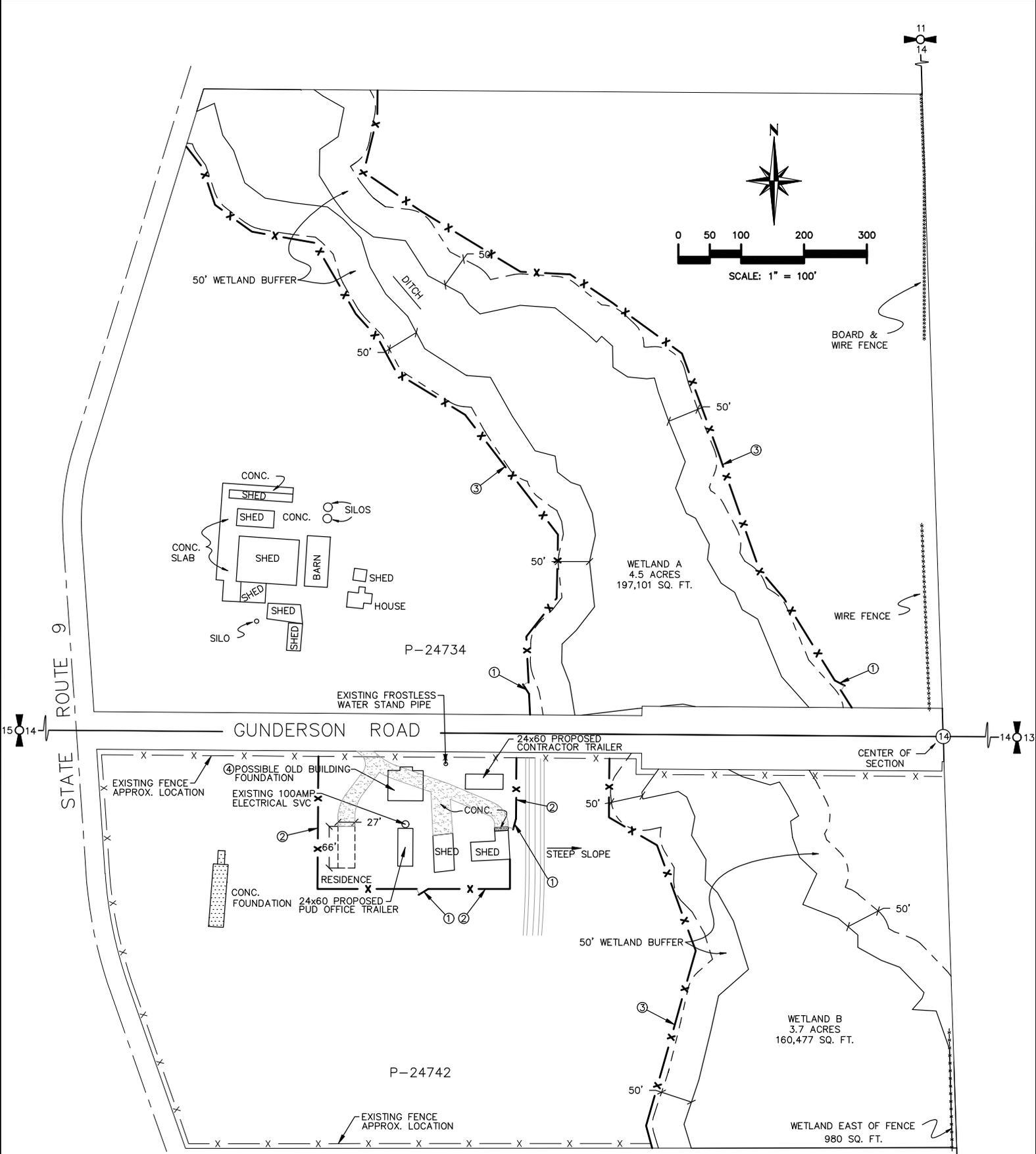
- A. Be responsible for all on-going maintenance and utility cost associated with the field office and its operation for items furnished per this Section.

### **3.3 RESTORATION**

- A. After Final Acceptance of the Contract, the Contractor shall be responsible for the removal and disposition of the District's field office and removal of all temporary facilities, including appurtenances and construction materials, and restore area of parking lot and office trailers to pre-construction conditions. Comply with easement requirements per Section 01060.

**END OF SECTION**

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**NOTE:**  
 WETLAND BOUNDARIES SHOWN HEREON  
 ARE BASED UPON FIELD DELINEATION BY  
 WETLAND TECHNOLOGY IN AUGUST & SEPTEMBER 2007

1. GATE PER PUD STANDARD DETAIL WG-1
2. HOGWIRE FENCE TYPE B - PER SPEC SECTION 02831
3. TEMP LIVESTOCK FENCE TYPE D - PER SPEC SECTION 02831
4. OWNER BELIEVES IT WAS ALL REMOVED

CRITICAL AREA DURING  
 THE WET SEASON

DATE: 12/11/08

PROPOSED SITE DEVELOPMENT MAP IN THE NW 1/4 AND SW 1/4 OF SECTION 14, TOWNSHIP 34 NORTH, RANGE 4 EAST, W.M. SKAGIT COUNTY, WASHINGTON FOR: GRETTA LUNDVALL		
FB 304 PG 15	LISSER & ASSOCIATES, PLLC	SCALE: 1" = 100'
MERIDIAN: ASSUMED	SURVEYING & LAND-USE CONSULTATION MOUNT VERNON, WA 98273	DRAWING: 01-082WL

**SECTION 01550**  
**SITE ACCESS AND STORAGE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes requirements related to access to the site of the Work and transportation considerations.

**1.2 ACCESS LIMITATIONS**

- A. Investigate the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation, ingress and egress to the site of the Work, and work adjacent to roadways. Be responsible to construct and maintain any haul roads required for construction operations.
- B. The pipeline corridor is on easements through private property. Access to the right-of-way shall be through public roads that cross the pipeline right-of-way or private roads that the District has rights to access the pipeline corridor. Refer to the Drawings and easements (Appendix B) along with the approved WSDOT SR-9 access permit (Appendix A) for acceptable access points.

**1.3 ONSITE ACCESS ROADS**

- A. Existing driveways and access roads may be used by the Contractor for hauling materials in and out of the site in compliance with the traffic control plans. Be responsible for the assessment of road conditions and initial improvements and maintenance of haul roads throughout the duration of construction.
- B. Access to the pipeline corridor is limited by topography, overhead utilities, and the presence of wetlands, stream crossings, and bridges. These roads will be used by the Contractor with limitations.
- C. Driveways shall be maintained to be open and passable by privately owned vehicles.
- D. At the completion of work, grade gravel roads and driveways to drain and restore with crushed rock surfacing, concrete, or asphalt, to match pre-construction surface and grade unless indicated otherwise.

**1.4 TEMPORARY CROSSINGS**

- A. Temporary Bridges: Wherever necessary, provide suitable temporary bridges or steel plates over open excavations, except in such cases as the Contractor shall secure the written consent of the individuals or authorities concerned to omit such temporary bridges or steel plates. Written consent shall be delivered to the District prior to excavation. All such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street crossings shall conform to the requirements of the authority having jurisdiction in each case (WSDOT, Mount Vernon, or Skagit County).
- B. Street Use: Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street or parking area during the performance of the Work, and it shall so conduct its operations as not to interfere unnecessarily with the authorized work of WSDOT, utility companies, or other agencies in such streets or parking areas. Fire hydrants on or adjacent to the Work shall be kept accessible to fire-fighting equipment at all times. Temporary provisions shall be made by the Contractor to assure the use of sidewalks and the proper functioning of all gutters, storm drain inlets, and other drainage facilities.

**1.5 PIPE AND MATERIAL STORAGE**

- A. Do not string pipe or stockpile imported earth materials on streets or in places which interfere with vehicular traffic. Comply with related requirements and observe WSDOT, Mount Vernon, and Skagit County clearance requirements for stringing of pipe.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01560**  
**ENVIRONMENTAL CONTROLS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies temporary environmental controls required to be maintained during construction. Other environmental requirements are specified within the permits included in Appendix A.

**1.2 SUBMITTALS**

- A. Procedures: 01300.
- B. Revisions to SWPPP if required per this Section.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 AIR POLLUTION CONTROL**

- A. Do not discharge smoke, dust, and other contaminants into the atmosphere that violate the regulations of legally constituted authorities.
- B. Prevent smoke, dust, engine exhaust fumes, and other contaminants from entering building spaces by directing them away from building intake plenums, building doors, or openings. Do not allow internal combustion engines to idle for prolonged periods of time. Maintain construction vehicles and equipment in good repair. When exhaust emissions are determined to be excessive, repair or replace equipment.
- C. Use electrically-powered equipment where practical.
- D. Minimize dust nuisance by cleaning, sweeping, and sprinkling with water or other means. The use of water in amounts resulting in mud on public streets is not acceptable as a substitute for sweeping or other methods.

**3.2 NOISE CONTROL**

- A. Noise complaints received by the District during the Work will be shared with the Contractor. Work with the District, as required, to resolve noise related complaints.
- B. Perform all work in compliance with the local authority having jurisdiction's noise ordinances, except where additional restrictions are applicable. Schedule noisy operations to minimize their duration.
- C. Use whatever means necessary to comply with the noise ordinances. Be responsible for all costs necessary to reduce noise levels to those specified in the noise ordinances or to obtain a variance from the specific levels.
- D. Provide following noise abatement equipment or operate construction equipment in the following manner so as to avoid exceeding noise limitations:
  - 1. Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated without mufflers.
  - 2. Equipment that cannot meet the noise levels specified under the local noise ordinances shall be quieted by use of improved exhaust mufflers or other means.
  - 3. Noisy portable equipment, such as generators, compressors, or pumps shall be located as far away from sensitive noise receptor areas as practicable. (Noise sensitive receptors include residences.)
  - 4. Noise barriers shall be constructed around stationary construction equipment which has to be utilized at locations near sensitive noise receptors.

5. Idling equipment shall be shut off when not in active use.
6. No equipment operating in through the night shall produce greater than 68 dbA at a distance of 23 feet.

### **3.3 WATER QUALITY AND EROSION CONTROL**

- A. Stormwater Pollution Prevention Plan (SWPPP):
  1. District will provide the Contractor the SWPPP to be implemented during construction; the SWPPP is included in Appendix D.
  2. Contractor shall modify the SWPPP if, during inspections or investigations conducted by the District or the applicable local authority having jurisdiction, it is determined that the SWPPP is, or would be, ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site.
  3. A copy of the SWPPP and NPDES Construction Stormwater General Permit shall be kept at the construction site at all times during construction.
    - a. Comply with the SWPPP and the NPDES Construction Stormwater General Permit.
    - b. Maintain a site log book that contains a record of the implementation of the SWPPP and other permit requirements associated with the NPDES Construction Stormwater General Permit.
- B. Temporary Drainage: Conform to the regulations and requirements of legally authorized surface water management agencies.
- C. Keep trenches and areas of excavations free from water as required to permit continuous progress of, or to prevent damage to, the Work or the work of others.
- D. Discharge dewatering waters and runoff or other waters collected in or intercepted by excavations under the work of this Contract in conformance with all permits. Conduct operations in such a manner as to prevent sediment from reaching storm drains and surface waters. There are no sanitary sewers available near the site for dewatering discharge or discharge from testing and disinfection.
- E. Prevent solids or turbid runoff from entering waterways. No dirt, sediments, cement leachate, or other material harmful to fish shall enter fish bearing waters. Cover and secure excavated area, spoils piles and imported or stored fill materials. Cut and cover techniques, straw bales around storm drains and construction sites, silt fencing and similar erosion control measures shall be employed as required to prevent contamination of local waterways.
- F. All water that collects and/or drains off the project site must be contained and not allowed to leave the project area without treatment if turbidity exceeds levels identified in the NPDES Construction Stormwater General Permit issued by the Washington State Department of Ecology. Refer to Appendix A for permit terms and conditions. Provide testing for turbidity as required by permits. Dewatering system shall be designed to control releases to avoid soil erosion and contamination of waterways.
- G. If water quality standards or permit conditions are violated, shut down work causing the violation until protection and remediation is completed. Be responsible for all associated impacts.
- H. Be responsible for the overflow of any storm drains or surface waters resulting from the addition of flow from Contractor's activities and any damages associated with such overflow.
- I. Prevent additional construction wastes such as paper, wood, garbage, sanitary wastes, and fertilizer from leaving the site and entering waterways. Dispose of all debris on land in such a manner that it cannot enter a waterway or cause water quality degradation.
- J. See Sections 02270 and 02950 for additional requirements.

### **3.4 PROGRESS CLEANING AND SITE MAINTENANCE**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove waste materials, debris, and rubbish from the site immediately upon such materials becoming unfit for use in the Work. In the event this material is not removed, the District reserves the right to have the material removed and the expense charged to the Contractor.

- C. Prevent dirt and dust from escaping trucks departing the site by covering loads, washing truck tires before leaving the site, or other methods as applicable.
- D. Be responsible for controlling dust and mud within the project limits. All streets outside the project limits used by the Contractor during the execution of this Contract shall be kept clean. Use watering trucks equipped with high-velocity water jets and low-head sprinkling devices, power sweepers, and any other pieces of equipment necessary to render the streets free of all mud, debris, and foreign materials. Any damage caused by dust or mud accumulation on the streets and in the storm drain system or ditches shall be the sole responsibility of the Contractor.
- E. Watering trucks may be used on paved streets with an adequate storm drainage system. Watering trucks shall not be used on streets where, in the opinion of the Engineer, mud could be created, causing a nuisance. Where water flushing is not allowed, street sweepers (not power brooms) shall be used.
- F. Clean all roadway surfaces upon completion of each day's activities. Equipment required for this operation shall be on the job site or available at all times. Failure to have this equipment on the job site or available may necessitate a shutdown of the Work.
- G. Clean all roadways, streets, and appurtenances, including sidewalks and paths which are open for public use, of all material or debris which has been dropped or otherwise deposited thereon, as a result of Contractor on- and off-site operations, at the conclusion of each working day, and at such other times as deemed necessary by the District or Engineer to ensure the safety of the traveling public and to prevent inconvenience to the public and owners of private property adjacent to the Work.
- H. Any violation of the above requirements will be sufficient grounds for the District or Engineer to order the roadways, streets, and appurtenances cleaned by others and to deduct all costs of such cleaning from any money due to the Contractor.

### **3.5 OIL SPILL PREVENTION AND CONTROL**

- A. Regulations:
  - 1. Be advised that discharge of oil from equipment or facilities into state waters or onto adjacent land is not permitted under Washington State water quality regulations.
- B. Be responsible for prevention, containment, testing, and cleanup of spilled oil, fuel, and other petroleum products used in the Contractor's operations. All such prevention, containment, testing, and cleanup costs shall be borne by the Contractor. At a minimum, take the following measures regarding oil spill prevention, containment, and cleanup.
- C. Minimum Precautions:
  - 1. Include oil spill prevention measures as part of the Spill Prevention, Control, and Countermeasure (SPCC) plan.
  - 2. Equipment must be cleaned before leaving the work area. Loose oil, grease, and fuel must be cleaned from machinery.
  - 3. As required by permit, equipment with hydraulic systems using hydraulic oil must use clean vegetable based hydraulic oil.
  - 4. No fuels or chemicals shall be stored within wetlands, on bridges, or in areas that drain to waterbodies. No equipment shall be refueled within these same areas.
  - 5. Fuel hoses, lubrication equipment, hydraulically operated equipment, oil drums, and other equipment and facilities shall be inspected regularly for drips, leaks, or signs of damage, and shall be maintained and stored properly to prevent spills. Proper security shall be maintained to discourage vandalism.
  - 6. All oil and products storage tanks shall be diked or located so as to prevent spills from escaping to the water. Diking and subsoils shall be lined with impervious material to prevent oil from seeping into the ground.
  - 7. All visible floating oils shall be immediately contained with booms, dikes, or other appropriate means and removed from the water. All visible oils on land shall be immediately contained using dikes, straw bales, or other appropriate means and removed using sand, ground clay, sawdust, or other absorbent material. All used cleaning materials shall be properly disposed of by the Contractor.

8. Maintain on the job site, in the vicinity of ongoing work, the following spill response and containment materials:
  - a. Oil-absorbent booms: minimum four each, five feet long.
  - b. Oil-absorbent pads or bulk material, adequate for coverage of 200 square feet of surface area, minimum.
  - c. Straw bales.
  - d. Dry all.
  - e. Gloves.
  - f. Plastic bags.
- D. In the event of any oil or product discharges into public waters, or onto land with a potential for entry into public waters, immediately notify the District and the following agencies at their listed 24-hour response numbers:
  1. Washington DOE Northwest Regional Office, Telephone No. (425) 649-7000.

### **3.6 VIBRATION CONTROL AND SETTLEMENT CONTROL**

- A. Coordinate construction activities with private property operations within the work corridor that may be sensitive to construction-related vibrations or settlement.
- B. Coordinate construction activities with utility owners for utilities within the work corridor that may be sensitive to construction-related vibrations or settlement.
- C. Limit construction activities around vibration- and settlement-sensitive structures or utilities. Where appropriate, use construction techniques that modify the propagation paths of the ground waves associated with vibration.

### **3.7 CULTURAL RESOURCES FINDINGS**

- A. References:
  1. Comply with the National Historic Preservation Act of 1966 and 36 CFR 800 which provide for the preservation of potential historical architectural, archaeological, or cultural resources (hereinafter called “cultural resources”).
  2. Comply with the requirements of the National Historical Preservation Act of 1966 as it relates to the preservation of cultural resources and fair compensation to the Contractor for delays resulting from such cultural resources investigations.
- B. Training of Contractor personnel for recognition of potential cultural resources discovered during excavation for the pipeline and other structures will be provided by the Professional Archeologist under contract to the District.
  1. Training will be provided in two sessions of up to 4 hours in duration.
  2. Training is mandatory for all field personnel involved with excavation.
  3. In the event of a find, the Contractor shall follow the Archeological Monitoring and Inadvertent Discovery Plan in Appendix E.
- C. The District will provide a professional archeologist to monitor excavation activities associated with construction of the Work per the Archeological Monitoring and Inadvertent Discovery Plan in Appendix E.
  1. Provide 2-week written notice prior to start of excavation and again at 48 hours prior to excavation for District to coordinate schedule with professional archeologist.
  2. Contractor shall cooperate with professional archeologist to allow inspection and sampling.
- D. Accommodate other professional archeologist requests (via the District).
  1. Provide notice of schedule and schedule changes to the District, so the District can inform professional archeologist.

### **3.8 FINES**

- A. Be responsible for all fines incurred from non-compliance with regulations of governing authorities.

**END OF SECTION**

**SECTION 01570**  
**TRAFFIC REGULATIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies requirements for traffic control and compliance with traffic regulations.
- B. The Work occurs in large extent adjacent to State Route (SR) 9 and SR 538 and includes bridge crossings. WSDOT is the regulatory agency for SR 9. The City of Mount Vernon is the regulatory agency for SR 538 in the area of the Work. Skagit County has jurisdiction over the County roads crossed or paralleled by the Work.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Traffic Control Supervisor:
    - a. Possess a valid Flagger Certification Card. Approved states are: Idaho, Montana, Oregon, and Washington.
    - b. Have 2,000 hours of traffic control experience. This experience may come from working with traffic control on a maintenance or survey crew. It may include being a project inspector on construction projects requiring traffic control. An employee developing or reviewing traffic control plans gains traffic control experience as well. The combination of the above allowable experience, in traffic control, must equal at least one year, or 2,000 hours. This experience is required to become a certified Traffic Control Supervisor.
    - c. Documentation of traffic control experience: To document the traffic control experience, a person must have two letters of recommendation that verify their work with traffic control. The letters must not come from the employee attempting to become a certified Traffic Control Supervisor.
      - 1) One letter needs to come from supervisor, either current or past.
      - 2) The other letter must come from a resource that knows the employee's present or past experience.
    - d. Take the Work Zone Traffic Control Supervisor's course from recognized safety training organization. Each person must attend the two and one half day course and pass the written test with at least 80 percent.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications:
  - 1. Traffic Control Supervisor.
- C. Traffic control plans and proposed modifications by Contractor.
- D. Notification Schedule: Submit weekly.

**1.4 TRAFFIC CONTROL PLANS**

- A. Take all necessary precautions for the protection of the Work and the safety of the public.
- B. Comply with provided traffic control plans as required to support the provided traffic control measures in addition to any Contractor-proposed modifications showing methods of handling traffic required for performing the Work.
  - 1. All flaggers are to be shown on the traffic control plan except for emergency situations.

2. Traffic control plans shall be in accordance with the established standards for plan development as shown in the MUTCD, Part VI, and as required by WAC 296-155-305.
3. Traffic control plans plus any Contractor-proposed modifications shall be submitted for review by the Contractor.
4. Be solely responsible for providing copies of the approved traffic control plans containing Contractor-proposed modifications to roadway governing jurisdictions for approval.

#### **1.5 TRAFFIC CONTROL SUPERVISOR**

- A. The Project requires the Contractor to provide a Traffic Control Supervisor. The Work occurs in large extent adjacent to State Route 9 and 538 and includes bridge crossings. WSDOT is the regulatory agency for State Route 9. The City of Mount Vernon is the regulatory agency for State Route 538 in the area of the Work. Skagit County has jurisdiction over the county roads crossed by the Work.
- B. Traffic Control Supervisor (TCS) shall be present on the project whenever flagging or spotting or other traffic control labor is being utilized, or less frequently if authorized by the District. The TCS shall personally perform all the duties of the TCS. During non-work periods, the TCS shall be available to the job site within a 45-minute time period after notification by the District. The TCS's duties shall include:
  1. Having a current set of approved traffic control plans (TCPs) including accepted modifications provided by the Contractor, WSDOT Franchise Amendment, referenced standards, and the Contract Documents.
  2. Ensuring compliance with flagger certification and requirements of the roadway jurisdiction's requirements.
  3. Proper operation of traffic control devices including lights and associated power supply and generators.
  4. Prepare daily traffic control reports.

#### **1.6 DISTRICT'S AUTHORITY**

- A. If the Contractor fails or refuses to provide and maintain all traffic controls required by the Contract Documents or ordered by the jurisdiction, the District may:
  1. At no cost to the District, suspend all work without further notice to the Contractor or the Contractor's surety until the Contractor complies.
  2. At the Contractor's expense provide, erect, maintain, and remove required traffic control devices and flaggers.
- B. The District will deduct all related costs from any payments due to the Contractor.
- C. The above options shall not bar the District from exercising other remedies as a result of the Contractor's failure or refusal to comply with a contractual obligation.

#### **1.7 JOB COORDINATION**

- A. Coordinate all Work to offer the least possible obstruction and inconvenience to public.
- B. Work requiring lane restrictions shall be scheduled to avoid interruptions to school bus traffic.
- C. Do not open areas of work and leave the area unfinished. Finish work in progress insofar as practical. All work areas must be filled or covered at the end of the work shift.
- D. Coordinate with property owners in order to maintain convenient access for local traffic to private properties at all times.
- E. Access to private properties shall also be maintained. Temporary closure of driveways shall be minimized. Full driveway access shall be restored after work hours.
- F. Coordinate revisions to existing traffic control with the governing jurisdictions. Keep traffic controls in operation unless otherwise required by the District for the benefit of the traveling public during progress of the Work. As work progresses and as conditions permit, reset temporarily relocated or removed traffic and street name signs in their permanent location.

- G. Unless otherwise indicated, provide for passage and access of emergency vehicles, police, fire, and disaster units. Assume liability for damages resulting from failure to provide said access.
- H. Obtain appropriate approvals from both the Police Departments and the Fire Departments prior to street closures.
- I. Provide local access to all private properties. Provide a certified flagger to prevent any conflicts between local access traffic and construction crews or heavy equipment whenever local access is required into/out of the construction zone.
- J. Coordinate with property owners or designated representatives and service providers for uninterrupted garbage/recycling collection, mail, and other delivery services.

## **1.8 NOTIFICATIONS**

- A. Obtain written approval from the local authority having jurisdiction before scheduling to partially close any street.
- B. Prepare and submit a Notification Schedule weekly for District approval and Contractor to use in informing the public of the schedule and sequence for performing the Work. Give such details as the time of commencement and completion of the work, names of streets to be affected, schedule of operation, routes of detours, etc.
- C. Notify property owners living adjacent to the Work a minimum of two weeks in advance of the construction in the area of Work.
- D. Notify property owners a minimum of 2 days in advance of driveway closures.
- E. Notification shall include the time of commencement, time of completion of the Work, names of streets to be partially closed, schedule of operation, etc.
- F. To accommodate emergency vehicle rerouting, notify in writing local fire and law enforcement authorities and other affected agencies not less than 72 hours prior to construction operations which deviate or delay traffic from the existing traffic patterns.
- G. Advance lane closure signs shall be placed one week in advance of lane closures unless indicated otherwise on the Drawings.

## **1.9 MEETINGS**

- A. Attend a traffic control preconstruction meeting to discuss traffic control issues and safety. Representatives from Mount Vernon, Skagit County Public Works, WSDOT, and emergency service providers will be invited. District shall schedule this meeting. At the traffic control preconstruction meeting, describe planned haul routes, haul times, proposed lane closures, and WSDOT franchise amendment requirements including work hours and Contractor-proposed variance requests. Interested parties will have an opportunity to express any concerns with the proposed traffic control plans and Contractor's proposed modifications. Other ongoing construction projects and options to reduce congestion will be discussed.
- B. Prior to the beginning of hauling materials or equipment, hold a traffic control awareness meeting with truck drivers regarding traffic concerns discussed at the traffic control preconstruction meeting, including methods to reduce congestion, obeying speed limits, specific locations identified as safety hazards, and allowable haul times.
- C. During construction, discuss traffic safety and traffic concerns at the regularly scheduled progress meetings. Reinforce the importance of traffic safety and update the crews regarding safety in the particular area where construction is occurring at the time and communicate feedback received from the governing jurisdictions.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Comply with all local permits, conditions, and mitigation requirements related to the use of area roadways affected by construction activities. Haul only during permitted hours.

### **3.2 TRAFFIC MAINTENANCE**

- A. Take all necessary measures to maintain a normal flow of vehicular and pedestrian traffic to prevent accidents. Make the necessary arrangements to reroute traffic, provide and maintain barriers, cones, guards, barricades, lights, construction warning and regulatory signs and other safety devices in accordance with the requirements of the "Manual of Uniform Traffic Control Devices".
- B. All regulatory devices shall be suitable for nighttime operation. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise. All control signs necessary for nighttime traffic control or remaining in place during the night shall be fully reflectorized.
- C. Maintain emergency exiting from buildings within and immediately adjacent to construction site.
- D. Realignment of lanes or road closures and detours requires additional illumination during the hours of darkness. This illumination shall be maintained and monitored by Contractor at their expense for the duration of the Work.
- E. Maintain vehicular traffic at all locations to the greatest extent possible and reduce and reroute traffic only for the shortest time possible consistent with effective construction operations. Do not block required travel lanes including trucks delivering materials.
- F. Access by emergency vehicles shall be maintained at all times on all roadways.
- G. Use temporary covers over excavations to accommodate traffic.
- H. Coordinate Traffic Control Plan with other contractor's traffic control plan and WSDOT projects for all work in the area.
- I. Reset and repair all traffic control devices immediately.
- J. TCS shall inspect traffic control devices and nighttime lighting for proper location, installation, message, cleanliness, and effect on the traveling public. Traffic control devices shall be inspected at least once per hour during working hours except that Class A signs need to be checked once a week and nighttime lighting need to be checked only once a shift. Traffic control devices left in place for 24 hours or more shall also be inspected at least once during the nonworking hours when they are initially set up (during daylight or darkness, whichever is opposite of the working hours). The TCS shall correct, or arrange to have corrected, any deficiencies noted during these inspections.
- K. Remove traffic control devices when no longer needed, repair all damage caused by installation of the devices, and remove post settings and backfill the resulting holes to match grade.
- L. State Route 9-specific requirements:
  - 1. In addition to the other requirements in this Section:
    - a. No equipment shall be located on WSDOT bridges. All equipment transported over legal load requires WSDOT approval.
    - b. Do not store materials or equipment on WSDOT bridges.
    - c. Existing Traffic Signage on the ends of bridges shall be temporarily relocated during construction. Submit and get WSDOT approval for temporary sign locations.

### **3.3 SAFETY**

- A. Use adequate safeguards, flaggers, signs, barricades, safety devices, and protective equipment. Take any actions needed to warn and protect life, health, and safety of the public and to protect property in connection with the performance of the Work.
- B. Where flaggers are employed to safeguard traffic, use flagger equipment in accordance with the MUTCD VI and WAC 296-155-305. This equipment must be used by flaggers while actually flagging traffic. All flaggers are required to possess a current flagging certification card.
- C. Furnish any standard signs as well as any other appropriate signs prescribed by the District or Engineer as applicable and necessary for the Work. Erect signs on posts and supports and maintain them in a neat and safe condition until the necessity for them has ceased.
- D. Safeguard and direct traffic after the existing signs have been removed. Preserve and maintain traffic control and street name signs. Signs and other traffic control devices damaged or lost shall be replaced or repaired. The option whether a sign can be repaired or be replaced shall be the District's. Such decisions shall be final and binding on the Contractor.
- E. Patrol traffic control areas and reset all disturbed signs and traffic control devices immediately. Remove or cover all non-applicable signs during periods not needed.
- F. During the hours of non-construction, maintain all existing traffic lanes safe for vehicular traffic. Leave all unfinished work in a safe, non-hazardous condition to the public in Accordance with "Safety Standards for Construction Work," Department of Labor and Industries, Chapter 296-155 WAC.

### **3.4 MULTIPLE WORK LOCATIONS**

- A. The Contractor may have the need to have multiple work zones along the pipeline alignment. Work may occur at multiple headings provided there is sufficient distance between crews such that there is no accumulative impact created by traffic control measures between one work zone and the other.
- B. Coordination shall be made between adjacent or overlapping projects to check that duplicate signing is not used and to check compatibility of traffic control between adjacent or overlapping projects.
- C. The Contractor shall provide a work plan that shows the work zones by station and distance between traffic control measures.
- D. If a situation arises where adjacent traffic control measures result in unacceptable delays or unsafe conditions, the District will request the Contractor suspend work until the Contractor changes his plan of operations and prepares a revised traffic control plan that is approved by the local authority having jurisdiction.

**END OF SECTION**

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**SECTION 01600**  
**PRODUCTS, MATERIALS, AND EQUIPMENT**

**PART 1 - GENERAL**

**1.1 DEFINITIONS**

- A. Products: Includes purchased items for incorporation into the Work, regardless of whether specifically purchased for the Project or taken from Contractor's stock of previously purchased products.
- B. Materials: Products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of work.
- C. Equipment: Products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items).
- D. Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms, which have recognized meanings in the construction industry.
- E. Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying and erection of the Work.

**1.2 QUALITY ASSURANCE**

- A. Source Limitations: To the greatest extent possible for each unit of work, provide products, materials, and equipment of a singular generic kind from a single source.
- B. Compatibility of Options: Where more than one choice is available as options for Contractor's selection of a product, material, or equipment, select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material, and equipment selection.

**1.3 PRODUCT DELIVERY, STORAGE, AND PROTECTION**

- A. Deliver and store products in accordance with manufacturer's written recommendations and with seals and labels intact and legible and by methods and means which will prevent damage, deterioration, and loss including theft.
- B. Delivery schedules shall be controlled to minimize long-term storage at the site and overcrowding of construction spaces. Provide coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or materials sensitive to deterioration, theft, and other sources of loss.
- C. For exterior storage of fabricated products, products shall be placed on supports above ground. Products subject to deterioration shall be covered with impervious sheet covering, and ventilation shall be provided to avoid condensation. Ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.
- D. Loose granular materials shall be stored on surfaces in a well-drained area and shall be prevented from mixing with foreign matter.
- E. For mechanical and electrical equipment, provide a copy of the manufacturer's service instructions with each item. The exterior of the package shall contain notice that instructions are included.
- F. Storage shall be arranged to provide access for inspection. Periodically inspect to assure products are undamaged and are maintained under required conditions.

**1.4 TRANSPORTATION AND HANDLING**

- A. Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.

- B. Provide equipment and personnel to handle products, materials, and equipment by methods to prevent soiling and damage.
- C. Provide additional protection during handling to prevent marring and otherwise damaging products, packaging, linings, coatings, and surrounding surfaces.

**1.5 PROPOSED "OR-EQUAL" ITEM**

- A. Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words "or equal" or "or approved equal", materials or equipment of other suppliers may be accepted if sufficient information is submitted by the Contractor to allow the District to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:
  - 1. The burden of proof as to the type, function, and quality of any such "or equal" product, material or equipment shall be upon the Contractor.
  - 2. The District shall be the sole judge as to the type, function, and quality of any such "or equal" product, material, or equipment, and the District's decision shall be final.
  - 3. Contractor shall furnish at the Contractor's expense additional data about the proposed "or equal" product, material, or equipment when requested by the District.
  - 4. The District may require the Contractor to furnish at the Contractor's expense a special performance guarantee or other surety with respect to any "or equal" product, material, or equipment.
  - 5. Acceptance by the District of an "or equal" product, material, or equipment proposed by the Contractor shall not relieve the Contractor of the responsibility for full compliance with the Contract Documents and for adequacy of the "or equal" product, material, or equipment.
  - 6. The Contractor shall be responsible for resultant changes including design and construction changes and all additional costs resulting from the changes which the accepted "or equal" product, material, or equipment requires in the Contractor's Work, the Work of its subcontractors and of other contractors, and shall effect such changes without cost to the District.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

END OF SECTION

**SECTION 01601**  
**JOB CONDITIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes requirements related to the following:
  - 1. Project conditions.
  - 2. Contractor's job trailer/field office.
  - 3. Maintaining facility operations.
  - 4. Work near water and wetlands.
  - 5. Limits of construction.
  - 6. Construction photographs and videos.
  - 7. Pre- and post-construction condition inspections of structures.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Condition Inspector Engineer:
    - a. Professional Engineer registered in the state of Washington who has completed a minimum of two projects providing construction condition inspections.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications:
  - 1. Condition Inspection Engineer.
- C. Pre-construction Condition Inspection Report.
- D. Post-Construction Condition Inspection Report.

**1.4 PURPOSE**

- A. Condition Inspections:
  - 1. Condition inspections will establish a baseline for the pre-construction condition of structures and a post-construction condition of those structures to document differences.
  - 2. Measurements of pre- and post-construction conditions will provide evidence for the evaluation of remediation of the structures to a minimum of the pre-construction condition.

**1.5 DEFINITIONS**

- A. Structure: A commercial building, single-family residence, or multi-family residence. Excludes: fences, play structures, decks, and garden sheds.

**1.6 PROJECT CONDITIONS**

- A. Prior to installation of material, equipment, and other work, verify with subcontractors, material or equipment manufacturers, and installers that the location in which those materials or equipment will be used is acceptable for installation of those materials or equipment.
- B. Work will occur in the proximity of high voltage transmission power lines and large buried utility pipelines including high pressure gas, raw water supply, and potable water transmission.
- C. Work will occur on steep slopes.
- D. A portion of the pipeline will be installed across the Nookachamps Creek valley which contains wetlands and floods on an annual basis. This same area has high groundwater and surface water.

- E. Permits, easements, and rights of entry obtained by the District are defined in Section 01060. All other permits, easements, and rights of entry required to perform the Work shall be obtained by the Contractor.

#### **1.7 CONTRACTOR'S JOB TRAILER/FIELD OFFICE**

- A. Locate the Contractor's job trailer/field office within the temporary construction easement on Parcel P24742; see Sections 01060 and 01520 for requirements.
- B. Provide electrical service to the Contractor's job trailer; see Section 01520.
- C. Assure attendance at this office during the normal working day.
- D. At this office, maintain complete field file of Shop Drawings, posted Contract Drawings and Specifications, permits, and other files of field operations including provisions for maintaining "As Recorded Drawings."

#### **1.8 MAINTAINING FACILITY OPERATIONS**

- A. The existing 24-inch-diameter water transmission pipeline is currently an operating facility that provides potable water to the District and its customers. There are approximately 20 services on the existing 24-inch-diameter water transmission pipeline that must be maintained while the new pipelines are being constructed, disinfected, and tested.
- B. Ensure construction activities do not interfere with the District's operation of potable water facilities which includes the Judy Reservoir Water Treatment Plant and Judy Reservoir. Access to all valves, above ground facilities, and vaults must remain open at all times for District operation.

#### **1.9 WORK NEAR WATER AND WETLANDS**

- A. Comply with restrictions and additional requirements related to work near or in wetlands, creeks, streams, or tributaries described as listed in Section 01060 and Section 02227.

#### **1.10 LIMITS OF CONSTRUCTION**

- A. Perform all construction activities within the Construction Limits indicated in the Drawings.
- B. Perform erosion control and disposal of construction water as close to the Construction Limits as practicable and always on properties identified with permission granted to the District and the Contractor.
- C. Contractor on-site staging and storage areas shall be inside the Construction Limits, as indicated in the Drawings. Contractor may arrange for additional staging and storage areas outside of the Construction Limits with written approval from the property owner or local authority having jurisdiction. Optional construction areas are indicated in the Drawings.
- D. Perform clearing, grubbing, and tree removal activities only within the Construction Limits indicated in the Drawings. Protect-in-place trees within the Construction Limits where indicated in the Drawings.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. The construction photos and videos are intended for use in documenting construction and as evidence in ascertaining the extent of damage as a result of the construction operations and are for the protection of the property owner, the Contractor, and the District.
- B. Maintain copies of site examination documentation for the duration of the Work.
- C. District will share site pre-construction record photographs and videos with Contractor in electronic format.

## **2.2 PHOTOGRAPHS**

- A. District will be taking photographs before, during, and after construction to document conditions and construction.
- B. Contractor may elect to take photographs as well for documentation purposes.

## **2.3 VIDEOS**

- A. District will be taking videos before, during, and after construction to document conditions and construction.
- B. Contractor may elect to take videos as well for documentation purposes.
- C. District will be taking periodic drone videos of the pipeline corridor. Appendix F includes a website link to a drone video of the pipeline corridor completed by the District on May 8, 2020.

## **PART 3 - EXECUTION**

### **3.1 PHOTOGRAPHS AND VIDEOS**

- A. No construction shall start until the preconstruction photos and videos have been completed by the District.

### **3.2 PRE-CONSTRUCTION AND POST-CONSTRUCTION CONDITION INSPECTIONS OF STRUCTURES**

- A. Condition inspections shall be completed prior to the start of construction and after pipe installation is complete with the District present for both. Notify the District a minimum of five working days prior to completing conditions inspections to allow the District inspector(s) to be present during inspections.
- B. Complete a detailed examination of each structure that is required to have pre- and post-construction condition inspections completed as indicated in the Drawings.
  - 1. The detailed examination shall be performed by the Condition Inspection Engineer.
  - 2. Provide adequate numbers of photos of each building exterior and interior to document existing condition of structure and include all cracks, sticking doors and windows, and structural distress areas. Photographs shall be taken by the Condition Inspection Engineer.
  - 3. Prepare drawings to scale and indicate location of all existing cracks, sticking doors and windows, and structural distress.
  - 4. Measure, photograph, and record all initial existing crack widths.
  - 5. Measure, photograph, and record all new and developing crack widths.
  - 6. Place 2-dimensional crack measurement templates, such as Avongard or similar, at critical and representative locations during preconstruction inspection.
  - 7. The measurements shall be taken at least twice before construction and once after construction prior to removal.
- C. Document results of the condition inspections in the Pre-construction Condition Inspection Report and the separate Post-Construction Condition Inspection Report that shall be prepared, stamped, dated, and signed by the Condition Inspection Engineer.

### **3.3 RESTORATION**

- A. After Final Acceptance of the Contract, the Contractor shall be responsible for the removal and disposition of the District's field office and Contractor's job trailer/field office and removal of all temporary facilities, including appurtenances and construction materials, and restore area of parking lot and office trailers to pre-construction conditions. Comply with requirements per Sections 01060 and 01520.

**END OF SECTION**

**SECTION 01700**  
**PROJECT CLOSEOUT**

**PART 1 - GENERAL**

**1.1 FINAL CLEANUP**

- A. Promptly remove from the vicinity of any completed work all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the Work by the District will be withheld until the Contractor has satisfactorily complied with the requirements for final cleanup of the Site.

**1.2 CLOSEOUT TIMETABLE**

- A. Establish dates for pipeline and equipment testing and acceptance periods as required under the Contract. Such dates shall be established not less than one week prior to beginning any of the foregoing items to allow the District and Engineer sufficient time to schedule attendance at such activities.

**1.3 FINAL SUBMITTALS**

- A. The Contractor, prior to requesting final payment, shall obtain and submit the following items to the District:
  - 1. Written guarantees, where required.
  - 2. Operating manuals and instructions.
  - 3. Record Drawings.
  - 4. Bonds for maintenance, etc., as required.
  - 5. Certificates of inspection and acceptance by local authorities having jurisdiction.
  - 6. Releases from all parties who are entitled to claims against the Project, property, or improvement pursuant to the provisions of law, on the Owner Release Form (attached to Section 01060), or on a Contractor's standard form if accepted by the District.
  - 7. Releases from property owners where the Contractor has secured an easement, permit or agreement for use of the property.

**1.4 MAINTENANCE AND WARRANTY**

- A. Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of the required repair work, and any repair or resurfacing constructed by the Contractor which becomes necessary by reason of such settlement shall likewise be considered as a part of such required repair work.
- B. The Contractor shall make all repairs and replacements promptly upon receipt of written order from the District. If the Contractor fails to make such repairs or replacements promptly, the District reserves the right to do the Work and the Contractor and his surety shall be liable to the District for the cost thereof.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION**

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**SECTION 01720**  
**RECORD DRAWINGS AND INFORMATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies record (as-built) drawings, documents, and information.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Record Drawings (marked up set of drawings to support preparation of record drawings).
- C. Electronic files of vendor or subcontractor submitted “as-built” files or shop drawings. Electronic files shall be integrated into the production of the red-line markups of Record Drawings.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Record Drawings: Continuously maintain, update, and correct as-built information on a full sized set of Contract Documents to reflect the “as-constructed” conditions. Alternatively, these may be prepared in CAD and submitted as electronic files in DWG and PDF formats. Record drawings shall be continuously updated to show:
1. Work accomplished in the prior month to verify payment due.
  2. Field changes of dimensions, materials, and details made by the Contractor.
  3. Changes made by Change Order, Field Directive, or resulting from a Request for Information. Numerical reference of the applicable Change Order, Field Directive, or Request for Information shall be included on the Drawing.
  4. Dimensional location of all embedded, buried, and concealed features as placed by Contractor including pipe, valves, hydrants, structural embedments, etc. Items not located or indicated in the Drawings but placed by Contractor shall be recorded and provided as prescribed in this Section. Piping shall be dimensioned relative to visible features wherever possible.
- B. Construction Detail Records: Provide original plots on 11-inch by 17-inch of information prepared by the Contractor for construction or installation which is supplemental to the details on the Drawings such as relocated water mains, ditches, culverts, etc. Alternatively, these may be prepared in CAD and submitted as electronic files in DWG and PDF formats. Reference appropriate Drawings which show the work. Drawings shall be provided for the following:
1. Details not shown on the original drawings but required for constructing the facility including adjacent utility system details, modified structures, utility conflict resolution details, etc.
  2. Other information as required by other sections.

**3.2 MARKING DEVICES**

- A. Waterproof felt tip pens for hard copies or PDF/BlueBeam editor for PDF format as required to maintain Record Drawings described in this Section using the following color coding:
1. Red: Document changes including dimensional and other notations.
  2. Blue: Notes indicating work installed without change or notes for clarification about revisions.
  3. Green: Work deleted.

### 3.3 RECORDING

- A. Record information concurrently with construction progress. No work shall be concealed until the required information is recorded. Be cautioned against ordering concrete or CDF until items concealed by the placement of the concrete or CDF are recorded on the Record Drawings.
- B. The following actual construction items shall be recorded on the Record Drawings:
  - 1. Horizontal and vertical locations of underground utilities and appurtenances to be surveyed to provide horizontal and vertical coordinates. Minimum requirements for accuracy specified in the following chart.

Description	Horizontal location	Vertical location (elevation)	Notes
Pressurized piping	CL +/- 0.2 feet	CL +/- 0.1 feet	Horizontal coordinates and depth of valves and fittings, plus water pipe at fittings, bends, and 50-foot intervals.
Gravity drains, culverts, catch basins, inlets	CL +/- 0.2 feet	I.E. +/- 0.01 feet	Horizontal coordinates and rim elevation of structure lid and invert elevations of all connecting pipes.
Conduits, cable, and duct banks at beginning and end of straight runs	CL +/- 3 inches	Nominal depth of cover to final grade or t.o.c. elevations +/-0.5 feet	Show actual conduit arrangement cross-sections and encasement width and height for encased duct banks

CL = centerline,  
 I.E. = invert elevation.  
 t.o.c. = top of concrete

- 2. Precise survey measurements:
  - a. Taken on all final locations of buried or concealed items.
  - b. Coordinates and elevations of starting and ending points and at directional changes.
  - c. List coordinates and elevations from the survey on the Record Drawings.

### 3.4 DELIVERY TO DISTRICT

- A. Record Drawings will be used to verify and document progress to support monthly payment requests per Section 01311. Work not included in the Record Drawings will not be included for payment in monthly payment requests.
- B. Prior to request for Notice for Substantial Completion of any area or system on the Project, transmit Record Drawings including Contract title, date, Contractor's name and address, index with title and number of each document, statement indicating completion of record information for specific areas or, if for project close-out, that the documentation is completed and in compliance with Contract requirements attested by the signature of the Contractor.
- C. The District and Engineer shall review the Record Drawings for compliance.

**END OF SECTION**

## SECTION 01730

### OPERATION AND MAINTENANCE INFORMATION AND MANUALS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section specifies operating and maintenance (O&M) information and manuals.

##### 1.2 SUBMITTALS

- A. Procedures: Section 01300.
- B. Submit O&M information from the OEM (original equipment manufacturer) at these phases:
1. Preliminary O&M Information: Submit with the original equipment product data.
  2. Initial O&M Information: Submit prior to testing.
  3. Final O&M Information: Submit after completion of testing but prior to Final Acceptance.

##### 1.3 OPERATIONS AND MAINTENANCE INFORMATION

- A. Submit O&M information for each item of mechanical equipment in an organized manner. It shall be written so that it can be used and understood by the District's operation and maintenance staff.
- B. Where specified, provide O&M information for equipment and material. Provide the following items of information:
1. Names and addresses of the manufacturer, the nearest representative of the manufacturer, and the nearest supplier(s) of the manufacturer's equipment and parts.
  2. Significant design criteria including pertinent calculations used in designing, selecting, or verifying the suitability of the installed equipment.
  3. Performance data and curves: manufacturer's certified performance data and curves when specified in the Contract; otherwise, manufacturer's catalog performance data and curves.
  4. Lubrication information: manufacturer's recommendations regarding the lubricants to be used and lubrication schedule to be followed.
  5. Control diagrams: include diagrams for internal and connection wiring.
  6. Installation and startup procedures: manufacturer's recommendations for installation, adjustment, calibration, and troubleshooting.
  7. Operating procedures: manufacturer's recommended step-by-step procedures for starting, operating, and stopping the equipment under specified modes of operation.
  8. Preventive maintenance procedures: manufacturer's recommended steps and schedules for maintaining the equipment.
  9. Overhaul instructions and required parts and materials: manufacturer's directions for the disassembly, repair, and reassembly of the equipment, parts and any safety precautions that must be observed while performing the work.
    - a. Overhaul parts list: manufacturer's recommendations of manufacturer's part numbers and quantity of parts which should be stored by the District and special storage precautions which may be required for a complete overhaul, as well as the generic title, description, and manufacturer's part number of each component part of the equipment.
    - b. Exploded view or plan and section views: detailed plan and section views of equipment shall be provided when exploded views are not available. Views shall have detailed part callouts matching those callouts of the manufacturer's overhaul parts list. Exploded or cut views of equipment shall be provided, if available, as a standard item of the manufacturer's information.
  10. Specific information: as necessary where items of information are not included in the above list but are required.

## **PART 2 - PRODUCTS**

### **2.1 ELECTRONIC MATERIALS**

- A. Electronic copies of material:
  - 1. USB flash drive.

## **PART 3 - EXECUTION**

### **3.1 PRELIMINARY O&M INFORMATION SUBMITTAL**

- A. Provide information adequate to insure the equipment is:
  - 1. Packaged and shipped correctly.
  - 2. Stored and maintained properly per manufacturer's recommendations.
  - 3. Installed per manufacturer's recommendations.
  - 4. Maintained properly prior to commissioning.
  - 5. Fully tested and started per manufacturer's recommendations.
  - 6. Maintained properly until accepted by the District.

### **3.2 INITIAL O&M SUBMITTAL**

- A. Manufacturer's standard brochures and OEM manuals, used to describe the equipment and the O&M procedures, shall be modified to reflect only the model or series of equipment used. Extraneous material shall be crossed out neatly or otherwise annotated or eliminated.
- B. Photocopies of manufacturer's standard brochures and manuals will not be approved for the final bound sets.
- C. Facsimile paper or photocopies of facsimile information will not be allowed.
- D. Disposition of O&M information will be noted on the returned submittals. Only O&M information with a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300 shall be included in the Final O&M Information.
- E. Operational Testing shall not start on any equipment until Initial O&M Information for that equipment is submitted and receives a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300.
- F. Maintain and provide records documenting the maintenance provided by the Contractor prior to commissioning.

### **3.3 FIELD CHANGES**

- A. Following the accepted installation and operation of an equipment item, the item's instructions and procedures shall be modified and supplemented to reflect field changes or additional field data information.

### **3.4 FINAL SUBMISSIONS**

- A. Provide:
  - 1. One complete copy in a bookmarked and searchable PDF file on USB flash drive of the O&M information that receives a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300. Bookmarks shall be the same as the items in the Table of Contents.

**END OF SECTION**



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**SECTION 01750**  
**SPARE PARTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section summarizes the requirements for turnover of spare parts listed in Division 2 through Division 16. More specific information pertaining to types and quantities of the spare parts is provided in the individual Sections.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Spare Parts Release Form (attached to the end of this Section) for spare parts required per the individual Sections.
- C. Spare Parts List.

**1.3 SPARE PARTS LIST**

- A. Furnish a list of recommended spare parts for all mechanical equipment.
- B. The spare parts list shall be limited to those spare parts which each manufacturer recommends be maintained by the District in inventory.
- C. Each manufacturer or supplier shall indicate the name, address, and telephone number of its nearest outlet of spare parts to facilitate the District in ordering.
- D. In addition to spare parts recommended by each manufacturer, spare parts list shall also include the following:
  - 1. Two (2) 36-inch-diameter butterfly valves with Class E Flanges.
  - 2. One (1) 36-inch-diameter ductile iron dismantling joint.
  - 3. Recommended spare parts for Badger flow meters per manufacturer.
  - 4. Two (2) manway covers with 8-inch-diameter flanged outlets.

**1.4 STORAGE**

- A. Until turnover, be responsible for the delivery, storage, and protection of spare parts and equipment required in accordance with manufacturer recommendations.
- B. Store on pallets or shipping skids, and identify as follows:
  - 1. The pallets or skids shall be sequentially numbered, by Contract number. Each pallet or skid shall have a single, unique numerical designation.
  - 2. Items or containers on each skid shall be alphabetically ordered and identified by a tag with the following information:
    - a. The containers or items on each pallet or skid shall always begin with "A", and proceed in alphabetical order. (Example: If pallet #007 has five items on it, the items would be individually tagged and identified as 007-A, 007-B, 007-C, 007-D, and 007-E.)
    - b. The information recorded on the tags shall be in the same order in which the spare parts are turned over. Any reorganization of parts or containers on pallets shall be reflected in accurate identification tags. Pallets, parts, or equipment with inaccurate, incomplete, or missing tags, will not be accepted.
  - 3. Spare parts subject to deterioration such as ferrous metal items and electrical components shall be properly protected by lubricants or desiccants and encapsulated in hermetically sealed plastic wrapping. The quality of protection shall be equal to that required for shipment overseas and storage in humid, tropical climates.
  - 4. Those spare parts with individual weights less than 50 pounds and dimensions less than 2'-0" W x 1'-6" H x 3'-0" L shall be stored in a heavy wooden boxes, with a hinged wooden cover. The hinges

SPARE PARTS

shall be heavy-duty strap types. Paint and identify boxes with stenciled lettering indicating "Spare Parts". A neatly typed inventory of the parts contained within shall be taped inside in a heavy-duty plastic protective sleeve to the underside of the cover. The boxes shall be identified per this Section, and the parts description shall reference the typed inventory list taped to the cover.

5. Provide access to spare parts for inspection while in storage.

## **PART 2 - PRODUCTS (NOT USED)**

## **PART 3 - EXECUTION**

### **3.1 TURNOVER OF THE SPARE PARTS**

- A. Provide 14 days written advance notification of intent to turn over spare parts. The written notification shall be accompanied by a completed Spare Parts Release Form.
- B. Provide for the delivery and off-loading of spare parts at a District location, as determined by the District's representative.
- C. Jointly inspect spare parts with the District and verify condition and quantities. Mutual agreement and signoff on the Spare Parts Release Form shall constitute turnover of the spare parts.
- D. The spare parts may be delivered only upon completion of the operational testing phase of the work, and prior to issuance of Substantial Completion. The only exception shall be the acceptance of spare parts for that portion of the work accepted for possession and use prior to issuance of Substantial Completion.

### **3.2 DOCUMENTATION**

- A. Provide an electronic copy of the Spare Parts Release Form (attached to the end of this Section) in Microsoft Excel software 2010 or newer and one hard copy to the District with the spare parts.
- B. Include the Spare Parts Release Form in the Final O&M Information. Reference the Spare Parts Release Form in the Table of Contents.

**END OF SECTION**



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**SECTION 02100**  
**SITE PREPARATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes requirements for clearing, grubbing, disposal, stripping, and stockpiling topsoil.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
1. Clearing Contractor and Personnel for Clearing near Power Lines:
    - a. Logging near power lines shall be accomplished by qualified company and personnel as defined in the WAC.
    - b. Certification of qualifications for tree trimming and clearing near overhead electrical power lines.
    - c. Qualified clearing contractors:
      - 1) Asplundh Tree Expert Company.
      - 2) Davie Tree Expert Company.
      - 3) Kemp West Inc.
      - 4) Or Approved Equal.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications of Clearing Contractor and Personnel for Clearing near Power Lines.

**1.4 REGULATIONS CONCERNING MERCHANTABLE TIMBER**

- A. The project does not require a Forest Practices Permit from the State Department of Natural Resources.
- B. All merchantable timber within the construction limits are owned by the Contractor unless otherwise indicated. All cleared trees within the construction limits become the property of the Contractor for disposal unless otherwise indicated.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Temporary erosion and sediment control (TESC) measures shall be in place per Section 02270 prior to clearing and grubbing.
- B. Tree clearing near power lines shall be performed in conformance with Washington State Laws:
  1. WAC 296-45-455 Line-clearance tree-trimming operations.
  2. WAC 296-32-360 Tree Trimming-Electrical hazards.
  3. WAC 296-127-01387 Power line clearance tree trimming.
  4. WAC 296-24-960 Working on or near exposed energized parts.

**3.2 SITE ACCESS**

- A. Develop necessary access to the site, including access barriers or gates to prohibit entry of unauthorized persons. Utilize access points procured by the District.

### 3.3 PRESERVATION OF TREES

- A. It is the District's intent to minimize clearing, particularly removal of trees, to as small an area as reasonably practical to enable construction of the pipeline.
- B. Do not damage, disturb, or remove any trees, shrubs, or ground cover outside the construction limits indicated in the Drawings. If trees straddle the construction limits, the Contractor shall notify the District for direction on whether to remove the trees.
- C. Protect existing trees that are indicated in the Drawings to be protected from damage by construction activities. Include a perimeter barrier fence (polyfence) at each tree to be protected, located at the drip-line of the tree. Protect all trees to remain against cutting, breaking, or compaction of roots; skinning or bruising of bark; and breaking of branches.
- D. Within 5 feet of drip lines of trees to remain:
  - 1. Do not stockpile materials.
  - 2. Do not allow vehicular traffic or parking of vehicles. If passage of vehicular traffic is unavoidable, place 6 inches of clean wood chips to protect tree roots from the effects of soil compaction.
  - 3. Do not alter surface drainage patterns except as indicated in the Drawings.

### 3.4 DAMAGE TO TREES

- A. If any tree designated as a tree to remain is damaged in the course of construction, immediately notify the District for inspection and directions for remedy.
- B. Remedies for damage will be one of the following, at the discretion of the District:
  - 1. Repair trees damaged by construction operations, in a manner acceptable to the District and/or private property owner. Engage a qualified tree arborist acceptable to the District and/or private property owner to perform tree repair work.
  - 2. Remove and replace dead or damaged trees and vegetation:
    - a. Replace trees under 6-inch caliper measurement with new trees of the same size and species. Plant and maintain according to the requirements of these Specifications.
    - b. For trees over 6-inch caliper measurement, compensation shall be either paragraph 1) or 2) below:
      - 1) Replace with new trees of 6-inch caliper measure, and the same species. Compensate the District and/or private property owner for the difference in value of the damaged tree and the replacement tree, calculated as the difference between the assessed value of the tree as calculated by a District-approved arborist according to the Guide to Plant Appraisal, 10th Edition.
      - 2) Alternatively compensate the District and/or private property owner in cash or as a credit to the Contract for three times the value of the damaged tree, as appraised by a District-approved arborist according to the Guide to Plant Appraisal, 10th Edition.
    - c. At the District's discretion, remove and dispose of the damaged tree.

### 3.5 CLEARING AND GRUBBING

- A. Clearing:
  - 1. Construction areas shall be cleared of grass, weeds, shrubs, and trees, logs, upturned stumps, loose boulders, and any other objectionable material of any kind which would interfere with the performance or completion of the Work, create a hazard to safety, or impair the subsequent usefulness of the Work.
- B. Grubbing:
  - 1. Grubbing shall consist of complete removal of roots, stumps, trash and other debris from all graded areas so the site is free of roots and debris. Topsoil shall be left sufficiently clean so that further picking and raking will not be required.
- C. All material from the clearing and grubbing process shall be removed from the Site and disposed of in approved locations. Where roots over 3 inches protrude from the excavated slope, cut roots flush with ground surface.

- D. Unless otherwise indicated, native trees where the base is located outside of construction limits shall not be removed without the District's approval. If necessary for the Contractor's selected means and methods, the removal of any trees, shrubs, fences, or other improvements outside of the construction limits shall not occur without the District's and the private property owner's approval, and those improvements shall be replaced in-kind at no additional cost to the District.
- E. Due to steep slopes and the desire to maintain stability, some areas within the construction limits will only require clearing of trees to allow working room for equipment and stringing of pipe. In these areas, grubbing and removal of shrub vegetation shall be avoided. All cleared materials shall be removed and disposed of offsite. These areas are indicated in the Drawings.
- F. Stockpile all limbing, clearing, and slash material in accordance with United States Department of Agriculture Forest Service - Fuel Model 8 guidelines. Stockpile slash within 2 days of cutting. Slash stockpile area shall be at areas acceptable to the District.
- G. Fell trees into the area being cleared. Felling methods shall include:
  - 1. Use controlled felling to ensure the direction of fall to prevent damage to property, structures, trees designated to remain, and traffic.
  - 2. Fell hazardous trees or unstable live trees before felling timber in the immediate clearing vicinity.
  - 3. Minimize tree removal where stumps must remain; flush cut to remove from view.
  - 4. Trim branches on trees that overhang the construction limits to give a clear height of 16 feet above the roadbed or Work area, unless otherwise indicated. Trim tree limbs as near flush with the trunk as practicable. Saw cut limbs.
- H. Remove and temporarily stockpile downed wood in wetlands and buffers per Section 02227.
- I. No chemicals shall be used to kill brush or other plants unless otherwise specified.
- J. Furnish equipment designed to meet state safety regulations and operated by a competent, fully qualified operator:
  - 1. Grapple Piling Machine:
    - a. Track-mounted mechanism; equipped with a bucket and thumb type attachment or grapple attached to a boom that has a minimum reach of 15 feet, measured from the center pin.
    - b. Machine with attachments shall not exert more than 9 pounds per square inch ground pressure.
  - 2. Furnish a minimum of two warning signs meeting MUTCD requirements. Warning signs to be placed on the roadside prior to entrance to work areas, warning of specific safety hazards, such as flying debris, falling trees, or heavy equipment:
    - a. Dimensions: Minimum of 3 feet by 3 feet.
  - 3. To prevent the spread of noxious weeds, clean all equipment and vehicles prior to entry onto road right of way. Removal of all dirt, grease, and plant parts that carry noxious weed seeds or vegetative parts is required and may be accomplished with a pressure hose.
- K. Backfill all holes and depressions resulting from tree root and stump removals:
  - 1. Use native material.
  - 2. Compact by track-walking until no further settlement is noted under equipment weight.
  - 3. Grade to conform to the surrounding ground contours.
  - 4. Level all soil piles left from stump removal by rough grading.
- L. Notify the District when site clearing is complete.

### **3.6 TOPSOIL**

- A. Definition of Topsoil: Per Section 02260.
- B. Stripped topsoil shall be stockpiled for later incorporation as the final dressing for the disturbed areas.
- C. Strip and stockpile topsoil following installation of ESC measures. Protect stockpiles using ESC measures, as accepted by District.
- D. Topsoil Removal (including Wetland Topsoil Removal):
  - 1. Strip topsoil to depths encountered.

## SITE PREPARATION

- a. Remove heavy growths of grass before stripping.
  - b. Set aside all loose woody debris over topsoil before stripping to be replaced upon construction completion.
  - c. Stop topsoil stripping sufficient distance from trees that are to be protected to prevent damage to root system.
  - d. Separate topsoil from underlying subsoil or objectionable material.
  - e. Do not strip topsoil outside of the construction limits as indicated in the Drawings.
2. Stockpile topsoil within the limits of construction:
- a. Construct storage piles to freely drain surface water.
  - b. Protect storage piles to prevent erosion.
- E. Wetland Topsoils:
- 1. Wetland topsoils shall be stockpiled separately from other topsoils for replacement in wetlands during surface restoration.
  - 2. Wetland areas cannot be used for stockpiling of other excavated soils to avoid contamination and compaction.
  - 3. Wetland soils that have been contaminated with other soils are not acceptable for restoration and shall be disposed of offsite at Contractor's expense.

### **3.7 DISPOSAL OF CUTTING AND WASTE MATERIALS**

- A. Onsite burning will not be permitted.
- B. Remove all waste materials from site and dispose of in a legal manner.
- C. Burying is not an acceptable means for disposal of organic matter, concrete, or construction debris. Prevent material from clearing and grubbing work from becoming mixed or covered with excavated material or backfill.
- D. Woody debris from clearing operations may be chipped. Chips may be sold to Contractor's benefit or used onsite as mulch in areas acceptable to the District and property owner. Dispose of chips that are unsalable or unsuitable for landscaping or other uses.

### **3.8 ACCEPTANCE**

- A. Upon completion of areas of site clearing, obtain District's acceptance of the extent of clearing and grubbing.

**END OF SECTION**

**SECTION 02115**  
**DEMOLITION AND ABANDONMENT**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes requirements related to demolition of portions of the existing 24-inch-diameter water transmission pipeline (bar wrapped concrete cylinder pipe) and ductile iron distribution piping of various sizes at connections and plugging the pipes and removal.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Plan for Pipeline Decommissioning and Abandonment:
  - 1. Submit at least 30 days prior to commencing demolition and abandonment activities associated with the existing 24-inch-diameter water transmission pipeline.
- C. Concrete Mix Designs for concrete plugs submitted under Section 03002.

**1.3 PLAN FOR PIPELINE DECOMMISSIONING AND ABANDONMENT**

- A. Prepare plan for decommissioning and abandonment of the existing 24-inch-diameter water transmission pipeline.
- B. At a minimum, plan shall include the following:
  - 1. Schedule and construction sequencing for work to decommission the existing pipeline including the following activities:
    - a. Notification to the District and Fire Marshall.
    - b. Installation and testing of new 36-inch-diameter water transmission pipeline and water distribution piping.
    - c. Switchovers of water services to the new water distribution piping.
    - d. Planned shutdowns and connections of new water distribution piping to existing water services.
    - e. Abandonment or removal of existing 24-inch-diameter water transmission pipeline.
  - 2. Construction planning for work to provide temporary restraint for existing 24-inch-diameter water transmission pipeline, water distribution lines, and water services when required by Contractor's means and methods.
  - 3. Construction planning for work to maintain water service during construction.
  - 4. Construction planning for proposed cut-in, cut over of services, removal of existing pipe and service equipment, seal and plugging of pipeline, and other information pertinent to completion of the Work.

**1.4 COORDINATION OF WORK**

- A. Pipe-related demolition activities shall not be performed on the existing 24-inch-diameter water transmission pipeline until the new 36-inch-diameter water transmission pipeline is in service and cut over of all of the existing water distribution piping and services is completed.

**1.5 SALVAGE DISPOSITION**

- A. Salvaging of Pressure Reducing Valve (PRV) and Vault in Beaver Lake Road:
  - 1. Coordinate with the District to schedule for the removal and salvage of the existing pressure reducing valve (PRV) and vault in Beaver Lake Road with the final tie in with the line coming from the new PRV.
  - 2. Provide a minimum of 10 working days notification to the District prior to the planned tie in.
  - 3. The District will perform all customer notification, and Contractor shall provide all excavation, excavation support system, dewatering, backfilling, and restoration necessary for the existing PRV removal and salvage. This includes providing all materials necessary to remove the existing 6-inch

- segment of pipe and replacing it with a 12-inch spool once the PRV and vault have been removed to restore service.
4. Be responsible for dewatering, excavation, excavation support system, backfilling and restoration for the tie-in work.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Concrete Design Criteria for Concrete Plugs:
  1. See Section 03002.
  2. Shrinkage characteristics: non-shrink.
- B. Plugs or Caps:
  1. Grout Plugs: Cement-based dry-pack grout conforming to ASTM C1107, Grade B or C.
  2. Manufactured Plugs: Commercially available plug or cap specifically designed and manufactured to be used with size, type of pipe, and pressure rating of pipe being plugged.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Notify the District prior to beginning demolition and abandonment activities.
- B. Any work on active District water distribution and service facilities is to be performed by District crews. Contractor shall provide all coordination, excavation, excavation support system, dewatering, backfilling, and restoration necessary for District work.
- C. Carefully observe and comply with local ordinance or regulations relating to traffic safety, fire prevention, noise, and dust abatement.
- D. Material and debris resulting from the demolition shall become the property of the Contractor, shall not be allowed to accumulate, and shall be removed promptly from the site.
- E. Haul debris away promptly. Spray with water as necessary to prevent dust. Allow no debris outside the construction limits. At completion of demolition, clean all loose material or soil from streets or driveways.

### **3.2 EXISTING PIPE AND FABRICATIONS**

- A. Examination:
  1. Do not begin cut, plug, and abandonment operations until acceptable to the District.
  2. Locate pipes to be decommissioned and plugged including depth and pipe material per Section 01195.
- B. Preparation:
  1. Notify the District at least 48 hours in advance of concrete placement.
  2. Select concrete placement equipment and follow procedures with sufficient safety and care to avoid damage to existing underground utilities and structures. Operate equipment at pressure that will not distort or imperil portion of work, new or existing.
  3. Perform demolition work prior to starting concrete placement. Clean areas of debris that may hinder concrete placement. Remove excessive amounts of substances that may degrade performance of concrete.
- C. Demolition and Removal:
  1. Removal of pipe and structures shall be required where indicated in the Drawings.
  2. Pipe shall be removed by unbolting flanges or cut and removed by abrasive saw or torch. The coating on pipe shall be removed before cutting.
  3. Use means of removal that will prevent damage to piping to remain.
  4. Remove thrust blocks, collars, pipe markers, and fittings as required to seal pipe ends.

5. Decommission existing pipelines by completely plugging ends and abandoned turnouts with concrete as indicated in the Drawings.

**END OF SECTION**













- B. Quality and quantity of discharge water shall comply with all state and local regulations and with requirements of all applicable permits including the NPDES Construction Stormwater General Permit per Section 01060.
- C. If the water produced as a result of dewatering operations is not suitable for direct discharge to receiving waters, the water shall be treated. Be responsible for the selection of proper equipment, chemicals and process to successfully treat the water for discharge.
- D. The removal of natural, in-place soils during dewatering operations shall be prevented.
  - 1. In order to remove silt and fine sized soil particles before disposal into any drainage system, water shall be filtered or coagulated using an approved method or allowed to settle in a sediment trap designed to meet the requirements of Washington Department of Ecology Surface Water Design Manual.
  - 2. If filtration or coagulation methods are used, they shall be conducted to achieve a minimum of 90 percent reduction in total suspended solids.
  - 3. The District may require submission of test results to a frequency of once per day to demonstrate adequate reduction in total suspended solids.
- E. No water shall be released directly to private property without written permission from the property owner unless otherwise indicated.
- F. Water released into any ditch, wetlands, swale, or water course shall be at such a rate so as to avoid any downstream flooding or channel erosion. The disposal system shall be set up such that after initial development, the quantity and size of soil particles will decrease until no visible soil particles are present in water being pumped at any time after 24 hours from initial pumping.
- G. Pumped water shall not be disposed of in a manner which causes contamination of drinking water wells in the vicinity.
- H. If treatment system components are not in place prior to commencing work, site water shall be transported off site and disposed of in accordance with the Discharge Contingency Plan described in this Section.
- I. If discharge of site water sampling and analysis shows that the discharge does not meet the NPDES Construction Stormwater General Permit after revision of treatment systems, implement the Discharge Contingency Plan.
- J. Be responsible for control of surface water, including on roadways where active work occurs, during both dry and wet weather. In the area of active work, water flow is prohibited from entering the storm sewer system, ditches, wetlands, and surface waters without prior treatment or haul from Site.
- K. Uncured concrete that is placed in direct contact with water or water used to wash concrete handling equipment and tools will become toxic to aquatic life. Do not directly discharge water that has come into contact with uncured concrete to storm sewer systems, ditches, wetlands, and surface waters.
- L. Prevent construction wastes such as, but not limited to, paper, wood, garbage, sanitary wastes, and fertilizer, from leaving the site and entering waterways. Dispose of wastes off site at a legal disposal site authorized for such wastes in such a manner that it cannot enter a waterway or cause water quality degradation.
- M. Use Ecology TAPE or C-TAPE approved stormwater treatment technology systems when sediment tanks, ponds, traps, or filtration systems are not sufficient to prevent the discharge from causing an exceedance of standards in this Section.
- N. Use appropriate treatment technology to reduce contaminant concentrations to meet NPDES Construction Stormwater General Permit criteria, SMMWW, and other standards in this Section.
- O. Perform treatment in accordance with Ecology approval and the GULD issued for the treatment process.
- P. Depending on the site, sediment-laden water from trenches shall be dispersed over vegetated areas outside of sensitive area buffers or the sediment shall be settled in temporary storage facilities, such as ponds or Baker Tanks or filter bags. Only clean water meeting permit requirements shall be discharged to



**SECTION 02160**  
**EXCAVATION SUPPORT SYSTEM**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies requirements for Contractor-designed excavation support systems of trenches, shafts, trenchless pits, and open excavations.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
1. Excavation Support System Designer: Structural Engineer registered in the state of Washington with a minimum of three years of experience in designing earth retaining structures for temporary construction similar to the type and depth proposed in similar soil and groundwater conditions as this Contract.
  2. Contractor: Minimum of three years of experience with the installation of earth retaining structures for temporary construction of similar type and depth proposed in similar soil and groundwater conditions as this Contract.
  3. Welders shall hold current certification by AWS.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications:
1. Excavation Support System Designer.
  2. Contractor.
  3. Welders.
- C. Excavation Support System Plan.
- D. Excavation Support System Designer confirmation that installed excavation support systems are in compliance with Excavation Support System Designer's design.

**1.4 EXCAVATION SUPPORT SYSTEM PLAN**

- A. Design documents, including:
1. Detailed written description of excavation support system to be used, including materials, required equipment, work sequence, and work schedule.
  2. Design drawings and calculations prepared, stamped, dated, and signed by the Excavation Support System Designer. The calculations shall demonstrate the integrity of the proposed support system to withstand ground, groundwater, jacking loads (as applicable), and construction loads. Include calculations for anticipated wall deflections.
  3. Drawings shall include:
    - a. Dimensions.
    - b. Minimum section properties.
    - c. Details for any guides or templates to be used.
    - d. Locations of existing structures, utilities, right-of-way easements, public, and private easements.
    - e. Locations of geotechnical instrumentation and monitoring.
  4. Methods and procedures for installing and removing excavation support systems.
  5. Shop drawings and manufacturer literature for major equipment and installation systems.
  6. Manufacturer literature for any chemicals, polymers, and any other materials that shall be used, including slurry mix and drilling mud.
- B. Information required by Chapter 296-155 WAC, Part N.
- C. Applicable requirements of WISHA for excavation and construction.

- D. Provide separate Excavation Support System Plans for different trenching, open excavation, and trenchless pit conditions.
- E. Review by the District is for the Contractor's general compliance with the requirements and references and shall not be construed as a detailed analysis for adequacy of the excavation support system, nor shall any provisions of the requirements be construed as relieving the Contractor of its overall responsibility and liability for the work.
- F. Confirmation from the Dewatering System Designer per Section 02140 and the Excavation Support System Designer that the Excavation Support System Plan and Dewatering Plan have been coordinated.

**1.5 EXCAVATION SUPPORT SYSTEM DESIGN REQUIREMENTS**

- A. Responsible to adequately size the excavation and to ensure that the excavation support system design is free of errors and omissions that may affect its safety, functionality, or performance.
- B. Accept full responsibility for complying with relevant references, specifications, and standards that apply to the design including those that are not named in this Section.
- C. The design, planning, installation, and removal, of excavation support systems shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.
- D. Design the excavation support system in accordance with Chapter 296-155 WAC, Part N.
- E. When designing with material stresses for temporary construction higher than the allowable stresses prescribed in the AISC and the IBC, increase in such stresses shall not exceed 20 percent of the value of the prescribed stresses. Overstressing is not permitted for any element of the excavation support system.
- F. Values for pile embedment and bending moment shall be determined by checking the piles using both the Free Earth and Fixed Earth Support methods using the larger value from either method for the toe embedment and moment.
- G. Struts are to be designed for the maximum load produced by the following methods of analysis: Free Earth Support or Fixed Earth Support method.
- H. Horizontal strutting below the barrel of a pipe and the use of pipe as support are not acceptable.
- I. Design shall include dewatering requirements per Section 02140 for support of the excavation and prevent inflow of surface water into the excavation.
- J. Control ground movements and deformations. Address vibration and settlement effects on the surrounding structures, utilities, and properties.
- K. Where applicable, the design shall be in accordance with the IBC.
- L. Provide a rigid excavation support system for pipe installation at locations indicated in the Drawings.
  - 1. Design to limit movement of support system and adjacent soils to protect Facilities.
  - 2. Design to allow excavation of a vertical trench section without the need to lay back the slope of the excavation in the process of installation; use of a trench box or similar excavation support system installed after excavation is not suitable where a rigid excavation support system is indicated in the Drawings.
- M. Provide rigid excavation support system for pipe installation at other locations deemed necessary by the Excavation Support System Designer.
- N. Soil parameters and loading criteria:
  - 1. Use soil data provided in Geotechnical Data Reports included in Section 01012 with Reference Documents.
  - 2. Determine water pressures and surcharge loads that may result from construction methods and dewatering activities and design the excavation support system for those additional pressures due to those loads.

EXCAVATION SUPPORT SYSTEM

3. Consider sequence of excavation and placement of the lateral support elements in the design of the excavation support systems.
4. Excavation support systems shall be designed to withstand anticipated loads from handling, ground, groundwater, surcharge, thrust, and adjacent facilities such as buildings. These include earth pressure, hydrostatic pressure, surcharge loads from surface equipment, materials storage, buildings, and construction loads and thrusts from the construction method used for the trenchless installation.

#### **1.6 SUPPORT SYSTEM REQUIREMENTS**

- A. Assess existing conditions, including property rights of adjacent property whether private or public, for the possible effects of proposed temporary works and construction methods.
- B. Obtain rights to enter property not obtained by the District.
- C. Select and design excavation support systems, methods, and details to ensure safety to the public, adjacent property and the completed work.
- D. When the construction sequence of structures requires the transfer of bracing loads to portions of any new structure or to any existing structure, provide a complete design analysis of the expected impact of that bracing on the structure. This action shall in no way absolve the Contractor of responsibility of damage resulting from said bracing.
- E. Completely remove excavation support system upon completion of intended construction activities.

#### **PART 2 - PRODUCTS (NOT USED)**

#### **PART 3 - EXECUTION**

##### **3.1 GENERAL**

- A. Construct the excavation support systems in such a manner as to not disturb the state of soil adjacent to the trench or excavation and below the excavation bottom.
- B. Control water in accordance with Section 02140.
- C. Construction activities shall observe federal, state, and local regulatory requirements, as well as any applicable good practice guidelines.
- D. Excavation Support System Designer shall:
  1. Inspect the constructed excavation support system prior to use and confirm in writing that the excavation support systems were built in conformance with the Excavation Support System Designer's design. Multiple design confirmations may be required.
  2. Review and confirm in writing the acceptability of any modifications to the excavation support systems made by the Contractor during construction and revise the applicable design documents to reflect modifications and submit to the District.
- E. Excavation and backfill shall be in accordance with Section 02200 and Section 02221.
- F. Performing structural welding in accordance with the applicable clauses of AWS D1.1.

**END OF SECTION**

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**SECTION 02200**  
**EARTHWORK**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies earthwork which consists of aggregate materials for a variety of uses including backfill of trenches and excavations for appurtenant structures along the pipeline, crushed rock aggregates for use under asphalt and road shoulders, embankment cuts and fills, and trench plugs.
- B. Over most of the pipeline alignment the surface will be restored to pre-construction grades and fine graded uniformly to maintain established drainage patterns. Areas where grades will be modified are as follows:
  - 1. Construction of the service road will require cuts and fills and fine grading over the pipeline between approximate Stations 500+80 and 624+00.
  - 2. Minor grading around pipeline appurtenances and structures.
  - 3. Grading and backfilling of abutments and approaches around the bridge at the East Fork Nookachamps Creek crossing.
  - 4. Minor fills over pipeline outside of wetlands to maintain minimum cover above the pipeline.

**1.2 QUALITY ASSURANCE**

- A. Quality Control:
  - 1. Contractor's Independent Testing Firm (Testing Firm): Employ and pay for services of a testing laboratory to perform materials evaluation and compaction and moisture testing (i.e., Proctor testing).
  - 2. District will hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling and compaction to assure that all work complies with this Section.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Samples of Imported Materials to be used 30 days in advance of use. Samples shall consist of 0.5 cubic feet of each type of material.
- C. Proposed Imported Materials sources with certifications and test results from the Testing Firm that Imported Material complies with requirements per this Section.
- D. Laboratory test reports and samples of Imported Materials to be used, showing the suitability of the material as indicated herein, and certifying:
  - 1. Moisture density relationships and gradation test reports and curves.
  - 2. Gradation tests for non-cohesive materials.
  - 3. Any other requirements of the material as described in Part 2 of this Section.
- E. Laboratory test reports (sieve tests) of Imported Material at a minimum for every 500 cubic yards of Imported Material placed or observed change in material type or change in source.

**1.4 DEFINITIONS**

- A. Excavation: Per Section 02221.
- B. Relative Compaction: Per Section 02221.
- C. Optimum Moisture Content: Per Section 02221.
- D. Unsuitable Material: Soil (onsite or imported) that is not suitable as fill or backfill because it does not meet the requirements of this Section:
  - 1. In-situ or site soils that are unsuitable as foundation or subgrade materials because of their density, moisture content, organic content (including coal), plasticity, or gradation.

2. Soils (onsite or imported) that are not suitable as fill because they cannot be compacted sufficiently to achieve the density specified for the intended use.
3. Material that contains hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.
4. Material containing debris such as wood waste, concrete, metal, or other deleterious material.
5. Material containing large boulders and cobbles which do not meet specifications for fill or backfill.

E. Imported Material: Material obtained by the Contractor from sources off the site.

## **1.5 IMPORTED MATERIAL ACCEPTANCE**

- A. Complete tests necessary to locate an acceptable source of Imported Material. Provide certification that the Imported Material conforms to the requirements per this Section along with copies of the test results from the Testing Firm. Provide sieve analysis testing.
- B. Imported Materials shall not be delivered to the site until the proposed source and materials tests have been accepted by the District.
- C. Frequency of Imported Material Testing:
  1. Minimum of 2 sieve tests for every 500 cubic yards of imported soil.
  2. Minimum of 2 in-place moisture-density tests for every 100 cubic yards of imported soil.
  3. The location and depth of density tests as selected by the District.
- D. All Imported Materials to be placed shall be from WSDOT-approved sources.

## **1.6 PROTECTION OF EXISTING UTILITIES AND STRUCTURES**

- A. Per Section 02221.

## **1.7 COMPACTION CONTROL TESTS**

- A. Compaction control tests (laboratory density tests) will be completed by an independent soils laboratory hired by the District.
- B. Laboratory densities will be determined by ASTM D1557.
- C. Density sampling of backfill placed by the Contractor shall be performed by Contractor's Testing Firm.
- D. In-place density will be determined by one or more of the following methods:
  1. ASTM D1556, Standard Test for Density of Soil In-place by the Sand Cone Method.
  2. ASTM D2167, Standard Test for Density of Soil In-place by the Runner Balloon Method.
  3. ASTM D2922, Standard Test for Density of Soil In-place by the Nuclear Method.
- E. The Contractor shall assist with District's testing work by leveling small test areas and excavating and shoring test pits when and where designated by the District. Backfill the test areas and test pits after the District's testing is complete. The frequency and location of testing shall be determined solely by the Engineer. The District may test any lift of backfill at any time, location, or elevation.

## **1.8 SITE CONDITIONS**

- A. Per Section 02221.

## **PART 2 - PRODUCTS**

### **2.1 SUITABLE FILL AND BACKFILL MATERIAL REQUIREMENTS**

- A. Fill, backfill, and embankment materials shall be processed select clean, fine earth, rock, or sand, free from grass, roots, brush, trash, organic matter, debris, and other deleterious material.
- B. Fill and backfill materials to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 1 1/2 inches.

- C. Suitable Materials: Only materials specifically approved as Suitable Materials may be used in fills, backfilling, and embankment construction subject to the indicated limitations. All other materials are considered Unsuitable Materials unless approved. In addition, when acceptable to the District, some of the material considered Unsuitable Material may be used when thoroughly mixed with Suitable Material to form a stable composite provided it is capable of being compacted to the specified relative compaction.
- D. Suitable Materials may be obtained from on-site excavations, may be processed on-site materials, or may be imported. If imported materials are required, the Contractor shall provide the Imported Materials as specified.

## 2.2 USE OF BACKFILL MATERIAL TYPES

- A. Where the Specifications conflict with the requirements of any local authority having jurisdiction or with the requirements of a pipe material manufacturer, immediately notify the District.
  - 1. In case of conflict between types of pipe bedding types, use the local authority having jurisdiction-specified material if that material provides a greater degree of structural support to the pipe, as determined by the District.
  - 2. In case of conflict between types of trench backfill types, use the local authority having jurisdiction-specified backfill material if that material provides the greater in-place density after compaction, as determined by the District.
- B. Backfill types shall be used in accordance with the following provisions:
  - 1. Pipe zone and trench backfill shall consist of the type of material indicated.
  - 2. Backfill around utility crossings of the pipeline shall be Select Native Trench Backfill Material or Imported Material as specified herein, except maximum rock size shall be reduced to 1 inch in any dimension.
  - 3. Trench backfill and final backfill for pipelines entering structures shall be the same material as used in the pipe zone, except where concrete encasement is required.

## 2.3 MATERIALS

- A. General:
  - 1. The following are fill material requirements unless indicated otherwise.
- B. Native Materials:
  - 1. May be reused provided they meet the requirements of the material specifications including gradation, moisture content, and can achieve required in-place density.
  - 2. Prior to reusing native materials, the Contractor shall obtain approval from the District.
  - 3. Native material not meeting the specifications or not receiving approval from the District cannot be used, and Imported Material shall be used where directed by the District.
- C. Pipe Bedding:
  - 1. Pipe Bedding shall be Imported Material complying with 2020 WSDOT Standard Specifications Section 9-03.13.
- D. Pipe Zone Backfill:
  - 1. Pipe Zone Backfill shall be Imported Material complying with 2020 WSDOT Standard Specifications Section 9-03.13.
- E. Trench Backfill (for use under Service Road and outside of roadway):
  - 1. Trench Backfill Outside of Roadway and Outside of Service Road:
    - a. Trench Backfill shall be Select Native Trench Backfill or Imported Material (where native material is not acceptable for use as Select Native Trench Backfill per the requirements indicated).
    - b. Select Native Trench Backfill Material:
      - 1) Select Native Trench Backfill excavated from the trench may be reused as trench backfill provided it meets the following requirements:
        - a) It meets the requirements of the trench backfill requirement including gradation, moisture content, and can achieve required in-place density.

- b) It contains no rocks larger than 8 inches in any dimension and no roots, debris, or organic material.
      - c) It is approved for reuse as trench backfill by the District.
    - 2) Native material not meeting the requirements above cannot be used as Select Native Trench Backfill, and Imported Material shall be used where directed by the District.
  - 2. Trench Backfill under Service Road:
    - a. Trench Backfill under Service Road shall be Imported Material and shall be gravel borrow conforming to 2020 WSDOT Standard Specifications 9-03.14(1).
  - 3. Imported Material:
    - a. Imported Material for use as Trench Backfill (for use under Service Road and outside of roadway) shall be gravel borrow conforming to 2020 WSDOT Standard Specifications 9-03.14(1).
  - 4. Trench Backfill around utility crossings of the pipeline shall be Select Native Trench Backfill Material or Imported Material as specified herein, except maximum rock size shall be reduced to 1 inch in any dimension.
- F. Crushed Surfacing Base Course (1-1/4 Inch Minus):
- 1. For use as trench backfill under roadways as indicated in the Drawings.
  - 2. Crushed surfacing conforming to 2020 WSDOT Standard Specifications Section 9-03.9(3) for gradation class "Base Course".
- G. Crushed Rock (5/8-Inch Minus):
- 1. Per 2020 WSDOT Standard Specifications Section 9-03.9(4).
- H. Gravel Borrow:
- 1. Gravel borrow conforming to 2020 WSDOT Standard Specifications Section 9-03.14(1).
- I. Trench Stabilization Material:
- 1. Permeable ballast conforming to 2020 WSDOT Standard Specifications Section 9-03.9(2) but derived from crushed material.
- J. Controlled Low Strength Material (e.g., Controlled Density Fill):
- 1. Per Section 02210.
- K. Quarry Spalls:
- 1. Quarry spalls conforming to 2020 WSDOT Standard Specifications Section 9-13.1(5).
- L. Gravel for drain and underdrains (Granular Drain Backfill):
- 1. Gravel Backfill for Drains shall conform to 2020 WSDOT Standard Specifications Section 9-03.12(4).
- M. Trench Plugs:
- 1. Controlled Low Strength Material per Section 02210.
- N. Permeable Ballast:
- 1. Permeable ballast conforming to 2020 WSDOT Standard Specifications Section 9-03.9(2) for gradation class Permeable Ballast.
  - 2. Material shall be washed prior to placement.
- O. Crushed Surfacing Top Course (5/8 Inch Minus):
- 1. Crushed surfacing conforming to 2020 WSDOT Standard Specifications Section 9-03.9(3) for gradation class "Top Course and Keystone".
- P. Stream Bed Mix:
- 1. Composition:
    - a. 50-percent of Streambed Sediment by volume.
    - b. 50-percent of 6-inch Streambed Cobbles by volume.
  - 2. Streambed Sediment:
    - a. Per 2020 WSDOT Standard Specifications Section 9-03.11(1).
  - 3. 6-inch Streambed Cobbles:

- a. Per 2020 WSDOT Standard Specifications Section 9-03.11(2).

Q. Stream Bed Boulders:

- 1. Per 2020 WSDOT Standard Specifications Section 9-03.11(3).

**2.4 GEOTEXTILE FILTER FABRICS**

- A. For soil stabilization (trench stabilization): Filter Fabric per Section 02221.
- B. For soil separation: Geotextile Fabric shall conform to 2020 WSDOT Standard Specifications Section 9-33.1, Table 4 (in Section 9-33.2) for a Woven, High Survivability geotextile and Table 5 (in Section 9-33.2) for Class B geotextile.

**PART 3 - EXECUTION**

**3.1 EXCAVATION - GENERAL**

- A. Per Section 02221.

**3.2 PIPELINE AND UTILITY TRENCH EXCAVATION**

- A. Per Section 02221.

**3.3 OVER-EXCAVATION NOT ORDERED OR INDICATED**

- A. Per Section 02221.

**3.4 BACKFILL - GENERAL**

- A. Per Section 02221.

**3.5 PLACING AND SPREADING OF TRENCH BACKFILL AND PIPE ZONE MATERIALS**

- A. Per Section 02221.

**3.6 COMPACTION OF TRENCH BACKFILL, PIPE BEDDING, AND PIPE ZONE MATERIALS**

- A. Per Section 02221.

**3.7 FOUNDATION MATERIAL UNDER STRUCTURES, VAULTS, AND MANHOLES**

- A. Place precast concrete structures, vaults, and manholes on a foundation of compacted permeable ballast a minimum of 12 inches thick and 6 inches larger than the footprint of the vault and manholes on all sides.

**3.8 STRUCTURAL EXCAVATION, FILLING, BACKFILLING, AND COMPACTION**

A. General:

- 1. In general, work includes, but is not necessarily limited to, excavation for structures and retaining walls, removal of underground obstructions and undesirable material, backfilling, filling, and fill, backfill, and subgrade compaction.
- 2. Obtain fill and backfill material necessary to produce grades required.
  - a. Materials and source to be approved by the District.
  - b. Excavated material approved by the District may also be used for fill and backfill.
- 3. In this Section, the word "foundations" includes footings, base slabs, foundation walls, mat foundations, grade beams, piers, and any other support placed directly on soil.
- 4. In the paragraphs of this Section, the word "soil" also includes any type of rock subgrade that may be present at or below existing subgrade levels.

B. Excavation Requirements for Structures:

1. General:

- a. Do not commence excavation for foundations for structures until the District grants approval to begin excavations and approves the following:
  - 1) The removal of topsoil and other unsuitable and undesirable material from existing subgrade.

- 2) Density and moisture content of site area compacted fill material meets requirements of specifications.
  - 3) Site surcharge or mass fill material can be removed from entire construction site or portion thereof.
  - 4) Surcharge or mass fill material has been removed from construction area or portions thereof.
2. Dimensions:
    - a. Excavate to elevations and dimensions indicated or specified.
    - b. Allow additional space as required for construction operations and inspection of foundations.
  3. Removal of obstructions and undesirable materials in excavation includes, but is not necessarily limited to, removal of old foundations, existing construction, unsuitable subgrade soils, expansive type soils, and any other materials which may be concealed beneath present grade, as required to execute work indicated in the Drawings.
    - a. If undesirable material and obstructions are encountered during excavation, remove material and replace as directed by the District.
  4. Level off bottoms of excavations to receive foundations, floor slabs, equipment support pads, or compacted fill.
    - a. Remove loose materials and bring excavations into approved condition to receive concrete or fill material.
    - b. Where compacted, fill material must be placed to bring subgrade elevation up to underside of construction, scarify existing subgrade upon which fill material is to be placed to a depth of 6 inches and then compact to density stated in this Section before fill material can be placed thereon.
    - c. Do not carry excavations lower than indicated for foundations except as directed by the District.
    - d. If any part of excavations is carried below required depth without authorization, maintain excavation and start foundation from excavated level with concrete of same strength as required for superimposed foundation, and no extra compensation will be made to Contractor therefore.
  5. Make excavations large enough for working space, forms, and inspection.
  6. Notify the District as soon as excavation is completed in order that subgrades may be inspected.
    - a. Do not commence further construction until subgrade under compacted fill material, under foundations, under slabs-on-grade, and under retaining wall footings has been inspected and approved by the District as being free of undesirable material, being of compaction density required by this Section, and being capable of supporting the allowable foundation design bearing pressures and superimposed foundation, fill, and building loads to be placed thereon.
    - b. The District shall be given the opportunity to inspect subgrade below fill material both prior to and after subgrade compaction.
    - c. Place fill material, foundations, retaining wall footings, floor slabs-on-grade, and equipment support pads as soon as weather conditions permit after excavation is completed, inspected, and approved and after forms and reinforcing are inspected and approved.
    - d. Before concrete or fill material is placed, protect approved subgrade from becoming loose, wet, frozen, or soft due to weather, construction operations, or other reasons.
  7. Dewatering:
    - a. General: Per Section 02140.
    - b. Where groundwater is or is expected to be encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade below foundations and fill material, to allow foundations and fill material to be placed in the dry, and to maintain a stable excavation side slope.
    - c. Keep dewatering system in operation until dead load of structure exceeds possible buoyant uplift force on structure.
    - d. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.
  8. Subgrade stabilization:
    - a. If subgrade under foundations, fill material, floor slabs-on-grade, or equipment support pads is in a frozen, loose, wet, or soft condition before construction is placed thereon, remove frozen, loose, wet, or soft material and replace with approved compacted material as directed by District.

- b. Place separation geotextile fabric over subgrade to provide separation from underlying materials.
  - c. Provide compaction density of replacement material as stated in this Section.
  - d. Loose, wet, or soft materials, when approved by District, may be stabilized by a compacted working mat of well graded crushed stone.
  - e. Compact stone mat thoroughly into subgrade to avoid future migration of fines into the stone voids.
  - f. Remove and replace frozen materials as directed by the District.
  - g. Method of stabilization shall be performed as directed by the District.
  - h. Do not place further construction on the repaired subgrades, until the subgrades have been approved by the District.
9. Protection of structures:
- a. Prevent new and existing structures from becoming damaged due to construction operations or other reasons.
  - b. Prevent subgrade under new and existing foundations from becoming wet and undermined during construction due to presence of surface or subsurface water or due to construction operations.
10. Shoring:
- a. General: Per Section 02160.
  - b. Shore, sheet pile, slope, or brace excavations as required to prevent them from collapsing.
  - c. Remove shoring as backfilling progresses but only when banks are stable and safe from caving or collapse.
11. Drainage:
- a. Control grading around structures so that ground is pitched to prevent water from running into excavated areas or damaging structures.
  - b. Maintain excavations free of water where foundations or fill material are to be placed.
12. Frost protection:
- a. Do not place foundations, slabs-on-grade, equipment support pads, or fill material on frozen ground.
  - b. When freezing temperatures may be expected, do not excavate to full depth indicated, unless foundations or fill material can be placed immediately after excavation has been completed and approved.
  - c. Protect excavation from frost if placing of concrete or fill is delayed.
  - d. Where a concrete slab is a base slab-on-grade located under and within a structure that will not be heated, protect subgrade under the slab from becoming frozen until final acceptance of the Project by the District.
  - e. Protect subgrade under foundations of a structure from becoming frozen until structure is completed and heated to a temperature of at least 50 Deg F.
- C. Fill and Backfill Inside of Structure and Below Foundations, Base Slabs, Equipment Support Pads, and Piping:
- 1. General:
    - a. Subgrade to receive fill or backfill shall be free of undesirable material as determined by District and scarified to a minimum depth of 6 inches and compacted to density specified herein.
    - b. Surface may be stepped by at not more than 12 inches per step or may be sloped at not more than 2 percent.
    - c. Do not place any fill or backfill material until subgrade under fill or backfill has been inspected and approved by the District as being free of undesirable material and compacted to specified density.
  - 2. Obtain approval of fill and backfill material and source from the District prior to placing the material.
  - 3. Fill and backfill placement:
    - a. Prior to placing fill and backfill material, optimum moisture and maximum density properties for proposed material shall be obtained from the District.
    - b. Place fill and backfill material in thin lifts as necessary to obtain required compaction density; see Section 02221 and the Drawings.

- c. Compact material by means of equipment of sufficient size and proper type to obtain specified density.
  - d. Use hand operated equipment for filling and backfilling next to walls.
  - e. Do not place fill and backfill when the temperature is less than 40 DegF and when subgrade to receive fill and backfill material is frozen, wet, loose, or soft.
  - f. Use vibratory equipment to compact granular material; do not use water.
4. Where fill material is required below foundations, place fill material, conforming to the required density and moisture content, outside the exterior limits of foundations located around perimeter of structure the following horizontal distance whichever is greater:
- a. As required to provide fill material to indicated finished grade.
  - b. 5 feet.
  - c. Distance equal to depth of compacted fill below bottom of foundations.
  - d. As directed by the District.
- D. Filling and Backfilling Outside of Structures:
- 1. This paragraph of this Section applies to fill and backfill placed outside of structures above bottom level of both foundations and piping but not under paving.
  - 2. Provide material as approved by the District for filling and backfilling outside of structures.
  - 3. Fill and backfill placement:
    - a. Prior to placing fill and backfill material, obtain optimum moisture and maximum density properties for proposed material from the District.
    - b. Place fill and backfill material in thin lifts as necessary to obtain required compaction density.
    - c. Compact material with equipment of proper type and size to obtain density specified.
    - d. Use only hand operated equipment for filling and backfilling next to walls and retaining walls.
    - e. Do not place fill or backfill material when temperature is less than 40 Deg F and when subgrade to receive material is frozen, wet, loose, or soft.
    - f. Use vibratory equipment for compacting granular material; do not use water.
  - 4. Backfilling against walls:
    - a. Use small equipment to backfill adjacent to walls.
    - b. Do not backfill around any part of structures until each part has reached specified 28-day compressive strength and backfill material has been approved.
    - c. Do not start backfilling until concrete forms have been removed, trash removed from excavations, pointing of masonry work, concrete finishing, damp proofing and waterproofing have been completed.
    - d. Do not place fills against walls until floor slabs at top, bottom, and at intermediate levels of walls are in place and have reached 28-day required compressive strength to prevent wall movement.
    - e. Bring backfill and fill up uniformly around the structures and individual walls, piers, or columns.
- E. Backfilling Outside of Structures Under Piping or Paving:
- 1. When backfilling outside of structures requires placing backfill material under piping or paving, the material shall be placed from bottom of excavation to underside of piping or paving at the density required for fill under piping or paving as indicated in this Section.
  - 2. Provide special compacted bedding or compacted subgrade material under piping or paving as required by other Sections for the Project.
- F. Compaction Requirements:
- 1. The following compaction test requirements shall be in accordance with ASTM D1557 for fine-grained materials (sand and select trench backfill) materials, ASTM D4253, and ASTM D4254 for coarse materials (4-inch-minus gravel and coarse drain rock). Where agency or utility company requirements govern, the highest compaction standards shall apply.

LOCATION OR USE OF FILL	RELATIVE COMPACTION (%)	MOISTURE CONTENT
Foundation material under structures, vaults, and manholes	95	Within $\pm 2\%$ of optimum
Foundation material under abutment and approach walls	95	Within $\pm 2\%$ of optimum

**3.9 DISPOSAL OF EXCESS EXCAVATED MATERIALS**

A. Per Section 02221.

**3.10 FIELD QUALITY CONTROL**

A. Per Section 02221.

**END OF SECTION**

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**SECTION 02205**  
**EMBANKMENT SURCHARGE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Embankment surcharges are anticipated to remain in place for 6 to 9 months after the surcharge has reached its maximum specified thickness. If survey monitoring results and interpretation by the Engineer indicates settlement criteria has been satisfied, the Engineer may authorize removal of the surcharge sooner than 6 to 9 months.
- B. The surcharge will need to be confined to near vertical walls due the topography of the site. Contractor may use stacked gravity blocks for final approach walls at their option to control limits of preload to the area shown in the Drawings.

**1.2 QUALITY ASSURANCE**

- A. Quality Plan: Conform to quality assurance/quality control requirements (as stated elsewhere in the Contract Documents) covering all earthwork operations, survey, and the field quality control to be performed.
- B. Quality Control: Provide quality control to ensure compliance with specified requirements.

**1.3 REFERENCES**

- A. This Section incorporates by reference the latest revisions of the Washington State Department of Transportation (WSDOT) 2020 Standard Specifications for Road, Bridge, and Municipal Construction

**1.4 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Material source, and all tests and certifications necessary to approve materials, including moisture/density relation test results.
- C. Survey readings of survey targets within 48 hours of obtaining readings.

**PART 2 - PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Soil for embankment surcharge shall conform to earth moving material requirements as stated elsewhere in the Contract Documents.
- B. Contractor may use imported materials to be used elsewhere on the project for surcharge fill.

**PART 3 - PART 3 - EXECUTION**

**3.1 NOTIFICATIONS TO DISTRICT**

- A. Notify District prior to installing settlement plates and survey targets.
- B. Notify District prior to beginning to remove surcharge materials.

**3.2 SETTLEMENT PLATES**

- A. Settlement plates shall be installed on prepared embankment subgrade at the locations indicated in the Drawings.
- B. Prior to placing any embankment fill over the prepared subgrade: settlement plate elevations shall be surveyed.

- C. Install survey targets on gravity blocks or geotextile fabric wall used to limit the surcharge footprint, minimum at each end of each wall and no farther than 25 feet horizontally along each wall.

### **3.3 SURCHARGE CONSTRUCTION**

#### **A. General**

1. Embankment surcharge shall be constructed at the locations indicated in the Drawings.
2. Use stacked gravity blocks or geotextile fabric wall to limit footprint of embankment surcharge to the limits shown on the Contract Drawings.
3. Embankment surcharge construction shall conform to this Section and the earth moving requirements as stated elsewhere in the Contract Documents.
4. Compaction of soil within 2 feet of the prepared subgrade shall be performed with roller compactors without vibration.
5. The Contractor shall expect some embankment settlement to occur simultaneous with embankment fill placement.
6. The District may direct the Contractor to place an additional 12 inches of surcharge after placing the surcharge. Additional fill placement shall not occur sooner than 30 days after completing surcharge construction to the dimensions shown on the Contract Drawings. Do not add more than 12 inches of fill to the top of the surcharge in any 30 day period or add more than 24 inches thickness total above the specified surcharge fill thickness.

#### **B. Monitoring**

1. Obtain initial survey reading of survey targets and settlement plates within 24 hours of completion of the surcharge construction.
2. Obtain subsequent survey readings at a frequency of not more than every two weeks.

### **3.4 SURCHARGE REMOVAL**

- A. The District's Geotechnical Engineer will review settlement monitoring data to determine if sufficient settlement has occurred to allow removal of the surcharge. The Contractor shall not remove the surcharge until receiving written authorization to do so from the District.
- B. Once removed the excess gravel borrow for surcharge embankment shall become the property of the Contractor for removal or reuse onsite. The material may be reused if it meets the moisture and gradation requirements and is accepted by the District.

**END OF SECTION**

**SECTION 02210**  
**CONTROLLED DENSITY FILL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies Controlled Density Fill (CDF). CDF may also be called Controlled Low Strength Material (CLSM.)

**1.2 QUALITY ASSURANCE**

- A. All testing will be done by a qualified testing laboratory selected by the Contractor (Testing Firm) at the Contractor's expense, except as otherwise indicated.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. CDF Mix Designs:
1. CDF mix designs which show the proportions and gradations of all materials proposed for each type of CDF indicated.
  2. Each mix design shall be accompanied by Contractor's Testing Firm's test results of the indicated properties.
  3. If the Contractor proposes to provide CDF with aggregates that do not conform to ASTM C33, include a testing program that will be used to control the variability of the aggregates. The testing program shall be acceptable to the District.
- C. Testing results.

**PART 2 - PRODUCTS**

**2.1 CONTROLLED DENSITY FILL**

- A. CDF shall be a mixture of cement, pozzolan, coarse and fine aggregate, admixtures, and water, mixed in accordance with ASTM C94.
- B. Composition: The following parameters shall be within the indicated limits and as necessary to produce the indicated compressive strengths.
1. Mix proportions as necessary.
  2. Entrained air content shall be between 8 percent minimum and 12 percent maximum.
  3. Water reducing agent content as necessary.
- C. Properties:
1. Density shall be between 100 lb/cu. ft. minimum and 150 lb/cu. ft. maximum.
  2. For wet CDF, slump shall be as required by the Contractor's methods, but shall not promote segregation nor shall slump exceed 9 inches.
  3. For dry CDF, slump shall be as required by the Contractor's methods, but shall not promote segregation nor shall slump exceed 2 inches.
  4. Compressive strength at 28 days shall be a minimum of 200 psi and a maximum of 300 psi.

**2.2 CEMENT**

- A. Cement shall be Type II in accordance with ASTM C150.

### **2.3 POZZOLAN**

- A. Pozzolan shall be Type F or C in accordance with ASTM C618. Pozzolan content by weight shall not be greater than cement content.

### **2.4 AGGREGATE**

- A. Aggregate shall consist of a well graded mixture of crushed rock or sand, with a nominal maximum size of 3/8 inch.
- B. One hundred percent shall pass the 1/2-inch sieve; no more than 30 percent shall be retained on the 3/8-inch sieve; and no more than 12 percent shall pass the number 200 sieve. If more than 5 percent of the aggregate passes the number 200 sieve, the material passing the number 200 sieve shall have a plasticity index of less than 0.73 (liquid limit-20), when tested in accordance with ASTM D4318.
- C. All aggregate shall be free from organic matter and shall not contain more alkali, sulfates, or salts than the native materials at the Site.

### **2.5 ADMIXTURES**

- A. Air entraining admixtures shall be in accordance with ASTM C260.
- B. Water reducing admixtures shall be in accordance with ASTM C494.

### **2.6 WATER**

- A. Water shall be potable, clean, and free from objectionable quantities of silt, organic matter, alkali, salt, and other impurities.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Prior to placing as pipe bedding, backfill, utility support (pipe protection), or trench dam, place the pipe to proper alignment and grade and support by blocking underneath the pipe to provide the minimum bedding depth indicated in the Drawings.
- B. Place CDF bedding, backfill, utility support (pipe protection), or trench dam in such a manner and rate that the pipes being installed do not become buoyant or otherwise disturbed.

### **3.2 PREPARATION**

- A. Subgrade and compacted fill to receive CDF shall be prepared according to Section 02221.

### **3.3 BATCHING, MIXING, AND DELIVERY**

- A. Batching, mixing, and delivery of CDF shall conform to ASTM C94. CDF shall be mixed at a batch plant acceptable to the District and shall be delivered in standard transit mix trucks.

### **3.4 PLACEMENT**

- A. CDF shall be placed by tailgate discharge, conveyor belts, pumped, or other means acceptable to the District. CDF shall be directed in place by vibrator, shovel, or rod to fill all crevices and pockets. Avoid over-consolidation which causes separation of aggregate sizes.
- B. CDF shall be continuously placed against fresh material unless otherwise acceptable to the District. When new material is placed against existing CDF, the placement area shall be free from all loose and foreign material. The surface of the existing material shall be soaked a

minimum of one hour before placement of fresh material but no standing water shall be allowed when placement begins.

- C. Temperature of the CDF shall be between 50 and 90 degrees F when placed. CDF shall not be placed when the air temperature is below 40 degrees F. No CDF shall be placed against frozen subgrade or other materials having temperature less than 32 degrees F.

### **3.5 PROTECTION**

- A. CDF shall be protected from freezing for 72 hours after placement.
- B. No fill or loading shall be placed on CDF until the material has sufficiently cured to bear the applied load.
- C. CDF shall be protected from running water, rain, and other damage until the material has been accepted and final fill completed.

### **3.6 TESTING**

- A. Trial Test Section:
  - 1. Prior to the start of construction, demonstrate the workability, setting characteristics, and strength of the resultant mix through the preparation of a trial or test section of the pipeline.
  - 2. The test section shall simulate, as nearly as possible, the field installation conditions in a typical lower trench area of the work. Modifications may require an additional test section for approval, as determined by the District.
- B. Field Testing:
  - 1. Conform to ASTM D4832.
  - 2. Prepare samples at point of placement:
    - a. One set of four cylinders for every 200 cubic yards.
      - 1) Test two cylinders at 7 days.
      - 2) Test two cylinders at 28 days.

**END OF SECTION**

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**SECTION 02212**  
**CONSTRUCTION SURVEY WORK**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies surveying activities.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Surveyor:
    - a. Professional Land Surveyor registered in the state of Washington.
    - b. Experienced in specified work.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications.
- C. Survey work records.
- D. Documentation associated with removal and replacement of survey monuments, right-of-way markers, Project survey control points, property corners, and section corners.
- E. Field survey records to support pavement restoration work, including curb, gutter, pavement, cement concrete, and channelization.
- F. Field survey records of low point elevations of Stream A.
- G. Field survey of existing ground surface elevations of all proposed manhole cover and access hatch locations prior to preparing shop drawings: Submit per Section 02540.
- H. Pre- and post-construction survey of wetlands: Submit per Section 02227.
- I. Potholing: Submit per Section 01195.
- J. Survey data and field notes for fences required to be removed and replaced in pre-construction locations.
- K. Settlement Monitoring Data.
- L. Corrective Action Plan.

**1.4 DEFINITIONS**

- A. Surface Settlement Points:
  - 1. Fixed markers placed on the ground surface or structures.
  - 2. Settlement points are monitored by optical survey methods to determine vertical or vertical and horizontal displacements.
  - 3. Surface settlement points are for the purpose of monitoring changes in elevation of existing ground and existing structures.

**1.5 SURVEY BY THE DISTRICT**

- A. Control points for vertical and horizontal control are indicated in the Drawings. Verify and use Contract control points as basis of work.

**1.6 REVIEW BY THE DISTRICT**

- A. Perform no excavation work until the Engineer or District inspects and accepts stakes, lines, and grades established by the Contractor. Work performed without surveyed field controls will be subject to removal at the Contractor's expense.

- B. Review by the Engineer or District does not constitute approval or acceptance of the work, nor does it relieve the Contractor of responsibility for performing work in conformance with the Contract.

## 1.7 CONTRACTOR'S RESPONSIBILITIES

- A. Provide all pipeline construction staking as required to complete the Work.
- B. Verify locations of property lines, right-of-way (ROW) lines, signs, and property ownership whenever it may limit or impact the progress of the work. Property lines indicated in the Drawings are conceptual and approximate.
- C. Provide the following items of work:
  - 1. Provide vertical and horizontal construction staking for pipeline and appurtenances:
    - a. Guard stakes must contain the following information:
      - 1) Pipeline station (on back).
      - 2) Offset from line (underlined).
      - 3) Offset from control point (circled).
      - 4) Cut or fill to grade.
      - 5) Distance right or left from centerline on stakes (on back).
  - 2. Inform the District when stakes are available for inspection.
  - 3. Preserve survey monuments and control stations according to the specifications and as governed by applicable law.
  - 4. Replace and augment control stations as necessary to control the work.
  - 5. Set stakes defining Construction Limits.
  - 6. Set stakes to define construction centerline, centerline offsets, or other lines necessary for control of the work.
  - 7. Set stakes to define work, including the following:
    - a. Pipes, valves, culverts, erosion control measures, drainage and water quality structures and facilities (including field verification of fit and functionality or as instructed by the District).
    - b. Wetland delineation.
- D. Remove and dispose of all flagging, lath, stakes and other temporary staking material after the construction is completed.
- E. In advance of the pavement and concrete demolition (including pavement, cement concrete, curb, gutter, and channelization), produce survey information to check the line and grade which the Contractor will use for restoration elevations and slopes.
  - 1. Survey areas of pavement, cement concrete, curb, gutter, and channelization restoration prior to demolition to be used to match pre-construction conditions for restoration activities.
  - 2. Replacement paving shall match the lines and grades of the adjacent paving.
  - 3. Replacement concrete shall match the lines and grades of pre-construction conditions.
  - 4. Replacement channelization shall match channelization of pre-construction conditions.
  - 5. In areas where curb and gutter is to be removed, survey the top, flowline, and gutter line of curb grades in order to replace this section of curb and gutter to the pre-construction lines and grades.
  - 6. Final Grading Tolerance: 0.1 foot plus/minus from required elevations.
- F. In advance of construction in vicinity of Stream A, produce survey information for bottom of stream channel at the tie in locations indicated in the Drawings, which the District will use to confirm slope of Stream A culvert and stream grading.
- G. In advance of preparing manhole and vault shop drawings per Section 02540, produce survey information (existing ground surface elevations) of all proposed manhole cover and access hatch locations.
- H. Complete pre- and post-construction survey of wetlands within construction limits that are affected by construction per Section 02227.
- I. Survey pothole locations per Section 01195.
- J. Survey in permanent fence location prior to removal of existing fence to ensure that the fence is placed at its pre-construction location.

- K. Survey surface settlement points prior to, during, and after construction.
  - 1. Settlement monitoring will provide instrumentation and reference points for monitoring vertical and horizontal ground or structure movement and to establish a baseline record of such movement. Measurements of ground or structure movement will provide evidence for the evaluation and implementation of corrective actions to prevent Action Levels from being exceeded.
  - 2. Operations that are found to reach settlement Action Levels shall be modified to prevent exceeding the Action Levels.
- L. Provide requirements of the record drawings per Section 01720.
- M. Notifying the District of conflicts and changes necessary due to utilities, match point variations, design revisions, and other variables.

**1.8 SURVEY WORK RECORDS**

- A. Maintain daily records of work performed by the survey crew. The daily records shall contain the date, crew names, type and location of work, and work accomplished. Upon request, furnish a copy of diary entries to the District. Furnish a final copy of the diary when the Project is complete.
- B. Construction survey shall be overseen by a Surveyor.
- C. Computations, survey notes, and other records necessary to accomplish the work shall be neat, legible and complete. Furnish copies of computations, notes, and other records when requested by the District.
- D. When the Work temporarily restricts horizontal and vertical clearances, document and submit the change 10 days before the restriction takes effect.
- E. All data and original documentation associated with this Project will become the property of the District.
- F. Dimensional location of all buried and concealed utilities, including all other utilities whether shown on the Drawings or not, as moved or placed by Contractor.

**PART 2 - PRODUCTS**

**2.1 SURFACE SETTLEMENT POINTS**

- A. Provide PK nails for locations in asphalt concrete pavement surface indicated in the Drawings.
- B. Provide bonded survey targets for locations on structures indicated in the Drawings.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Make all supporting computations and field notes required for control of the Work and as necessary to establish the exact position, orientation, and elevation of the work from control stations, including furnishing and setting construction stakes and marks, reference marks, and additional control stations.

**3.2 CONSTRUCTION STAKING TOLERANCES**

- A. Set stakes or other devices at an adequate frequency and within the following tolerances:

Item	Horizontal	Vertical
Culverts	± 0.10 ft.	± 0.05 ft.
Construction Centerline Control Points	± 0.05 ft.	N/A
Construction Centerline Station Points	± 0.10 ft.	N/A

Item	Horizontal	Vertical
Transmission Pipeline	±0.10 ft.	±0.03 ft.
Distribution Pipelines	±0.30 ft.	±0.20 ft.
Utility Pothole Locations	±0.10 ft.	±0.03 ft.

- B. Miscellaneous items not listed above will have a horizontal and vertical tolerance of 0.10 foot, unless otherwise indicated. Features that are to be constructed flush to another surface should take on the same tolerance as that surface.

### 3.3 CONSTRUCTION LIMITS

- A. Set stakes at the Construction Limits.
- B. Set stakes at a minimum of 50-foot intervals or greater if allowed by the District.
- C. Set additional stakes as required by the District.
- D. Paint stakes a color that is unique to the Construction Limits. Mark on stake the reference alignment and offset.

### 3.4 PIPES AND PIPELINE APPURTENANCES

- A. Provide centerline alignment and offset stakes.
- B. Locate stakes at appurtenances, pipe direction changes, deflection, and fittings. Locate stakes along pipeline at minimum 50-foot stations or as required in special situations, as in pipeline connections and other areas where conditions require tighter spacing of stakes to assure pipe grade and alignment.
- C. Provide survey records and field notes for the following:
  1. Original ground elevation at pipe centerline on every stake.
  2. Where the pipe elevation is controlled by minimum depth of cover, mark the stake with the minimum depth from original grade to pipe invert (or top of pipe at Contractor's preference.)
  3. If pipe segment is also controlled by minimum or maximum slope, also mark the stake with the minimum or maximum depth from original grade to pipe invert (or top of pipe at Contractor's preference.)
  4. If the pipe fitting, feature, or appurtenance is controlled by a spot elevation, show elevation control data on stake.
- D. Stake pipe according to pipe supplier layout drawings (shop drawings) where required.
- E. Notify the District immediately if a discrepancy in pipe slope, grade, or minimum cover depth cannot be maintained.

### 3.5 PRESERVATION OF SURVEY MONUMENTS

- A. Inventory all existing found monuments, right-of-way markers, and Project survey control points, including those indicated in the Drawings, and all found property corners and section corners. Update and maintain inventory throughout the life of the Project.
- B. Determine if monuments, right-of-way markers, Project survey control points, property corners, and section corners will be or have been disturbed or destroyed during the course of the Project.
- C. If no monuments, right-of-way markers, Project survey control points, property corners, or section corners have been disturbed or destroyed, supply a letter to the District stating that none of the monuments, right-of-way markers, Project survey control points, property corners, or section corners have been disturbed or destroyed. The letter shall bear the stamp and signature of the Surveyor.
- D. If monuments, right-of-way markers, Project survey control points, property corners, and section corners have been disturbed or destroyed, provide a letter to the District bearing the stamp and signature of Surveyor stating which of these monuments, right-of-way markers, Project survey control points, property corners, and section corners have been disturbed or destroyed. The Surveyor shall re-establish

all disturbed or destroyed monuments, right-of-way markers, Project survey control points, property corners, and section corners in accordance with code.

E. Provide recorded surveys for replaced monumentation.

### **3.6 RESTORATION**

A. In advance of pavement demolition (including pavement, curb, gutter, and channelization), produce survey information required to establish restoration elevations, slopes, and cross sections and channelization.

### **3.7 SURVEY OF STREAM A**

A. In advance of construction in vicinity of Stream A, produce survey information for bottom of stream channel at the tie in locations indicated in the Drawings, which the District will use to confirm slope of Stream A culvert and stream grading.

### **3.8 SURVEY OF MANHOLE COVERS AND ACCESS HATCHES**

A. In advance of preparing manhole and vault shop drawings per Section 02540, produce survey information (existing ground surface elevations) of all proposed manhole cover and access hatch locations.

### **3.9 SURVEY OF WETLANDS**

A. Complete pre- and post-construction survey of wetlands within construction limits that are affected by construction per Section 02227.

### **3.10 POTHOLE LOCATIONS**

A. Survey pothole locations per Section 01195.

### **3.11 SURVEY OF EXISTING FENCES**

A. Survey in permanent fence location prior to removal of existing fence to ensure that the fence is placed at its pre-construction location.

B. Existing fences to be removed and replaced in the pre-construction locations are indicated in the Drawings.

### **3.12 SETTLEMENT MONITORING**

A. General:

1. The surface settlement points indicated in the Drawings and specified herein delineate the minimum required. Since the Contractor's means and methods are not known to the District, add settlement points as necessary to adequately monitor the work.
2. Make all settlement points available to the District for monitoring. Provide the District with equipment necessary to take measurements, except for survey monitoring equipment, within one hour of request.
3. Inform the District in writing of the description and proposed locations of Contractor-identified settlement prior to implementation.
4. Settlement monitoring data: Collected by the Contractor's Surveyor and submitted for record purposes to the District within one day of collecting the data.
  - a. Ground Surface and Structure:
    - 1) Settlement shall be determined by optical survey methods for surface settlement points.
    - 2) The accuracy of the optical survey methods shall be  $\pm 0.01$  foot.

B. Install and monitor surface settlement points:

1. At locations indicated in the Drawings and specified herein.
2. At additional locations that the Contractor determines are needed to monitor the work. Obtain all rights of access prior to placement if not previously obtained by the District per Section 01060.

C. Benchmark: Establish one or more benchmarks a minimum of 500 feet from the Work at least 30 days prior to beginning ground-disturbing construction activities. Elevations shall be referenced to these benchmarks.

- D. Installation of Surface Settlement Points:
1. Unless otherwise indicated, install and perform surface settlement monitoring at locations indicated in the Drawings, at other locations determined by the District, and at other locations the Contractor determines necessary to monitor work.
  2. Install at least 30 days prior to beginning any ground-disturbing construction activities, including dewatering activities.
- E. Settlement Monitoring Schedule:
1. Prior to Construction:
    - a. Make initial readings to establish baseline on all settlement points.
      - 1) Take at least three sets of initial baseline measurements and readings, comparable and equal within the rated monitoring point accuracy, at all of the installed settlement points before construction starts.
      - 2) Do not start construction until at least two readings are obtained within the rated settlement point or survey accuracy indicated in this Section. Take additional readings as required.
    - b. After establishing baseline measurements and readings, monitor all settlement points weekly for a minimum of two weeks or until construction starts, whichever is greater.
  2. During Construction:
    - a. Monitor all surface settlement points that are within 200 feet of on-going construction activities that include excavation, backfilling, trenchless construction, or dewatering on a weekly basis until excavation, backfilling, trenchless construction, and dewatering in that area is complete.
  3. After Construction:
    - a. Monitor all settlement points on a weekly basis for a minimum of 2 weeks.
- F. Reporting of Settlement Monitoring Data:
1. Include electronic copies and hardcopy printouts of the settlement data. Electronic copies of the data shall be in MS Excel format. Data shall include that recorded in the previous 24 hours and all previously recorded data to facilitate review and analysis of data trends. Data tables shall include, at a minimum:
    - a. Reading date.
    - b. Initial elevation and/or coordinates.
    - c. Current elevation and/or coordinates.
    - d. Change in elevation from the initial elevation and/or change in horizontal position.
  2. Submit data from readings of all settlement points within one day after readings are collected at each location.
- G. Action Levels of Settlement Monitoring:
1. Conduct the work in a manner such that settlements, heave, and vibrations do not exceed the Action Levels indicated in Table A.
  2. If any measurement exceeds the Action Levels indicated in Table A:
    - a. Take immediate steps to stop the cause of settlement and vibration.
    - b. Immediately notify the District.
    - c. Double the monitoring frequency in the affected area.
    - d. Develop a Corrective Action Plan within one day of the problem and submit to the District for review.
    - e. Implement corrective actions per the Corrective Action Plan.
    - f. Verify success of corrective actions.
    - g. If corrective actions are not successful, cease all related operations contributing to the settlements and repeat process listed above.
    - h. Under some circumstances, corrective actions may require modification of construction procedures.

Table A. Action Levels

MONITORING POINT TYPE	ACTION LEVEL
Surface Settlement Points	0.25 inch

H. Protection and Maintenance:

1. Be responsible to repair and replace damaged and missing settlement points as required within one day of detection.

I. Removal of Surface Settlement Points:

1. Remove all settlement points. Restore surfaces to the conditions existing before installation and as required by the District.

**3.13 RECORD DRAWING INFORMATION**

- A. Per Section 01720.

**END OF SECTION**

## SECTION 02221

### TRENCHING, BACKFILLING AND COMPACTING FOR UTILITIES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section specifies excavation, trenching, backfilling, and compacting for the 36-inch-diameter water transmission pipeline and other underground utilities.

##### 1.2 QUALITY ASSURANCE

- A. Quality Control:
  - 1. Contractor's Independent Testing Firm (Testing Firm): Employ and pay for services of a testing laboratory to perform materials evaluation and compaction and moisture testing.
  - 2. District will hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling and compaction to assure that all work complies with this Section.

##### 1.3 SUBMITTALS

- A. Procedures: Section 01300.
- B. Excavation Schedule: Proposed methods and schedule for excavating, backfilling, importing new materials, and disposal of excess materials. Trench safety plans and trench shoring drawings including current certification of trench shields (trench boxes) if employed.
- C. Haul Routes: Submit planned haul routes for material disposal and importation. Include the planned number and frequency of trips.
- D. Disposal site location for waste materials hauled offsite.
- E. Site-Specific Health and Safety Plan if contaminated materials are encountered.

##### 1.4 DEFINITIONS

- A. Excavation: All excavation will be defined as unclassified.
- B. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the District.
- C. Optimum Moisture Content: Determined by the ASTM standard specified to determine the maximum dry density for relative compaction. Field moisture content shall be determined on the basis of the fraction passing the 3/4-inch sieve.
- D. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes. Well-graded does not define any numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters. Well-graded is used to define a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.
- E. Imported Material: Per Section 02200.
- F. Rock Excavation: Rock excavation as defined as bedrock material that cannot be excavated with a large horsepower excavator in good working condition, minimum 100,000 pound excavator, minimum 400 horsepower equipped with rock teeth on the bucket. If rock excavation is encountered, the excavation will be paid for on a unit price basis.

##### 1.5 PROTECTION OF EXISTING UTILITIES AND STRUCTURES

- A. Existing Utilities:

1. Protect existing utilities in accordance with Section 01195, 2020 WSDOT Standard Specification Section 1-07.17, and RCW 19.122.
- B. Damage to Existing Improvements:
  1. Be responsible for damage in accordance with Section 01195 and RCW 19.122.

#### **1.6 COMPACTION CONTROL TESTS**

- A. Compaction control tests (laboratory density tests) will be completed by an independent soils laboratory hired by the District.
- B. Laboratory densities will be determined by ASTM D1557.
- C. Density sampling of backfill placed by the Contractor shall be performed by Contractor's Testing Firm.
- D. In-place density will be determined by one or more of the following methods:
  1. ASTM D1556, Standard Test for Density of Soil In-place by the Sand Cone Method.
  2. ASTM D2167, Standard Test for Density of Soil In-place by the Runner Balloon Method.
  3. ASTM D2922, Standard Test for Density of Soil In-place by the Nuclear Method.
- E. Frequency of Compaction Testing:
  1. Minimum of two compaction tests every 50 feet of pipeline where trench compaction is required to be 90% or greater.
    - a. The first test shall be at a point equal to 1/2 the depth of the trench above the crown of the pipe.
    - b. The second shall be at a depth of 1 foot below the final ground surface.
- F. Frequency of Compaction Testing within Skagit County right of way:
  1. A minimum of one compaction test every 300 feet of trench and every 1.5 feet vertically unless otherwise specified by Skagit County.
- G. The Contractor shall assist with District's testing work by leveling small test areas and excavating and shoring test pits when and where designated by the District. Backfill the test areas and test pits after the District's testing is complete. The frequency and location of testing shall be determined solely by the Engineer. The District may test any lift of backfill at any time, location, or elevation.

#### **1.7 HAUL ROUTES AND DISPOSAL SITE LOCATIONS**

- A. Provide haul roads as necessary for the Work.
- B. Submit all haul locations for all types and classification of material to be removed from the worksite. If haul locations are to be added or location of material haul location is changed, submit new haul location and types and classification of material.
- C. Repair damage to roadway surfaces from the direct or indirect result of the Contractor's operation to the requirements of the responsible agency.
- D. Obtain necessary street use permits in connection with Contractor's operations.
  1. When hauling is done over highways or city streets, the loads shall be trimmed and the vehicle shelf areas shall be cleaned after each loading. The loads shall be watered after trimming to minimize dust. Comply with covered load regulations.
  2. Maintain traffic patterns in the existing structural filled areas which preserve the stability of the soil under future structural foundations or paved areas.
- E. Haul roads:
  1. Construct haul roads required to transport materials on Site.
  2. Select haul road alignment to avoid interference with facility operations.
  3. Remove haul roads after completion of embankment construction.
- F. Haul roads within wetlands:
  1. Per Section 02227.
- G. Restoration of haul roads:
  1. Clean and repair roads used during and at completion of the Work.

#### **TRENCHING, BACKFILLING AND COMPACTING FOR UTILITIES**

2. Unless otherwise indicated, resurface paved roadways and bring to pre-construction grade.
3. Unless otherwise indicated, restore roads which are not paved to existing conditions and pre-construction grade where the surface is removed, broken, damaged, caved, or settled during the Work.

## **1.8 SITE CONDITIONS**

- A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.
- B. Maintain and trim excavated materials to minimize inconvenience to public and adjoining property owners.
- C. Provide full access to public and private premises, water meters, fire hydrants, at street crossings, sidewalks and other points to prevent serious interruption of travel.

## **PART 2 - PRODUCTS**

### **2.1 EARTHWORK MATERIALS**

- A. Per Section 02200.

### **2.2 FILTER FABRIC**

- A. Filter fabric shall conform to Section 9-33.1, Table 3 (in Section 9-33.2), of the 2020 WSDOT Standard Specifications for woven soil stabilization fabric.

## **PART 3 - EXECUTION**

### **3.1 EXCAVATION - GENERAL**

- A. Excavation in Wetlands:
  1. Per Section 02227.
- B. Except when specifically provided to the contrary, excavation shall include the removal of all materials of whatever nature encountered, including all obstructions of any nature that would interfere with the proper execution and completion of the Work. Furnish, place, and maintain all supports and excavation support systems that may be required for the excavation. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable safety requirements.
- C. Removal and Exclusion of Water:
  1. Remove and exclude water, including surface water, stormwater, groundwater, irrigation water, and wastewater, from all excavations unless specifically stated herein.
  2. Dewatering shall conform to Section 02140.
  3. Water shall be removed and excluded from excavation until backfilling is complete and all field soils testing has been completed.

### **3.2 PIPELINE AND UTILITY TRENCH EXCAVATION**

- A. General:
  1. Unless otherwise indicated in the Drawings, excavation for pipelines and utilities shall be open-cut trenches with minimum widths as indicated.
- B. Topsoil Removal:
  1. Stockpile topsoil as specified in Section 02100.
- C. Trench Safety Systems:
  1. Install and maintain shoring, sheeting, bracing and sloping necessary to support the sides of the excavation and to prevent any movement that may damage adjacent facilities, delay the work, endanger life and health, or pose a threat to the environment. Conform to the requirements governmental regulations and agencies.

## **TRENCHING, BACKFILLING AND COMPACTING FOR UTILITIES**

2. All cribbing, sheeting, and shoring shall be designed by a qualified person and meet the requirements of Chapter 296-155 WAC (Safety Standards for Construction Work, Part N, Excavation, Trenching, and Shoring).
3. Comply with all other applicable codes, ordinances and statutes, and bear sole responsibility for the penalties imposed for noncompliance.
4. Be solely responsible for making and maintaining all excavations in a safe manner. Contractor to have Competent Person in trench safety, assigned to the project.
5. Use any combination of shoring and overbreak, tunneling, boring, sliding trench shield, or other method allowed by the applicable local, state, and federal safety codes.
6. Carefully reconsolidate the bedding and side support behind a trench shield prior to placing backfill.
7. Leave in place those portions of cribbing and sheeting extending below the crown elevation of the pipe, unless the bedding and side support can be reconsolidated/recompacted to the satisfaction of the Engineer.
8. Do not use horizontal strutting below the barrel of a pipe.
9. Do not use the pipe as support for trench bracing.
10. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield so that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls. If the trench walls cave in or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.
11. Damages resulting from improper shoring and failure to shore shall be the sole responsibility of the Contractor.

D. Contaminated Soil and Water:

1. There are no known locations of soil contamination at the project site. However, contaminated material may exist within the Work area.
2. Activities involving contaminated materials, should they be encountered, shall be in accordance with:
  - a. Washington State Department of Health Regulations.
  - b. Federal Resources Conservation and Recovery Act (RCRA), 42 USC, Sections 6901 through 6987.
  - c. Federal Hazardous and Solid Waste Amendments (HSWA), PL 98-616.
3. If contaminated materials are encountered during construction, stop work immediately in the area and secure the work area such that the public is not exposed to contaminated materials or potentially contaminated materials. This may be accomplished through temporary backfilling, trench plating, covering the exposed areas with plastic sheeting, or other means. Immediately notify the District, secure the area, and continue work in another area away from the area in question. Do not continue work in the potentially contaminated area until directed by the District. Stopping work in a potentially contaminated area and moving to another work area shall be considered part of the Work, and no additional payment will be made.
4. If contaminated materials are encountered, and if directed by the District, prepare a site-specific Health and Safety Plan (HSP), subject to review by the District, which details how the Contractor intends to protect workers while working in the presence of contaminated soils and groundwater.
5. The HSP shall be prepared, signed, and stamped by a Certified Industrial Hygienist employed by the Contractor. The HSP shall be reviewed and signed by the Contractor and all personnel who will be overseeing work in the contaminated construction zones, including subcontractors.
6. A copy of the HSP shall be provided to all personnel working in the contaminated areas. All personnel performing work in the identified contaminated areas shall be required to read the HSP and shall be required to sign an acknowledgement that they have been given and have read a copy of the HSP. No worker shall be allowed in the identified contaminated areas until a copy of their signed acknowledgement has been submitted to the District by the Contractor.
7. The HSP shall conform to the requirements of all local, state, and federal ordinances, rules, regulations, and guidelines concerning occupational health and safety issues. Included as part of the HSP is the requirement for and the implementation of ongoing monitoring of the Project by the Contractor for contaminated materials. This monitoring shall, at a minimum, include visual

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observation and odor detection by personnel with appropriate hazardous materials training, including 40 hours of EPA-approved Health and Safety training.

8. Analysis of contamination of soil and water samples will be provided by the District through a certified hazardous waste laboratory using U.S. EPA approved analytical methods.
9. Implementation of the HSP for the project, beyond the monitoring which is included with the HSP, requires: (1) detection of contaminated materials; (2) a written request by the Contractor to the District; and (3) acceptance by the District in writing that the HSP shall be implemented.
10. Stockpiling of contaminated material will be allowed only at locations accepted by the District and shall comply with all regulatory requirements. Provide temporary site or sites for stockpiling. No stockpiling of contaminated material shall be allowed within or adjacent to the pipeline alignment.
11. In the event that groundwater contamination is encountered, comply with all applicable federal, state, and local laws and regulations pertaining to the work performed during the dewatering and disposal of contaminated groundwater.

E. Open Trench:

1. Except for work in roadways, the maximum amount of open trench permitted in any one location shall be 200 feet, or the length necessary to accommodate the amount of pipe installed in a single day, whichever is greater.
2. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each day. All trenches shall be barricaded with flashing warning lights to prevent people, animals, and vehicles from falling into the trench.
3. The above requirements for backfilling or use of steel plates will be waived in cases where the trench is located further than 20 feet from any traveled roadway or occupied structure. In such cases, however, barricades and warning lights meeting safety requirements shall be provided and maintained.

F. Over-Excavation:

1. When required by the District, trenches shall be over-excavated beyond the depth or width indicated.
2. Such over-excavation shall be to the dimensions ordered by the District.
3. The trench shall then be backfilled to the grade of the bottom of the pipe bedding.
4. When the over-excavation ordered by the District is below or wider than the limits indicated, additional payment will be made to the Contractor. Said additional payment will be made under the unit price bid item for over-excavation and backfill.
5. Trench stabilization material shall be as indicated. Trench stabilization material shall be placed and leveled using the excavator bucket.

G. Trench Plugs:

1. Install at locations indicated in the Drawings.
2. Install per Section 02210.

**3.3 OVER-EXCAVATION NOT ORDERED OR INDICATED**

- A. Any over-excavation carried below the grade ordered by the District or indicated in the Drawings shall be backfilled to the required grade with the indicated material and compacted.
- B. Such work shall be performed by the Contractor at no additional cost to the District.

**3.4 EXCAVATION IN VICINITY OF TREES**

- A. Per Section 02100.

**3.5 BACKFILL - GENERAL**

- A. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any cast-in-place concrete structure until the concrete has attained sufficient strength to withstand the loads imposed.
- B. Backfill shall be placed after all water is removed from the excavation, and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.

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LOCATION OR USE OF FILL	RELATIVE COMPACTION (%)	MOISTURE CONTENT
Pipe zone materials	90	Within $\pm 2\%$ of optimum
Trench backfill, beneath seeded areas and Service Road	85	Within $\pm 2\%$ of optimum
Trench backfill, beneath paved or gravel areas, and beneath structures Trench backfill within zone of Williams Northwest Pipelines indicated on Drawing 01C148	95	Within $\pm 2\%$ of optimum
Trench backfill adjacent to walls	92	Within $\pm 2\%$ of optimum
Roadway gravel sub-base	95	Within $\pm 2\%$ of optimum
Crushed surfacing base course and top course	95	Within $\pm 2\%$ of optimum
Over-excavation trench backfill	90	Within $\pm 2\%$ of optimum

### 3.8 IMPROVEMENT, MAINTENANCE, AND RESTORATION OF HAUL ROUTES

- A. Ensure subcontractors, suppliers, and individuals associated with Contract activities use haul routes that receive a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300.
- B. Provide required signage and oversight for haul routes to ensure compliance with traffic routing requirements. If Contractor fails to abide by the haul routes, the District will assign City of Mount Vernon or Skagit County off-duty police officers for enforcement of haul route restrictions at the expense of the Contractor.
- C. Inspect haul routes daily and comply with Section 01560.
- D. Be responsible for any improvements, maintenance and restoration of haul routes related to construction use.
- E. Share haul routes with business traffic and maintain in good condition. Haul routes shall remain smooth, level and suitable for owner or the public to drive passenger cars on without damage to vehicles.
  - 1. If pavement damage is minor due to Contractor's work, plane existing asphalt and resurface.
  - 2. If pavement damage results in potholes or loose chunks of pavement during Contractor's work along haul routes, be responsible to promptly remove damaged asphalt and replace with a minimum of four inches of asphalt or meet the requirements of the local authority having jurisdiction, whichever requirements are more stringent.
- F. Restore haul routes to their pre-construction condition after they are no longer needed for construction purposes.

### 3.9 DISPOSAL OF EXCESS EXCAVATED MATERIALS

- A. Subject to the District approval excess excavated materials not required or not suitable for backfill or fill material shall spread evenly over the cleared corridor to the elevations shown. Any excess material shall be removed and disposed of offsite. Oversize rock may be washed and used as riprap for construction of stream restoration. Any rock that cannot be graded smoothly into the surface shall be removed and disposed of offsite.
- B. Make arrangements for hauling and disposal of the excavated material and conform to the requirements of the local authority having jurisdiction.

#### TRENCHING, BACKFILLING AND COMPACTING FOR UTILITIES

### **3.10 FIELD QUALITY CONTROL**

#### **A. Testing:**

1. Per Section 01400.
2. Perform in-place moisture-density tests and compaction tests as specified.
3. Costs of "Passing" tests paid by the District.
4. Perform additional tests as directed by the District until compaction meets or exceeds requirements.
5. Cost associated with "Failing" tests shall be paid by Contractor.
6. Reference to the District in this Section may imply Soils Engineer when employed by the District and directed by Engineer to undertake inspections and approvals as necessary.
7. Provide District, Engineer, and District's independent testing lab personnel with access for testing of soils related work.
8. Ensure work areas and excavations are safe for District, Engineer, and District's independent testing lab personnel.

**END OF SECTION**

**SECTION 02227**  
**CONSTRUCTION IN WETLANDS AND BUFFERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes requirements for construction within existing wetlands and buffers. Wetlands and buffers are indicated in the Drawings, and maintenance of new plantings.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Pre-construction and post-construction survey data and drawings.

**1.3 GENERAL**

- A. Conduct work in accordance with:
  - 1. Permit, easement, and access restrictions per Section 01060.
  - 2. Erosion and sediment control measures per Section 02270.
- B. Access requirements:
  - 1. Access shall be restricted to areas within the easements indicated in the Drawings and Section 01060.
  - 2. Meet permit conditions as specified in Section 01060.
  - 3. Meet City of Mount Vernon and Skagit County requirements where applicable.
- C. Haul Roads within Wetlands:
  - 1. Design haul roads for the soil and groundwater conditions as described in the Geotechnical Data Report.
  - 2. Use prefabricated wood or composite mat systems to support construction vehicles and equipment.
  - 3. Do not use rock, soil imported from outside the wetland, tree stumps, brush, or riprap to disperse vehicle loads.

**1.4 WARRANTY PERIOD**

- A. Per Section 02900.

**1.5 SITE CONDITIONS**

- A. See Section 01012 for the Geotechnical Data Report.
- B. Before proceeding with any work, Contractor shall inspect the site, carefully check grades, and verify dimensions and conditions affecting the Work.

**1.6 PROTECTION OF WORK, PROPERTY, AND PERSONS**

- A. Per Section 01195.

**PART 2 - PRODUCTS**

**2.1 LANDSCAPING**

- A. Per Section 02900.

**2.2 HYDROSEEDING AND SODDING**

- A. Per Section 02930.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Prior to pipeline excavation:
  - 1. Perform pre-construction survey of wetlands and wetland buffers within construction limits that are affected by construction; see Section 02212.
- B. Haul Roads within Wetlands:
  - 1. Install haul roads.
  - 2. Remove haul roads and any materials used to stabilize the base immediately prior to start of restoration.
- C. Wetland Topsoil Handling:
  - 1. Comply with Sections 02100 and 02260.
  - 2. Where excavation is required, remove the top 18 inches of wetland topsoil after vegetation has been cleared, grubbed, and disposed off-site.
  - 3. Temporarily stockpile wetland topsoil in piles not to exceed six feet in height.
  - 4. Replace wetland topsoil after backfill of pipe.
  - 5. Compact wetland topsoil to finish grade at 85 percent maximum density per ASTM D1557.
- D. Downed Wood:
  - 1. Where existing downed wood greater than 6 inches diameter at any point is present, remove and temporarily stockpile.
  - 2. Replace downed wood to original location during restoration activities prior to planting.
- E. Equipment Use:
  - 1. Equipment shall be staged outside of wetlands and buffers.
  - 2. Fueling of equipment shall occur outside of wetlands and buffers.
  - 3. Only vegetable-based hydraulic fluids shall be used for equipment operating in wetlands and buffers.
- F. Imported materials:
  - 1. Imported materials shall be stockpiled outside of wetlands and buffers.
- G. Surface Restoration:
  - 1. See Drawings for restoration.
  - 2. Restore wetland contours and drainage patterns to match original condition as documented through the pre-construction survey specified herein.
  - 3. Wetland and buffer landscaping: Per Section 02900.
  - 4. Wetland and buffer seeding: Per Section 02930.
- H. Temporary irrigation system and water supply for restoration area:
  - 1. Per Section 02900.

### **3.2 PRE-CONSTRUCTION AND POST-CONSTRUCTION SURVEY**

- A. Perform pre-construction and post-construction survey of the wetlands and wetland buffers within construction limits that are affected by construction.
- B. Survey:
  - 1. Survey grades along a 20-foot survey grid.
  - 2. Submit survey drawings within seven days after field survey:
    - a. Provide 1-foot contours and spot elevations at grid intervals within construction limits.
  - 3. Vertical Tolerances: 0.10 feet.
- C. Schedule:
  - 1. Pre-construction survey: Prior to commencement of earthwork in the wetlands and wetland buffers.
  - 2. Post-construction survey: After final grading, but prior to final surface restoration in the wetlands and wetland buffers.

3. The post-construction survey shall receive a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300 prior to final surface restoration including seeding, fertilizing, mulching, and planting.

**END OF SECTION**

**SECTION 02260**  
**TOPSOILING AND FINAL GRADING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes requirements related to topsoiling and final grading.
- B. Location of Work: All areas within limits of grading and all areas outside limits of grading which are disturbed in the course of the work.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Project Data: Test reports for furnished topsoil.

**1.3 SITE CONDITIONS**

- A. Verify amount of topsoil stockpiled and determine amount of additional topsoil, if necessary, to complete Work.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Topsoil:
  - 1. Topsoil is defined as the native upper layer of soil consisting of greater than 5% organic material, including but not limited to:
    - a. Soil materials containing mostly organic material: composted needles, branches, bark, grasses, etc.
    - b. Soils mixed with significant organic matter, including composted roots, plants, wood, etc.
    - c. Topsoil may not contain more than 10% by volume of gravel, cobbles, or weathered rock.
  - 2. All topsoil located over the pipeline in wetland, forested, and other vegetated areas shall be stripped, stockpiled, and replaced.
  - 3. Wetland topsoils shall be stockpiled separately for restoration of wetlands per Section 02227.
  - 4. Existing topsoil stockpiled per Section 02100.
  - 5. Capable of supporting native plant growth.
- B. Imported Topsoil:
  - 1. Provide imported topsoil where required to meet minimum depth required.
  - 2. Topsoil shall meet the requirements of Section 02900.

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Correct, adjust and/or repair rough graded areas.
  - 1. Cut off mounds and ridges.
  - 2. Fill gullies and depressions.
  - 3. Perform other necessary repairs.
  - 4. Bring all sub-grades to specified contours, even and properly compacted.
- B. Loosen surface to depth of 2 inches, minimum.

C. Remove all stones and debris per Sections 02900 and 02935.

**3.2 ROUGH GRADE REVIEW**

A. Reviewed by the District.

**3.3 PLACING TOPSOIL**

A. Do not place when subgrade is wet or frozen enough to cause clodding.

B. Spread to compacted depth as indicated for all disturbed earth areas.

C. If topsoil stockpiled is less than amount required for work, furnish imported topsoil at no cost to the District.

D. Provide finished surface free of stones, sticks, or other material per Sections 02900 and 02935.

E. Provide finished surface smooth and true to required grades.

F. Restore stockpile area to condition of rest of finished work.

**3.4 TOLERANCES**

A. Final Grading Tolerance: 0.1 foot plus/minus from required elevations.

**3.5 ACCEPTANCE**

A. Upon completion of topsoiling, obtain District's acceptance of grade and surface.

B. Make test holes where directed to verify proper placement and thickness of topsoil.

**END OF SECTION**

**SECTION 02270**  
**EROSION AND SEDIMENT CONTROL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes the requirements for work necessary for furnishing, installing, maintaining, and removing erosion and sediment control (ESC) measures for the Work area and staging areas.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Certified Erosion and Sediment Control Lead (CESCL): Active certification through a CESCL course approved by the Washington Department of Ecology (Ecology).

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications.
- C. ESC Plan for all work that will occur outside of designated Work area limits (construction limits) and for Work proposed that varies from the Drawings.

**1.4 DEFINITIONS:**

- A. Wet Season: October 1 through April 30.
- B. Dry Season: May 1 through September 30.

**1.5 ESC PLAN**

- A. Describe how Contractor intends to construct, inspect, operate, and maintain ESC measures indicated in the Drawings or for Contractor facilities such as stockpile areas or waste disposal sites.
- B. Except for cut-and-fill areas where ESC work depends on completion of earthwork, show that all ESC work will be completed before any other work in a segment begins.
- C. Schedule the ESC work in phases, providing no construction activity, including truck traffic, occurs in a segment with incomplete ESC work.
- D. The ESC Plan shall be coordinated with the schedules required in Section 01311.
- E. Revise and bring the ESC Plan up to date whenever the District makes written request for revisions and whenever the Contractor proposes to change the sequence of work. All revisions shall be coordinated with the current progress schedule.
- F. ESC Plan shall include:
  - 1. Scheduling and timing of ESC installations, with ESC installation schedules referenced to the progress schedule required.
  - 2. Manufacturer's data and detailed plans for the products required.
  - 3. Plans for diverting, collecting, pumping, and piping surface stormwater runoff, process water, and seepage from source to the treatment and discharge and disposal facilities. The ESC Plan shall include the provisions for operating and maintaining the system during periods of inactivity. The plan shall include:
    - a. Layout and details of the system.
    - b. Flow calculations for stormwater, seepage, and dewatering pump discharge. Sketch of location and sizing calculations for dewatering systems.
    - c. Information on pumps, including flow and head, power (gas, diesel, electric), and placement.

4. Plans for all work not indicated on the Drawings, including:
  - a. Additional earthwork proposed by Contractor.
  - b. Temporary access or haul roads.
  - c. Contractor-provided waste disposal areas.
  - d. Staging, Contractor's field office, and parking sites.
  - e. Storage of pipe and other materials.
  - f. Stockpile and material processing areas.
  - g. Optional Construction Areas (areas indicated in the Drawings) that Contractor elects to use.
5. Plans and schedules for operating, inspecting, and maintaining ESC facilities and equipment.
6. The name and 24-hour-a-day phone number, plus alternate contacts, for responsible Contractor ESC supervisor (CESCL).
7. Plans for site restoration of the following areas:
  - a. Work areas.
  - b. Office and parking areas.
  - c. Waste areas.
  - d. Temporary access roads.
8. CESCL: A designated individual employed by the contractor, who will have primary responsibility for the installation and maintenance of the ESC facilities. This person will be responsible for reporting and all responsibilities required by the NPDES Construction Stormwater General Permit.
9. A description of training that will be provided to all construction personnel to establish the importance of and the mechanics of the ESC measures on the project, including the individual expectations for following the ESC Plan.
10. A plan for the locations and outlets of dewatering systems.

## **1.6 OPERATION AND MAINTENANCE OF ESC FACILITIES**

### **A. Requirements:**

1. Be responsible for the operation and maintenance of all ESC facilities, equipment, and treatment.
2. Assign a single point of contact (CESCL) who can be contacted on a 24-hour-a-day, 7-day-a-week basis. This person shall have the authority to implement maintenance of ESC facilities. In the event that this person is unavailable, provide backup individual(s).
3. Respond with adequate personnel, equipment, and material immediately when notified of an emergency situation.

### **B. Noncompliance:**

1. After notification by the District, in writing, of noncompliance with the requirements of this Section, the District may have the work required to restore compliance performed immediately by District's forces or by such other means as the District may deem necessary.
2. For the purpose of this Section, "compliance" shall be agreed to include all items of work indicated in the Drawings, Specifications, and the ESC Plan that receives a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300, to meet the requirements.
3. Direct and indirect costs incurred by the District attributable to correcting noncompliance shall be paid by the Contractor.
  - a. Payment will be deducted from monies due, or to become due, the Contractor.
  - b. Such direct and indirect cost shall include, but not be limited to, compensation for additional professional services required, all fines or penalties levied against the District for damages relating to this Section, corrections, repair, and replacement of damaged work, and compensation for District overhead cost.
4. The rights exercised under the provisions of this Section shall not diminish the District's ability to pursue any other avenue for additional remedy of damages with respect to the Contractor's failure to perform the work as required.

## 1.7 ESC PRE-CONSTRUCTION MEETING

- A. Prior to commencing work, an ESC Pre-Construction Meeting shall be held between representatives of the Contractor (including the CESCL), the District, and the Engineer to review specific soil erosion and sediment control requirements to be employed during the Contract.

## PART 2 - PRODUCTS

### 2.1 SILT FENCE

- A. Filter Fabric Material Type 1: Woven polypropylene, monofilament yarn. The fabric shall be inert to biological degradation and shall be resistant to alkalies and acids found in soils. The base plastic shall contain stabilizers and inhibitors to make the fabric resistant to ultraviolet radiation. Filter Fabric Material Type 1 shall also meet the following physical properties:

DESCRIPTION	TEST	RESULT
Minimum thickness	ASTM D1777	13 mils
Minimum weight	ASTM D3776	6.5 oz/sy
Grab tensile strength	ASTM D4632	415 lbs x 250 lbs
Mullen burst strength	ASTM D3786	510 psi
Equivalent opening size	ASTM D4751	70-100 U.S. Std Sieve
Permeability (cm/sec)	ASTM D4991	0.015
Permittivity (1/sec)	ASTM D4991	0.2
Water Flow Rate (gpm/sf)	ASTM D4991	20

1. Filter Fabric Material Type 1 shall be Mirafi 700X Synthetic Industries Erosion 1, or Approved Equal.
- B. Posts shall be either 2-inch by 4-inch standard grade lumber or steel fence posts.
- C. Wire Fabric for silt fence:
  1. 2-inch x 4-inch mesh, 14 gauge, or Approved Equal.
  2. Hot-dip galvanized, ASTM A392, Class 2.
  3. Height: As indicated in the Drawings.
- D. Washed gravel for backfilling silt fence trench shall have a minimum diameter of 3/4 inch and a maximum diameter of 1-1/2 inches.

### 2.2 MULCHING

- A. Straw shall be used as the mulching material. The straw shall conform to the requirements in the 2019 DOE Stormwater Management Manual for Western Washington.

### 2.3 PLASTIC COVERING

- A. Plastic covering shall meet the requirements of the ASTM D4397 and have a minimum thickness of 6 mils.

### 2.4 COMPOST SOCK

- A. Compost sock shall be in accordance with 2020 WSDOT Standard Specifications 9-14.6(6).

### 2.5 ROCK CHECK DAMS

- A. Material for rock check dams shall be 4-inch minus rock spalls.  
B. Triangular silt dikes may be used if acceptable to the District.

## 2.6 RIPRAP PROTECTION

- A. Riprap material used as energy dissipating rock for the outlets of the stormwater diversion pipes shall be quarry spalls conforming to 2020 WSDOT Standard Specifications Section 9-13 and meeting the following requirements for grading:

SIEVE SIZE	PERCENT PASSING
8-inch	100
6-inch	40 - 60
2-inch	0 - 10

## 2.7 EROSION CONTROL MATTING

- A. Per Section 02935.

## 2.8 CONSTRUCTION ENTRANCE

- A. Quarry spalls shall meet the requirements of 2020 WSDOT Standard Specifications Section 9-13.1(5).

# PART 3 - EXECUTION

## 3.1 GENERAL REQUIREMENTS

- A. Provide ESC Plan for areas outside designated work area limits (construction limits) and areas inside designated work area limits. Areas outside designated work area limits include, but are not limited to, staging areas, parking areas, truck washing areas, waste storage, storage areas, disposal areas, and Optional Construction Areas that the Contractor elects to use.
- B. ESC measures in addition to those indicated in the Drawings may be required to meet discharge water quality and quantity criteria, depending on the Contractor's work methods, equipment, and operations.
- C. Take all necessary measures to control the quantity and quality of stormwater pollution through the use of sediment traps, silt fences, mulching, covering stored piles of soil, and other erosion control devices or methods.
- D. Comply with requirements of the SWPPP per Section 01560 and NPDES Construction Stormwater General Permit per Section 01060.

## 3.2 ESC DESIGN

- A. Where such measures are necessary, they shall be designed in accordance with the 2019 DOE Stormwater Management Manual for Western Washington and all other relevant regulations and design standards, and shall be stamped by a Professional Engineer licensed in the State of Washington.

## 3.3 FIELD WORK

- A. Perform no ground-disturbing activities on the Project, unless specifically authorized in writing by the District, until the ESC Plan has received a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300 and necessary ESC measures are completely in place and functional.
- B. Provide back-up equipment readily available in case emergency situations arise. This includes pumps, hoses, backhoes, generators, etc. as defined in the ESC Plan.
- C. Provide a stockpile of extra ESC materials such as silt fence, gravel, and crushed rock located on the Site for emergency situations.
- D. Clean water may be discharged into existing waterways per Sections 01060 and 02950. Perform turbidity testing as required to meet permit conditions.
- E. All construction procedures shall conform to the ESC plans and the requirements of the respective local authorities having jurisdiction within Project area.

- F. All excavated materials shall be stockpiled at the Contractor staging area or at a site designated by the Contractor and acceptable to the District.
- G. Any stockpiled material that is left unworked for more than 2 days during the Wet Season or 7 days during the Dry Season shall be immediately stabilized with the approved ESC methods (e.g., seeding, mulching, plastic covering, etc.). In addition, any stockpiled material near sensitive areas left unworked for 12 hours during the Dry Season shall be protected with plastic covering.
- H. Stockpiled material shall be covered during rain storms.
- I. Where spoil is placed on the downhill side of the trench, it shall be backsloped to drain toward the trench.
- J. Do not side cast, push, sluice or cause foreign, waste, or excavated material to enter surface waters. Materials shall be carefully excavated and moved to an approved spoil or waste area. Provide and maintain ESC measures.
- K. Sediment shall be trapped onsite using silt fences, sedimentation ponds, sediment traps, and other appropriate ESC methods.
- L. All ESC measures and facilities shall be maintained in proper condition so that they will individually and collectively perform the functions for which they were provided. In order to ensure the efficiency and proper maintenance of the measures and facilities, inspections shall be made daily by a CESCL to detect any impairment of the structural stability, adequate capacity or other requisites of the measures and facilities which might impair their effectiveness. Take immediate steps to correct any such impairment found to exist.
- M. All ESC devices shall be removed immediately after the disturbed areas are brought to their final, completed condition, unless directed otherwise by the District.
- N. Runoff, stormwater, and wastewater flows shall be controlled and treated during construction to minimize water quality impacts. Runoff from undisturbed areas shall be diverted from areas of construction activity by utilizing existing road drainage ditches as much as possible. Where this is not possible, diversion dikes and swales shall be constructed so runoff from undisturbed areas will not be contaminated by construction activities.
- O. Construction and grading materials shall not be stored within 50 feet of the Ordinary High Water level of streams, dry or flowing; and shall not be deposited or stored in or alongside wetlands, wetland buffers, streams, rivers, lakes, or watercourses where the materials can be eroded by high water or storm runoff.

### **3.4 TREATMENT**

- A. See Sections 01060 and 02140.
- B. Water from runoff, dewatering, and process wastewater shall be treated and disposed by dispersing it across vegetated (grassy) areas. Water with pollutants will require other disposal methods in accordance with local, state, and federal laws.
- C. Stormwater runoff from disturbed areas within the limits of construction and from Contractor staging and laydown areas shall be collected and treated before releasing. The extent of ESC measures required will depend on the extent of the Contractor's earthwork and ground cover disturbance and resulting erosion potential. Be responsible for meeting specified water quality criteria for all stormwater runoff discharge from construction areas.
- D. Comply with the water quality and quantity criteria stated in the permits if sediment-laden flow from the disturbed area enters any streams.

### **3.5 SILT FENCE**

- A. The silt fabric shall be one piece or continuously sewn to make one piece for the full height of the fence. Care shall be taken not to puncture the fabric during installation. Any damaged area shall be repaired or replaced. All joints shall have a 1.5-foot minimum overlap and shall be made in a manner that will not allow soil materials to pass through the joint. Minimize disturbance of native soils and vegetation when installing silt fences. Side casting soils on the downhill side will not be allowed.

- B. The posts shall be spaced no further apart than 6 feet. Closer spacing may be required if the fabric begins to sag and allow leakage over the top.
- C. Wire Fabric:
  1. Install wire fabric for attachment of filter fabric for sediment fence.
  2. Secure wire fabric to posts with aluminum alloy wire, minimum 10 gage. Secure at top, middle, and bottom.
  3. Bury 4-inch minimum of wire fabric and filter fabric in trench and adjacent to the post for the full length.
  4. Wire fabric to extend not more than 24 inches above the ground surface unless otherwise indicated.

**3.6 MULCHING AND PLASTIC COVERING**

- A. Do not clear any areas until construction is ready to begin. Disturb only the minimum area necessary to accomplish the work. If seasonal cover and erosion control practices have already been placed, plastic covering is required during the Wet Season until plant growth is firmly established.
- B. Protect all disturbed areas, including cleared, cut, fill, or other areas of reduced plant cover or exposed soil from erosion until permanent erosion control measures are established. Protection shall include plastic covering, organic or inorganic erosion control matting, riprap, temporary seeding, or straw mulch.
  1. Temporary seeding shall be done in accordance with the provisions of Section 02935.
  2. Erosion control matting shall be applied according to the manufacturer's instructions.
  3. Temporary erosion control measures shall be removed prior to installing permanent seeding erosion control only if the temporary facilities interfere with proper installation of permanent seeding (e.g., plastic on slopes to be seeded).
- C. All work areas that are disturbed shall receive temporary or permanent cover measures. The table and text below lists required cover measures by slope and season.

SEASON	SLOPE 3:1 OR FLATTER
Temporary, May 1 to September 30 (Dry Season)	3,000 lb/acre straw mulch if unworked for more than 7 days. Temporary hydroseed mix if future earthwork delayed more than 30 days.
Temporary, October 1 to April 30 (Wet Season)	Plastic on all slopes and stockpiles, with more than 10 feet of vertical relief, if unworked for more than 2 days. Permanent measures (except hydroseeding, which must be performed in the next growing season) if unworked for more than 15 days.
Permanent Measures (After Construction)	Hydroseed. Erosion control matting required at critical steeper areas as indicated in the Drawings.

1. Slopes steeper than 3:1 and with more than 10 feet of vertical relief require erosion control matting, in addition to the measures in the above table.
- D. Temporary stockpile slopes shall not exceed 2:1. Stockpiles shall be covered with plastic covering.
  - E. Plastic covering shall be installed and maintained tightly in place by using sandbags or tires on ropes with a maximum 10-foot grid spacing in all directions. All seams shall be overlapped 12 inches and taped or weighted down for the full length. Plastic covering sheets shall be toed in a minimum of 2 feet at the top of slopes in order to prevent surface water flow beneath the sheets.
  - F. Areas requiring mulching will be determined by the District based on weather and site conditions. Mulching techniques and rates shall conform to the 2019 DOE Stormwater Management Manual for Western Washington.

**3.7 COMPOST SOCKS**

- A. Per the Drawings.

### **3.8 ROCK CHECK DAMS**

- A. Construct rock check dams in ditches where indicated and in locations where excessive flow velocity may cause erosion.
- B. Rock check dams shall be placed by hand or mechanical placement and shall cover the entire section of the ditch. Placing the rock by end dumping is not permissible. The top of the dam shall be lower than the existing ground surface adjacent to the ditch.
- C. Spacing shall be such that the crest of a dam is the same elevation as the toe of the upstream dam.
- D. Remove temporary rock check dams after site has stabilized.

### **3.9 EROSION CONTROL MATTING**

- A. Per Section 02935.

### **3.10 TEMPORARY CULVERTS**

- A. Construct temporary culverts in accordance with 2020 WSDOT Standard Specifications Section 7-02.
- B. See Section 02950.

### **3.11 CONSTRUCTION ENTRANCE**

- A. This work shall consist of constructing access points to public roads in order to minimize the tracking of material onto the roadway. Open graded rock shall be used to construct the construction entrance.
- B. Place and maintain the open graded rock as indicated in the Drawings or as designated in the ESC Plan that receives a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300.

### **3.12 FLOW ROUTING**

- A. To the extent practical, install silt fences and construct swales, berms, and ditches as required to route surface water from offsite around the areas disturbed by construction. In locations where the offsite flow must cross the disturbed areas, install temporary culvert pipes as required to convey the water across the disturbed areas.

### **3.13 OTHER EROSION CONTROL MEASURES**

- A. Construction of other erosion control measures, in addition to those detailed in these Specifications, shall be in accordance with the 2019 DOE Stormwater Management Manual for Western Washington and the SWPPP.

### **3.14 MAINTENANCE DURING CONSTRUCTION**

- A. CESCL shall inspect all erosion control facilities daily, or more frequently if necessary, to ensure that they are in good condition and operating properly. Repair or replace damaged or missing items immediately.
- B. Clean, repair, and replace silt fences, stormwater diversion pipe sections, check dams, and rip rap pads as necessary to maintain their effectiveness and proper operation.
- C. Maintain seeded surfaces throughout construction including watering and mowing.
- D. CESCL shall maintain a daily inspection report file.
- E. Perform turbidity testing as required to meet permit conditions.
- F. Remove and properly dispose of trapped sediment, debris, trash, and all other material from measures designed to retain sediment.
- G. After excavation and grading, construct slope protection where required and as designated in the ESC Plan that receives a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300.

- H. Construct and replace existing storm drains and inlets as soon as possible.
- I. Provide necessary ditches, swales and dikes to direct silt laden water towards treatment and discharge and disposal areas.
- J. Excavate sediment out of basins, catch basins, check dams, and traps when capacity has been reduced by 50 percent or when more than 1 foot of sediment has accumulated.
  - 1. Remove sediment from behind sediment fence to prevent overtopping.
  - 2. Prevent sediments from being flushed to the downstream system during cleaning.
  - 3. Check dams shall be replaced before the pore spaces are filled with sediment.

### **3.15 HEAVY RAIN EVENTS**

- A. During periods of heavy rain events, as determined by the District, construction work on the pipeline shall be discontinued. The Contractor's equipment and personnel shall be available to construct and maintain the erosion control facilities.

### **3.16 SITE RESTORATION**

- A. As soon as practical after completion of a portion of the work, or when a work or waste area is no longer required, commence site restoration and install permanent erosion control measures. Temporary ESC methods shall be kept in effect until the permanent erosion control is established, and the District approves removal of designated temporary facilities.
- B. Disturbed areas shall be properly cleared of ESC measures, temporary structures, debris, and waste materials upon completion of the Project.
- C. Designated temporary water diversion and treatment areas or devices shall be removed and the areas restored to a permanent condition and drainage configuration after completion of Work.
- D. Work areas, staging, laydown, office and other disturbed areas shall be returned to their original condition.

**END OF SECTION**

## SECTION 02350

### HORIZONTAL DIRECTIONAL DRILLING

#### PART 1 - GENERAL REQUIREMENTS

##### 1.1 SUMMARY

- A. This work includes all labor, materials, and equipment necessary to complete horizontal directional drilling (HDD) installation of a 36-inch waterline and 4-inch conduit as shown on the Drawings.

##### 1.2 RELATED SECTIONS & REFERENCES

- A. Related Sections include but are not necessarily limited to:
  - 1. Division 01 – General Requirements
  - 2. Section 02140 - Dewatering, Site Water Discharge, and Decommissioning
  - 3. Section 02150 – 2.3 “External Grout” & 2.5 “Annular Space Grout”
  - 4. Section 02200 – Earthwork
  - 5. Section 02643 – Waterline Testing and Disinfection
  - 6. Section 15061 – Steel Pipe Lined and Coated (AWWA C900 Modified)
  - 7. Reference Documents:
    - 1) Geotechnical Data Report, Shannon and Wilson, Dated June 25, 2020.
    - 2) Geotechnical Data Report, GeoEngineers, August 12, 2020.
    - 3) Environmental Soil Sampling Report, GeoTest, August 2019
    - 4) Permits – Included in the bid documents Appendices
- B. This Section incorporates by reference the latest revisions of the embedded standards referenced herein. In case of conflict between the requirements of this Section and those of a published document, the requirements of this Section will prevail.

##### 1.3 SUBMITTALS

- A. Submit in accordance with the requirements of Section 01300 - Submittals, submit the following. Make all associated submittals at the same time.
- B. Qualifications.
  - 1. Provide qualifications to demonstrate compliance with the requirements of 1.4B of this section. Include the project name, location, date of construction, governmental agency/Owner, and the name, address, and phone number of the governmental agency/Owner’s representative with knowledge of the project details. Provide the type and size of pipe installed, length of bore, and soil conditions
  - 2. If key personnel on the project site are replaced during construction, the Contractor shall submit qualifications for the replacement personnel in accordance with the specifications. The Owner may reject any personnel who do not meet the qualification requirements herein.
- C. HDD Work Plan and Methods Statement.
- D. Equipment
- E. Schedule.
- F. Daily Reports. Submit all
- G. Field Quality Control Records.
- H. Pilot Bore Survey Report. Submit data in a format which can be opened and manipulated in a .XLSX file (MS excel).

## 1.4 QUALITY ASSURANCE

- A. Quality assurance testing and record keeping as specified in this Section.
- B. Qualifications:
  - 1. Drilling operator:
    - 1) Minimum of three [3] projects completed during the last 5 years operating drilling rigs of the size and capacity proposed on the project.
    - 2) Minimum of three [3] HDD installations completed during the last 5 years with outer pipe diameter 24 inches or greater. Two of the four HDD installations must include single installation length of 1200 feet or greater.
    - 3) Minimum of two [2] HDD installations completed during the last 5 years with outer pipe diameter 32 inches or greater.
  - 2. Steering Technician:
    - 1) Minimum of two [2] years of experience operating locating systems for HDD installations with the equipment proposed for use on this project.
    - 2) Minimum of five HDD installations completed in the past 5 years serving as steering technician for installation lengths of 1200 feet or greater.
  - 3. Mud Technician:
    - 1) Minimum three [3] HDD installations completed in the last 5 years operating soil separation plants for HDD rigs that are of the size and capacity proposed on the project.

## 1.5 DEFINITIONS

- A. Abandoned Bore: A borehole that is partially constructed up to any phase of the HDD installation without successful completion of product pipe pullback. Instances of retraction and re-drilling of sections of the pilot bore is not considered an abandoned bore.
- B. Barrel Reamer: A reamer that establishes a smooth bore wall by compacting soils in the borehole. A barrel reamer is cylindrical and does not allow drilling fluid or cuttings to pass through the middle. A barrel reamer used for a swab pass is larger than the outer diameter of the product pipe but smaller than the final reamed bore diameter.
- C. Compound Radius: Equivalent curve radius achieved when constructed borehole contains both a horizontal curve and a vertical curve in the same section of the borehole. The compound radius of a borehole is always less than the radii of the contributing horizontal and vertical curves.
- D. Drilling Fluid/Mud/Slurry: A mixture of water, bentonite, polymers, and other additives continuously pumped to the drilling tool, bit, or DHA to facilitate the removal of cuttings, stabilization of the bore, and cooling of the drill bit.
- E. Drilling Tool/Bit/Downhole Assembly (DHA): A tool or system of tools that excavate the bore.
- F. Electronic Data Recording (EDR): A data collection system on an HDD rig that records drilling parameters such as thrust pressure, torque, measured distance, rpm, weight on bit, bit location, clamp position, pump pressure, pump outlet, and down-hole pressure.
- G. Horizontal Directional Drilling (HDD): A guided, steerable drilling system used for the trenchless installation of product pipe where:
  - 1. A pilot bore path is excavated in an arc from a surface-launched drill rig. Excavation takes place with fluid assisted cutting from a Drilling Tool that is connected to a drill string that is pushed forward by the drilling rig.
  - 2. Pilot bore is directed by the positioning of a bent sub. Drilling fluid is pumped through the drill string to fill the bore for stabilization.
  - 3. Bore path is enlarged with subsequent reaming passes until the desired diameter is achieved, and with diameter as further defined in 3.02 F of this Section.
  - 4. A swab pass is achieved using a Barrel Reamer to compact the sides of the bore prior to pullback.
  - 5. As a final step, the product pipe is pulled into the fluid-stabilized bore.

- H. Inadvertent Returns: Drilling Fluid that emerges at the ground surface or in any other locations other than the entry or exit location of the design bore profile.
- I. OHWM: Ordinary High-Water Mark.
- J. Pilot Bore: The first guided pass of the HDD process which is then reamed to the size required to allow pullback of the product pipe. The pilot bore establishes the location of the bore as steering corrections can only be made during the construction of the pilot bore.
- K. Product Pipe: pipeline, cable, or conduit installed by HDD.
- L. Pullback: Part of the HDD process in which the drill string and product pipe are pulled through the fully prepared bore from one end to the other.
- M. Pullback Loads: The tensile load (force) applied to a drill string and product pipe during the pullback process.
- N. Swab Pass: The process of pulling a barrel reamer from one end of the borehole to the other end to ensure the borehole is open prior to pullback. A swab pass is conducted after all reaming activities are complete. Any reaming that is done to enlarge a borehole is not considered a swab pass. Pull back of the final reaming tool is not considered a swab pass.
- O. Tail String: Drill pipe attached to the reaming assembly that follows the reamer in the direction of reaming. Tail string connects the reamer to the entry and exit locations with the drill pipe at all times.

## **1.6 DESIGN CRITERIA**

- A. The bore will be constructed to meet the following design criteria:
- B. The product pipe will be installed in a manner which does not impose stresses above the allowable pipe stress with a safety factor of 2.
- C. Entire final pipe alignment as installed to be within the easement and rights-of-way indicated in the Drawings and the tolerances specified in this Section.
- D. Maintain a minimum of 15-feet of horizontal clearance between the outside dimensions of the 36-inch waterline and the 4-inch conduit

## **1.7 TOLERANCES**

- A. Tolerances apply for all phases of drilling and pipe pullback.
- B. Horizontal Tolerance: maximum deviation of 5 feet from centerline of the design alignment.
- C. Vertical Tolerance: maximum deviation of 5 feet from centerline of the design alignment.

## **1.8 EQUIPMENT**

- A. Provide all equipment for the installation of pipelines by HDD as shown on the Drawings. Submit specifications and information for major equipment as specified at 1.09L of this Section.
- B. Drilling equipment will be capable of advancing through the Site Conditions and the drill head must be steerable and provide necessary cutting surface and drilling fluid jets. The drill rig for pullback will have a minimum pullback capacity equal to the Contractor-estimated pull loads with a minimum safety factor of 2.0. The torque capacity of the drilling equipment shall be capable of advancing through the site conditions.
- C. Mud pumps will be adequately sized to supply the required flow rate and pressure at the anticipated rate of drilling for the anticipated Drilling Fluid viscosity.
- D. The HDD DHA shall have down-hole pressure sensing equipment located within 10-feet of the drill bit that is capable of measuring and recording drilling fluid pressure in the annulus of the borehole. The down-hole pressure sensor will be required for the installation of the 36-inch waterline and the 4-inch conduit.

1. Measurements shall be transmitted to the operation control console for real-time viewing by the drill rig operator and the Project Representative.
  2. Data from the pressure sensor shall be stored in a data logging system and submitted to the owner as an electronic data file along with the Daily Report.
- E. Drilling system shall include a fluid pump and separation plant with shaker screens, hydro-cyclones, and centrifuges for efficient mud cleaning at the anticipated drilling rates. The separation system or reclamation unit shall discharge soil into fully contained boxes or skips. Stockpiling of excavated drilling slurry is prohibited.
- F. Spill cleanup materials including visqueen, hay bales, straw wattles, silt fence, or equivalent will be on site to promptly contain instances of drilling fluid release
- G. A vacuum truck will be on site prior to the start of and during all drilling activities in compliance with Project Permits to ensure prompt containment of all drilling fluid spills.
- H. Tracking Equipment:
1. A magnetic tracking system (Tru-Tracker or equal) or gyroscope tracking must be used for the Pilot Bore.
  2. Use a guidance system capable of operating accurately and precisely within the specified tolerances for the specific site conditions.
  3. Guidance system must be calibrated per the manufacturer's recommendations prior to commencing pilot bore operations.
  4. Provide a tracking system that provides immediate information on the tool face, azimuth (horizontal direction), and inclination (vertical direction). The tracking equipment shall provide continuous electronic data monitoring and recording capabilities (EDR). Information shall include carriage position, thrust/pullback force, drilling mud pump volume, downhole pressure, weight on bit, rotary torque, and spindle RPM. The tracking equipment shall be capable of plotting the bore location and graphing drilling parameters.
- I. Include all other equipment as necessary to complete the HDD installation.
- J. Contingency plan equipment required onsite prior to the beginning of any drilling activities shall include a pneumatic hammer for pipe retrieval if needed along with pilot bit capable of drilling rock if encountered.
- K. Any equipment used inside the OHWM must be free of external petroleum-based products. Equipment must be checked daily for leaks. Any leaks must be repaired prior to continued construction activities per Project Permits.

## **1.9 HDD WORK PLAN AND METHODS STATEMENT**

- A. Detailed description of methods, equipment, and materials to be used during HDD operations.
- B. Describe the number of reaming passes to be used, and the tooling and tooling diameter to be used for each ream pass.
- C. Scaled plan showing the following: the work zone equipment configuration at each end of the bore; staging and storage areas; and the location of slurry, cuttings, drilling fluid handling areas, and materials storage locations.
- D. Equipment list including make and model and specifications of all major equipment to be used on this project such as the HDD drill rig and drilling mud handling equipment. If different drill rigs will be used to install the waterline and conduit, provide details on both drill rigs. At a minimum include the following.
  1. Include HDD rig pullback and torque capacity.
  2. Include HDD rig general dimensions.
  3. Provide descriptions, drawings, and photographs of drilling and reaming tooling.
  4. Provide a conversion table to convert thrust/pull and torque pressure gauge readings on the HDD drill rig to thrust/pull force [lbs] and torque [ft-lbs].

5. Provide manufacturer's specifications on the tracking system tolerance and manufacturer's recommended calibration procedure.
  6. Provide annular pressure measurement tool specifications including the manufacturer, size, position on the DHA, and sensor accuracy and precision.
  7. If equipment is used to place the tracking system within the boundaries of the OHWM, provide details on construction mats that will be used and their layout in the wetland for allowing the use of heavy equipment in accordance with Project Permits.
- E. Example template of the daily report and driller's log.
- F. Describe how the drill rig will be anchored to resist thrust and pullback forces.
- G. Describe mud containment measures: Include methods and materials to be incorporated into the work to ensure that the drilling fluids are contained in the hole and no fluids escape into surface waters or wetlands.
- H. Describe how the annular pressure data collected during the pilot bore will be used to reduce the risk of inadvertent returns.
- I. Describe plan for pipe assembly, staging, and testing:
1. Identify the selected area for pipe assembly and time to assemble the pipeline.
  2. Include layout drawings showing pipe assembly area.
  3. Access diagrams detailing pipe delivery and off-loading.
- J. Pullback Plan
1. Describe pullback procedures and site arrangement plan during pullback. Include a layout drawing showing pipe staging area when the product pipe is laid out for pullback.
  2. Provide a detailed pick plan showing the number and locations of equipment to be used to move the pipe during pullback. Include maximum spacing between cranes to safely handle the pipe with a safety factor of 2.0 on allowable bending stresses.
  3. Describe measures taken to protect utility poles during pullback.
  4. Provide estimates of staging time, length of road closures, and measures taken to prevent damage to surrounding private parcels.
  5. Include layouts of rollers, equipment, and cribbing related to the pipe.
  6. Include lifting capacities of cranes or other equipment planned for use lofting pipe.
  7. Indicate how the product pipe will be filled with water during pullback to control buoyancy and provide ballasting.
  8. Describe how the excess drilling mud displaced from the reamed hole will be handled and removed off site to a legal disposal site during the pullback.
  9. Provide pipe stress Calculations as further described at 1.09K of this Section.
- K. Provide information on the Tracking Equipment and Procedures Used
1. Describe the tracking and locating systems which satisfy the requirements of 1.08 of this Section.
  2. If a surface coil will be used, describe the placement of the coil. Provide a detailed description of how locating will be performed within the limits of the OHWM.
  3. Confirm these systems can achieve the required line and grade within the tolerance specified.
  4. Include records of equipment calibrations and certifications for the guidance tool.
- L. Provide a Drilling Fluid Management Plan:
1. Include a detailed description of the types of drilling fluids, mixing and recycling methods and equipment. Include specific products including viscosifier, polymers, and additives to be used with current MSD sheets.
  2. Provide estimated drilling fluid volumes required for each stage of drilling.
  3. Provide required annular pressure estimates as further described at 1.09K of this Section.

- M. Pipeline alignment and profile with supporting Calculations prepared, stamped, dated, and signed by a Professional Engineer licensed in the State of Washington for both the waterline and conduit installations.
  - 1. Pullback loads for conditions and operating practices anticipated.
  - 2. Pipe stresses expected to result from loads during pullback including pipe bending, tension, earth, and groundwater loads
  - 3. Calculations identifying the critical downhole pressure causing hydrofracture or inadvertent drilling fluid returns.
  - 4. Estimate of drilling fluid pressures required to create the bore.
  - 5. Breakover evaluation to determine the minimum/maximum lofting height and required loft configuration to avoid over stressing the product pipe.
- N. Contingency Plan: Provide an outline of the corrective procedures to be used in the following potential situations including operational parameters to be measured and recorded to determine if the situation is occurring or has just occurred. Potential problems to be addressed by the submitted work plan include:
  - 1. Inadvertent return within the wetland boundary. Follow all project permit requirements.
  - 2. Loss of drilling fluids into the formation without inadvertent fluid returns.
  - 3. Pullback loads in excess of 90% of the manufacturer's recommended maximum allowable pipe pull load.
  - 4. No drilling fluid returns during advancement of pilot bore and reaming operations.
- O. Pipe recovery. If any pneumatic hammering or ramming devices are used to advance or extract the pipe, it shall be used solely as a recovery effort to advance the pipe in the instance the pipe becomes stuck and if all other means of recovery have been exhausted. The pneumatic hammering or ramming device shall be included in the recovery plan and shall be onsite prior to pullback beginning
- P. Provide a waste disposal plan:
  - 1. Meet all requirements of Section 01060-Permits and Regulatory Requirements and Project Permits as included in the bid document Appendices.
  - 2. Identify the waste disposal site for removed drilling fluid and provide documentation that the site will accept the materials.
  - 3. Describe the method of disposal for all waste materials resulting from the pipeline construction such as Drilling Fluids, cuttings, waste oil, and fuel.
- Q. Water use and disposal plan.
  - 1. Meet all the requirements of Section 01060-Permits and Regulatory Requirements and Project Permits as included in the bid document Appendices.
- R. Describe method of water disposal. Dumping of water into surface waterways must be in compliance with Project Permits. Describe plan to complete annular space grouting between the bore wall and the product pipe within 50 feet of the east and west ends of the bore following the completion of product pipe pullback.

#### **1.10 NOTIFICATION**

- A. Provide notification of the intent to begin full butt penetration welding of 36-inch steel waterline and 4-inch conduit product pipe [48] hours prior to start of welding.
- B. Provide notification of the intent to start drilling pilot bore [48] hours prior to the start of drilling operations.
- C. Provide notification to the Owner immediately if the pilot bore moves to within 2-feet of the easement or ROW limits or outside the specified tolerances.
- D. Provide notification of the intent to start the pipe pullback [48] hours prior to the start of pullback operations.

### HORIZONTAL DIRECTIONAL DRILLING

- E. Provide notification to the Washington Department of Fish and Wildlife a minimum of 3 business days before beginning drilling activities beneath Nookachamps Creek, in accordance with and included in Project Permits of the bid document Appendices.

### **1.11 SCHEDULE**

- A. Create and maintain a detailed construction schedule showing major construction activities and durations.
- B. At a minimum, the schedule will note work hour restrictions per Project Permits and include the following for each of the pipelines installed by HDD:
  - 1. Utility locate requests and work timelines
  - 2. Site preparation.
  - 3. Drilling rig mobilization and setup.
  - 4. Pilot bore drilling.
  - 5. Reaming.
  - 6. Swab Pass.
  - 7. Delivery, layout, assembly, and staging of the product pipe prior to pullback
  - 8. Pullback.
  - 9. Pre- and Post-installation waterline testing and disinfection

### **1.12 DAILY REPORTS**

- A. Complete in specified detail.
- B. Submit the information by noon of the day following the shift for which the records were taken.
- C. Operation records for the pilot bore and each subsequent reaming pass will include the following information:
  - 1. Start and finish time for each crew shift each day.
  - 2. Drilling Lengths.
  - 3. Configuration of drill head and reamers.
  - 4. Number of drill pipes and or length of product pipe installed.
  - 5. Instances of inadvertent drilling fluid returns or drilling fluid losses.
  - 6. Instances of retraction and re-drilling of pilot bore segments.
  - 7. Include relevant observations including hard drilling zones, steering problems, or circulation problems as applicable.
  - 8. Include the drilling fluid marsh funnel viscosity, mud weight, and percent sand content to be recorded 2 times per shift or whenever changes are made to the drilling fluid makeup.
  - 9. For each drill pipe section during pilot, reaming, and pullback provide the following:
    - 1) Start time and drilling time required.
    - 2) Thrust/pull.
    - 3) Rotational torque.
    - 4) Drill length/position along alignment.
  - 10. Pilot Tracking/Locating Survey Update: Provide an updated survey at the end of each day of drilling. Include:
    - 1) Station and length along alignment.
    - 2) Horizontal and Vertical deviation from the target alignment.
    - 3) Depth.
    - 4) Elevation.
    - 5) Inclination and Azimuth.
    - 6) 3-joint radius calculated for each drill pipe section

### **1.13 SITE CONDITIONS**

- A. Geological and hydro-geological conditions per Reference Documents:
  - 1. Geotechnical Data Report, Shannon and Wilson, June 2020
  - 2. Revised Geotechnical Data Report, GeoEngineers, August 2020

## **HORIZONTAL DIRECTIONAL DRILLING**

3. Environmental Soil Sampling Report, GeoTest, August 2019

**PART 2 - PRODUCTS**

**2.1 PRODUCT PIPE**

- A. 36-inch OD Steel Product Pipe: AWWA C200 Steel: Section 15061 – Steel Pipe Lined and Coated (AWWA C200 Modified)
- B. 4-inch HDPE Conduit
  - 1. HDPE SDR-9 (Dura Line or equivalent)
  - 2. 0.5-inch wall thickness
  - 3. Smooth wall
  - 4. Color: orange
  - 5. Preinstalled locatable tape

**2.2 ANNULAR SPACE GROUT**

- A. The bore shall be grouted between the pipe and the surrounding soil on both sides of the drill. Grouting is required to seal the annular space surrounding the pipeline for a length of 20 feet from the entry and exit location.
- B. Design grout in accordance with Section 02150, 2.3 External Grout.

**2.3 DRILLING FLUID**

- A. Designed for the Site Conditions and the proposed installation tooling.
- B. Select mixture proportions to ensure continuous circulation, bore stability, and completely fill the space between the bore and the drill pipe to control settlement.
- C. Water pH shall be suitable or made suitable for mixing as recommended by drilling fluid manufacturer.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Install the pipelines by means of horizontal directional drilling as shown on the Drawings. All HDD equipment and support equipment shall be in good working condition, in compliance with all laws and regulations, and of suitable capacity to perform the anticipated work. Owner or Engineer may inspect all proposed HDD equipment and support equipment for suitability to perform anticipated work. Engineer may require additional or alternative equipment if any inspection identifies that the Contractor's equipment is inadequate to perform the relevant work or does not comply with the submitted information.
- B. All HDD equipment will be staged outside the OHWM.
- C. HDD activities shall not disturb the Nookachamps Creek streambed. If the streambed collapses and flow from the creek enters the drilling or if drilling mud is released to the streambed, work activities shall cease, the Owner shall be immediately notified, and the Washington Fish and Wildlife habitat biologist shall be contacted in accordance with Appendix A: Project Permits.
- D. No sediment-laden water shall enter the Nookachamps Creek.
- E. All HDD operations will be conducted in accordance with the schedule constraints in Appendix A: Project Permits.
- F. The 36-inch waterline shall be installed prior to the installation of the 4-inch conduit.

- G. Installation will consist of the horizontal directional drilling of a pilot hole as shown on the project drawings. Once the pilot boring is in place, meets the specified tolerance requirements, and has been submitted for approval, ream and swab the hole and install the product pipe.
- H. No reaming will be initiated until the pilot bore survey is submitted and receives an acceptable disposition from the Owner.
- I. Provide all material, equipment, and facilities required for directional drilling. Alignment and elevation of the bore hole will be consistently maintained throughout the directional drilling operation.
- J. The Contractor shall be responsible for all work necessary for testing, withdrawing, and conveying water to the job site. There is an existing 2-inch flushing assembly at the SW corner of SR-9 which is on the East side of the HDD crossing. There will be no charge to the Contractor by the District for the water used from District owned sources. There currently are no available water sources on the West side of the HDD crossing. A bid item has been included for a “weld-o-let” outlet to be installed by contractor off of the existing 24-inch Concrete Cylinder Pipe Transmission Line. Contractor will be required to check out and use a PUD hydrant meter and procure and use an approved Reduced Pressure Backflow Assembly installed immediately after the hydrant meter. Report total water consumption as displayed via the hydrant meters to the District
- K. Per the parameters of the Contract, the Contractor shall be responsible for the means and methods of the HDD construction.
- L. No work will begin until the submitted HDD Work Plan and Method Statements have been approved.
- M. During HDD, provide the Owner unrestricted access and provide necessary assistance to review records, observations, measurements, data, and for sample collection.
- N. No ponding or stockpiling of drilling fluid is allowed on site. All drilling fluid will be contained within onsite tanks, approved drilling entry and exit pits, and the soil separation plant.
- O. Contractor shall provide lighting for any night work in accordance with Project Permits as included in the bid document Appendices.
- P. Contractor shall protect existing culvert on the West side of the HDD crossings when staging, welding, testing, and pulling back the pipeline.

**3.2 INSTALLATION REQUIREMENTS**

- A. Unattended bore pits will be either backfilled, covered by plating or enclosed by a security fence.
- B. Adhere to all applicable environmental regulations and permit requirements within the contract.
- C. Drill curves at the radius indicated on the Drawings. The drilled radius shall be calculated over a three joint (two drill pipe) segment using the following formula:

$$R_{drilled} = \frac{L_{drilled}}{A_{avg}} * 57.32$$

Where:  $R_{drilled}$  = drilled radius over  $L_{drilled}$ , (feet)  
 $L_{drilled}$  = length drilled, no greater than 100, (feet)  
 $A_{avg}$  = total change in angle over  $L_{drilled}$ , (degree)

- D. Within 24-hours of completion of the pilot bore, submit a complete set of pilot bore survey records to the Engineer. These records will include copies of the plan and profile drawing showing the actual and design location of the pilot bore, noting horizontal and vertical offsets.

**HORIZONTAL DIRECTIONAL DRILLING**

- E. Upon completion and acceptance of the pilot hole, the hole opening or enlarging phase of the installation will begin. The bore hole diameter will be increased to accommodate the pullback operation.
- F. The open borehole will be stabilized by means of bentonite drilling slurry pumped through the inside diameter of the drill rod and through openings in the reamer. The drilling slurry must be in a homogenous and flowable state serving as an agent to carry the loose cuttings to the entry or exit through the annulus of the borehole.
- G. Ream the borehole to a minimum diameter of outer diameter of the pipe plus 12 inches. Ream the borehole diameter to a greater size if required by the site conditions. The contractor is responsible for the final borehole size. The reaming must be completed with a minimum of one intermediate ream diameter up-size between the pilot bore phase and the final ream diameter. Single pass reaming directly from the pilot bore diameter to the final borehole diameter is not permitted.
- H. During all reaming passes, tail string must be installed behind the reamer to centralize the reaming assembly and allow recovery of down-hole tooling.
- I. Reaming passes must be completed for the full length of the bore. Partial reaming passes will not be permitted.
- J. Upon completion of reaming to the final bore diameter, a swab pass must be completed prior to pulling the product pipe into the prepared borehole. The daily reports which include drilling parameters from the swab pass shall be submitted to the Owner prior to pull-back operations.
- K. The product pipe must be ballasted to control buoyancy during product pipe pullback.

### **3.3 DRILLING FLUID MANAGEMENT**

- A. If borehole circulation is lost, drilling shall be stopped, and circulation regained by any number of methods, including retraction of drill string to a point where circulation is re-established and forward drilling to the bottom of the borehole.
- B. If borehole circulation is lost, the borehole shall be inspected by the contractor for any evidence of an inadvertent fluid return. If an inadvertent fluid return is identified, all drilling activities shall be stopped until the area impacted by the drilling fluid is completely contained.
- C. Notify the Owner immediately upon the discovery of an inadvertent fluid return. Report all inadvertent returns to the appropriate Agencies as per the Project Permits
- D. Any inadvertent fluid return location shall be allowed to heal prior to re-pressurizing. If inadvertent returns continue at the impacted location when drilling advances, the Owner shall be notified immediately, and the Contractor shall propose a plan for containment of the fluids and reasonable pumping strategy to allow completion of a drilling mud circuit
- E. Drilling fluid containment measures will be set up around the HDD drilling rig, entry pit, exit pit, and soil separation plants at the onset of drilling and will be maintained as required to ensure that all inadvertent fluid releases or overflows at these locations are contained. These measures are for secondary containment only. All drilling fluids contained within approved drilling pits, onsite tanks, or the soil separation plant.
- F. Manage drilling fluid per contractor submitted Drilling Fluid Management Plan.

### **3.4 BORE TRACKING**

- A. Obtain sufficient tracking information to maintain control of the bore to within the project tolerances specified at Paragraph 1.07 of this Section.
- B. At a minimum, readings must be recorded after advancement of each successive drill pipe. Additional readings may be necessary to achieve the line and grade tolerances listed herein. Access to all recorded readings and plan and profile information will be made available to the Owner upon request and in compliance of this section.

### **3.5 PIPE ASSEMBLY AND HANDLING**

- A. Join the pipe per the manufacturer's recommendations and Section 15061

### **3.6 ANNULUS GROUTING**

- A. Fill the annulus between the conductor casing or bore wall and the product pipe for a length of 50 feet from the entry and exit point with grout per Section 02150, 2.5 "Annular Space Grout".
- B. If a borehole is abandoned during any stage of the HDD installations per the definition at 1.5A, furnish and inject cementitious grout into the borehole to completely fill the abandoned borehole per 02150, 2.3 "External Grout".

### **3.7 RECORD KEEPING AND AS-BUILTS**

- 1. Maintain a daily project log of drilling operations and a guidance system log per the requirements of 1.12 of this Section.

### **3.8 FIELD QUALITY CONTROL**

- A. Disinfection and Testing
  - 1. Meet requirements of Section 15061 and Section 02643.
- B. Hydrostatic Pressure Test
  - 1. Prior to the initiation of the pullback and upon completion of the HDD operations, the pipeline will be pressure tested in accordance with Section 02643 Water Pipeline Testing and Disinfection.

### **3.9 DEMOBILIZATION**

- 1. Do not demobilize equipment from the job site until approved by the Engineer.

### **3.10 SITE CLEANUP AND RESTORATION**

- A. Backfill of Endpoint Excavations
  - 1. Backfill of excavations shall not commence until approved by the Engineer.
- B. Remediation of Ground Subsidence and Voids
  - 1. Check for voids along all attempted drill paths and the final HDD corridor that are outside the OHWM. Fill voids and compact subsoil along installed pipeline and along any abandoned drill path. Restore ground above HDD corridor to original contours and condition including furnishing and installing approved fill materials at no additional cost to Owner.
- C. Clean Up and Restoration
  - 1. Remove all equipment, materials, debris, temporary access roads/equipment pads, temporary markers, and other remnants of construction, including trash, and then perform final clean up to restore all work areas in accordance with Contract Documents. Restoration shall include temporary and permanent re-vegetation as applicable and/or as specified in the drawings and Contract Documents.

**SECTION 02423**  
**STORM DRAINAGE SYSTEM**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies storm drainage system pipes including culverts and storm drains.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Product technical data for pipe material and couplings used to connect to existing pipes/culverts, including acknowledgement that products submitted meet requirements of standards referenced.
  2. Certifications.
  3. Test reports.
- C. Proposed test method, scheduling, and duration for testing of culverts and storm drains.
- D. Testing Results.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Culverts:
1. Corrugated polyethylene pipe per 2020 WSDOT Standard Specifications Section 7-02.2 and AASHTO M294 Type S.
    - a. Pipe, Couplings, and Fittings shall meet the requirements of AASHTO M294.
    - b. Pipe dimensions per Drawings.
  2. Ductile iron pipe, Class 50, per 2020 WSDOT Standard Specifications Section 9-05.13.
    - a. Cement mortar lined and 1-mil seal coat per AWWA C104.
    - b. Joints shall be non-restrained joints. Non-restrained joints shall be rubber gasket type, push on type, and shall meet the requirements of AWWA C111.
    - c. Pipe dimensions per Drawings.
- B. Storm Drains:
1. Corrugated polyethylene pipe per 2020 WSDOT Standard Specifications Section 9-05.1(6). AASHTO M252 Type S.
    - a. Pipe, Couplings, and Fittings shall meet the requirements of AASHTO M252
    - b. Pipe dimensions per Drawings.
- C. Replacement of Existing Culverts or Storm Drains:
1. Existing 36-inch-diameter Concrete Culvert near Station 163+28 to be replaced:
    - a. Reinforced concrete culvert pipe per 2020 WSDOT Standard Specifications Section 9-05.3(2), ASTM C76, Class III.
    - b. Pipe dimensions to match existing.
    - c. Provide coupling to connect new culvert to existing.
  2. Existing 8-inch-diameter CPP near Station 296+15 to be replaced:
    - a. Solid Wall PVC Pipe per 2020 WSDOT Standard Specifications Section 9-05.12(1).
  3. Existing 12-inch-diameter Concrete Culvert near Station 349+60 to be replaced:
    - a. Reinforced concrete culvert pipe per 2020 WSDOT Standard Specifications Section 9-05.3(2), ASTM C76, Class III.
    - b. Pipe dimensions to match existing.
    - c. Provide coupling to connect new culvert to existing.

4. Existing 12-inch-diameter Concrete Culvert near Station 354+35 to be replaced.
  - a. Reinforced concrete culvert pipe per 2020 WSDOT Standard Specifications Section 9-05.3(2), ASTM C76, Class III.
  - b. Pipe dimensions to match existing.
  - c. Provide coupling to connect new culvert to existing.
5. Existing 18-inch-diameter Concrete Culvert near Station 357+00 to be replaced.
  - a. Reinforced concrete culvert pipe per 2020 WSDOT Standard Specifications Section 9-05.3(2), ASTM C76, Class III.
  - b. Pipe dimensions to match existing.
  - c. Provide coupling to connect new culvert to existing.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Construct per 2020 WSDOT Standard Specifications Sections 7-01.3 and 7-02.3.
- C. Per Drawings.

### **3.2 FIELD QUALITY CONTROL**

- A. Culvert and Storm Drain:
  1. General:
    - a. Submit complete information for review describing the proposed test method, scheduling, and duration.
    - b. Cleaning and testing shall comply with 2020 WSDOT Standard Specifications Section 7-04.3(1).
  2. Exfiltration Test/Infiltration Test:
    - a. Perform an exfiltration test on each reach of pipe per 2020 WSDOT Standard Specifications Section 7-04.3(1)B.
    - b. Whenever the ground water table is above the crown of the higher end of the pipe reach at time of testing, an infiltration test may be performed in lieu of the exfiltration test upon written permission of the District. Perform infiltration test per 2020 WSDOT Standard Specifications Section 7-04.3(1)C.
  3. Low Pressure Air Test:
    - a. Low pressure air testing may be allowed in lieu of exfiltration/infiltration testing with approval from the District.
    - b. Perform low pressure air test per 2020 WSDOT Standard Specifications Section 7-04.3(1)E or 7-04.3(1)F.
  4. Repair and retest any pipe that does not meet testing requirements.

**END OF SECTION**

**SECTION 02460**  
**SURFACE RESTORATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies surface restoration of crushed surfacing, asphalt concrete, and other surfaces.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Product Data:
  - 1. Submit product data as required by 2020 WSDOT Standard Specifications for materials in this Section.
- C. Field survey records to support pavement restoration work, including curb, gutter, pavement, cement concrete, and channelization: Submit per Section 02212.

**PART 2 - PRODUCTS**

**2.1 TOPSOIL**

- A. Per Section 02260.

**2.2 GRASSED AREAS**

- A. Per Section 02935.

**2.3 WETLAND AREAS**

- A. Planting per Section 02900.
- B. Seeding per Section 02935.

**2.4 LANDSCAPED AREAS (PLANTINGS)**

- A. Per Section 02900.

**2.5 STREAM BED AREAS**

- A. Per Section 02200.

**2.6 GRAVEL BORROW, CRUSHED SURFACING BASE COURSE, AND CRUSHED SURFACING TOP COURSE**

- A. Per Section 02200.

**2.7 ASPHALT CONCRETE**

- A. Per Section 02513.

**2.8 PAVEMENT MARKINGS**

- A. Per Section 02513.

**2.9 CEMENT CONCRETE**

- A. Per 2020 WSDOT Standard Specifications Section 5-05.2.

**2.10 CURBS AND GUTTERS**

- A. Per 2020 WSDOT Standard Specifications Sections 8-04 through 8-07.

## **2.11 SIDEWALKS AND DRIVEWAYS**

- A. Per 2020 WSDOT Standard Specifications Section 8-14.

## **2.12 FENCES**

- A. Per Section 02831.

## **2.13 LANDSCAPE GRAVITY BLOCK WALLS**

- A. Per Section 02832.

# **PART 3 - EXECUTION**

## **3.1 GENERAL**

- A. Drawings indicate the approximate minimum area of restoration. The actual limits of the restoration will be determined in the field by the District, City of Mount Vernon, and Skagit County inspectors based on open excavation limits and damage as a result of Contractor operations.

## **3.2 WORK REQUIRED PRIOR TO DEMOLITION**

- A. Survey areas of pavement, cement concrete, curb, gutter, and channelization restoration prior to demolition per Section 02212 to be used to match pre-construction conditions for restoration activities.
- B. Replacement paving shall match the lines and grades of the adjacent paving.
- C. Replacement concrete shall match the lines and grades of pre-construction conditions.
- D. Replacement channelization shall match channelization of pre-construction conditions.
- E. In areas where curb and gutter is to be removed, survey the top, flowline, and gutter line of curb grades in order to replace this section of curb and gutter to the pre-construction lines and grades.

## **3.3 SUBGRADE PREPARATION**

- A. The subgrade shall be prepared in accordance with Sections 02200 and 02221.
- B. For paved or gravel areas, the surface of the subgrade after compaction shall be hard, uniform, smooth and true to grade and cross section.
- C. Subgrade for pavement shall not vary more than 0.02-foot from the indicated grade and cross section.
- D. Subgrade for base material shall not vary more than 0.04-foot from the indicated grade and cross section.

## **3.4 TOPSOIL**

- A. Per Section 02260.

## **3.5 GRASSED AREAS**

- A. Per Section 02935.

## **3.6 WETLAND AREAS**

- A. Planting per Section 02900.
- B. Seeding per Section 02935.

## **3.7 LANDSCAPED AREAS (PLANTINGS)**

- A. Per Section 02900.

## **3.8 STREAM BED AREAS**

- A. Per Sections 02200 and 02221.

**3.9 GRAVEL BORROW, CRUSHED SURFACING BASE COURSE, AND CRUSHED SURFACING TOP COURSE**

A. Per Sections 02200 and 02221.

**3.10 ASPHALT CONCRETE**

A. Per Section 02513.

**3.11 PAVEMENT MARKINGS**

A. Per Section 02513.

**3.12 CEMENT CONCRETE**

A. Per 2020 WSDOT Standard Specifications Section 5-05.3.

**3.13 CURBS AND GUTTERS**

A. Per 2020 WSDOT Standard Specifications Sections 8-04 through 8-07.

**3.14 SIDEWALKS AND DRIVEWAYS**

A. Per 2020 WSDOT Standard Specifications Section 8-14.

**3.15 FENCES**

A. Per Section 02831.

**3.16 LANDSCAPE GRAVITY BLOCK WALLS**

A. Per Section 2832.

**END OF SECTION**

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**SECTION 02513**  
**ASPHALTIC CONCRETE VEHICULAR PAVING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies asphalt concrete vehicular paving use for pavement overlay, trench patches, and parking lots.

**1.2 QUALITY ASSURANCE**

- A. Quality Control:
  - 1. District will hire an independent soils laboratory to conduct in-place moisture-density tests for compaction to assure that all work complies with this Section.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Product technical data including:
  - 1. Acknowledgement that products submitted meet requirements of standards referenced.
  - 2. Manufacturer's installation instructions.
- C. Asphalt design mix.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. Asphalt Concrete, Hot Mix Asphalt:
  - 1. Per 2020 WSDOT Standard Specifications Section 5-04.2.
- B. Pavement Markings:
  - 1. Per 2020 WSDOT Standard Specifications Section 8-22.2.
  - 2. Pavement marking paint shall be a product specifically formulated for use on asphalt concrete pavement and shall have a proven record of performance and durability.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Drawings indicate the approximate minimum area of pavement restoration. The actual limits of the pavement restoration will be determined in the field by the District and City of Mount Vernon and Skagit County inspectors based on open excavation limits and pavement damage as a result of Contractor operations.
- B. Pavement restoration shall match pre-construction grade.
- C. Final pavement restoration shall be completed as soon as possible and when directed by the District.
- D. Settlement of replaced pavement over trenches within the Warranty Period shall be considered the result of improper or inadequate compaction of the subbase or base materials. Promptly repair all pavement deficiencies noted during the Warranty Period at the Contractor's sole expense.

**3.2 ASPHALT CONCRETE**

- A. Per 2020 WSDOT Standard Specifications Section 5-04.3.
- B. All edges shall be sealed and sprinkled with sand to avoid nighttime glare due to reflection off sealed joints.

C. Replacement paving shall match the lines and grades of the adjacent paving.

### **3.3 PAVEMENT MARKINGS**

- A. Replace all pavement markings damaged by construction.
- B. Unless otherwise indicated, replace to match markings and striping that were in place prior to construction.
- C. Be responsible for referencing the existing road marking layout prior to removal and maintain all references necessary to reinstall the permanent marking upon completion of the project.
- D. Comply with 2020 WSDOT Standard Specifications Section 8-22.3.
- E. Pavement marking paint shall be applied where pavement paint was removed by construction operations. It shall be applied when the pavement surface is dry and clean, and when the air temperature is above 40 degrees F. All equipment used in the application of pavement marking shall produce stripes and markings of uniform quality with clean and well-defined edges that conform to the details and dimensions of adjacent striping. Drips, overspray, improper markings, and paint material tracked by traffic shall be immediately removed from the pavement surface and the striping repaired.
- F. Do not paint until minimum of five (5) days has elapsed from time surface is completed.
  - 1. A longer period may be required if directed by District.

### **3.4 TEMPORARY PAVEMENT PATCHING**

- A. Furnish, place, and maintain a 4-inch minimum compacted thickness of temporary pavement patch over open cuts. Temporary asphalt patching is required where vehicular or pedestrian traffic must be accommodated and permanent pavement patching cannot be placed immediately.
- B. Temporary pavement patch shall be compacted and leveled to coincide with adjacent surfaces.
- C. Before final restoration, remove the temporary pavement patch and such underlying material as may exist, clean exposed face of the existing pavement to remain, and restore the pavement.

**END OF SECTION**

**SECTION 02540**  
**PRECAST CONCRETE VAULT STRUCTURES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes precast concrete manhole and vault structures and appurtenances for the following:
  - 1. Stream A precast concrete box culvert;
  - 2. Precast concrete meter vaults on the Judy Reservoir site;
  - 3. Precast concrete meter vaults and PRV vaults on Beaver Lake Road and Fox Road;
  - 4. Precast concrete vaults for drain assembly pump chambers;
  - 5. Precast concrete vaults for the air vacuum and air release valve assemblies;
  - 6. Valve boxes for the 30- and 36-inch-diameter butterfly valves; and
  - 7. Valve boxes for the gate valves on the drain assembly and air piping.
  - 8. Concrete inlet with beehive grate for storm drainage.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Product technical data including:
  - 1. Acknowledgement that products submitted meet requirements of standards referenced.
  - 2. Manufacturer's installation instructions.
- C. Structural Calculations for the Stream A precast concrete box culvert, precast concrete meter vaults on the Judy Reservoir site, precast concrete meter vaults and PRV vaults along Beaver Lake Road and Fox Road, and precast concrete vaults for the air vacuum and air release valve assemblies:
  - 1. Structural calculations shall be prepared, stamped, and signed by a Professional Engineer registered in the State of Washington with an expertise in structural engineering.
  - 2. Loadings shall be based on lateral earth loadings. Design shall be based on permanent loading condition, including HS-20 loading.
  - 3. Calculations shall be sufficiently detailed and include:
    - a. Concrete reinforcement in walls, bottom slab, and top slab and cone.
    - b. Picking points for lifting
- D. Hydraulic uplift calculations for precast concrete meter vaults on the Judy Reservoir site, precast concrete meter vaults and PRV vaults along Beaver Lake Road and Fox Road, and precast concrete vaults for the air vacuum and air release valve assemblies: Calculations shall be stamped, signed, and dated by a Professional Engineer registered in the state of Washington.
- E. Field survey of existing ground surface elevations of all proposed manhole cover and access hatch locations prior to preparing shop drawings per this Section.
- F. Shop Drawings:
  - 1. Shop drawings for precast manhole sections, precast vaults, hatches, cast iron frames and covers, valve boxes, and appurtenances showing typical components and dimensions, reinforcements, and other details.
  - 2. Weights of all precast sections.
  - 3. Itemize, on a separate schedule, a sectional breakdown of each manhole and vault structure with all components and refer to Drawing identification number or notation.
  - 4. Indicate knockout size, elevations, and orientation for all piping entering each manhole and vault.
  - 5. Provide standard joint details and seals for joints.
- G. Concrete Mix Design.
- H. Coating Product and Application Procedures.
- I. Gasket Material and Design.

PRECAST CONCRETE VAULT STRUCTURES

### 1.3 SHIPMENT, STORAGE AND HANDLING

- A. Handle and transport precast concrete components with suitable equipment that will not subject members to excess stress or damage the finished surface.
- B. Visual evidence of damage shall constitute cause for rejection or repair, as determined by the District.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. The use of salvaged or scrap materials is not permitted.

### 2.2 MATERIALS

- A. Stream A Precast Concrete Box Culvert:
  - 1. Box culvert shall be constructed of segmental precast reinforced concrete, of the dimensions indicated in the Drawings, and in conformance with ASTM C789.
  - 2. Box culvert shall be designed for HS-20 vehicle loading.
- B. Vaults:
  - 1. Vaults shall be precast concrete, of the dimensions indicated in the Drawings, and in conformance with ASTM C857 and ASTM C858.
  - 2. The top slab and lid or hatch shall be designed to carry an H-20 load transmitted through the entry riser.
  - 3. Hydraulic Uplift Calculations for precast concrete meter vaults on the Judy Reservoir site, precast concrete meter vaults and PRV vaults along Beaver Lake Road and Fox Road, and precast concrete vaults for the air vacuum and air release valve assemblies:
    - a. Vaults shall be designed to resist hydraulic lift with a factor of safety of at least 1.2 assuming groundwater is at the surface with the vault assumed to be empty.
  - 4. If the vault has more than one section, the joint shall be sealed with rubber gaskets in addition to external and internal grouting and exterior shrink wrapped to seal out groundwater.
  - 5. Acceptable Manufacturers:
    - a. Oldcastle Precast.
    - b. Granite Precast.
    - c. Or Approved Equal.
  - 6. Gaskets:
    - a. Vault gaskets between risers, base, and top shall be as supplied by the manufacturer.
    - b. The vault shall be watertight assuming that the groundwater is located at the level of the surrounding ground surface.
  - 7. Water Proofing (shrink wrap):
    - a. Heat shrink system for sealing vaults with adhesive:
      - 1) 2.5 mm polyethylene membrane with protective heat-activated adhesive, or
      - 2) 2.5 mm polyethylene membrane heat shrink sleeve and Visco-elastic adhesive liquid sealant, or
      - 3) External rubber sleeve with a minimum thickness of 30 mils, attached with butyl adhesive. Butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils.
    - b. Acceptable Manufacturers:
      - 1) WrapidSeal, Canusa-CPS.
      - 2) Approved Equal.
  - 8. Coating:
    - a. The interior of vaults shall be coated with Source One Environmental GreyCoat Epoxy Coating (white color), or Approved Equal.
  - 9. Access Hatches:
    - a. Hatches:
      - 1) Hatches shall be fabricated aluminum of the dimensions indicated in the Drawings.
      - 2) Hatches shall have odor and debris gaskets and frame drip containment drain.

#### PRECAST CONCRETE VAULT STRUCTURES

- 3) Hatches shall be lockable to prevent outside entry with recessed padlock hasp for District-provided padlock.
- 4) Hatches shall be spring-assisted.
- b. Frame:
  - 1) Frame shall be 1/4-inch-thick mill finish aluminum with bend down anchor tabs around the perimeter.
  - 2) Designed for odor gasket and debris gasket.
  - 3) Designed with 1-1/2-inch-diameter drain coupling located in the channel frame at the low point of the channel frame.
  - 4) Designed for factory-installed secondary fall through prevention systems.
- c. Cover:
  - 1) Minimum 1/4-inch-thick mill finish aluminum diamond pattern.
  - 2) Reinforce cover with aluminum stiffeners.
    - a) Reinforced for AASHTO H-20 wheel loading.
    - b) Deflection: Maximum 1/150 of span.
- d. Gaskets:
  - 1) Odor gasket: Continuous EPDM gasket mechanically attached to the frame to create an odor barrier around the entire perimeter of the cover.
  - 2) Debris gasket: EPDM gasket mechanically fastened to the perimeter of the frame to reduce the amount of dirt and debris that enters the drainage channel.
- e. Hardware:
  - 1) All hardware shall be stainless steel.
  - 2) Positive hold open arm that engages automatically when door reaches full 90 degree open position.
  - 3) Slam lock and removable key handle.
- f. Finishes:
  - 1) Factory finish shall be mill finish aluminum.
  - 2) Bituminous coating applied to the exterior of the frame in contact with concrete.
- g. Acceptable Manufacturers:
  - 1) Bilco, Co.
  - 2) LW Products.
  - 3) Approved Equal.
- 10. Manhole Grade Adjusting Rings and Frames and Covers: See "Manholes" per this Section.
- 11. Ladder and Safety Post:
  - a. Provide vaults with ladders and safety post.
  - b. Ladders shall be as indicated in the Drawings.
  - c. Acceptable Manufacturers:
    - 1) Bilco, LU-3.
    - 2) Approved Equal.
- C. Manholes:
  - 1. Grouts:
    - a. Per Section 03600.
  - 2. Precast Concrete Manhole Sections:
    - a. Per ASTM C478.
    - b. Cement: ASTM C150, Type II.
    - c. Size, length, and pipe connection method as indicated.
    - d. Hydraulic Uplift Calculations:
      - 1) Manholes shall be designed to resist hydraulic lift with a factor of safety of at least 1.2 assuming groundwater is at the surface with the manhole assumed to be empty.
  - 3. Manhole Joint Gaskets:
    - a. Rubber gasket type: ASTM C443.
  - 4. Manhole Grade Adjustment Rings:

PRECAST CONCRETE VAULT STRUCTURES

- a. Concrete manhole blocks, reducers, and grade adjustment rings: ASTM C139 and ASTM C55, except that the nominal horizontal thickness shall be 6 inches measured radially, and semicircular grooves, 1 inch in diameter, shall be scribed in the ends.
- b. Concrete Grade Ring: ASTM C139, sized per Drawings.
- 5. Manhole Pipe Connections:
  - a. Manhole pipe connections shall be in accordance with the manhole manufacturer's recommendations.
  - b. Design manhole pipe penetrations to resist hydraulic pressure based on assuming that the groundwater is located at the level of the surrounding ground surface.
  - c. Locate flexible connection within a distance no greater than one-half of the outside diameter of the pipe or 12 inches, whichever is greater, from the outside face of the manhole structure.
- 6. Frames and Covers:
  - a. Frames:
    - 1) Cast iron, ASTM A48, Class 30B.
    - 2) Per District requirements and as indicated in the Drawings.
  - b. Covers:
    - 1) General:
      - a) Ductile iron, ASTM A536, Grade 60-40-18.
      - b) Per Drawings.
    - 2) Castings:
      - a) Cast manufacturer's name into, and not stamped on, an exposed surface.
  - c. Provide watertight seals using O-ring gaskets.
- 7. Bolts:
  - a. Stainless steel bolts for bolt-down manhole frame.
- 8. Shrink-Wrap:
  - a. Heat shrink system for sealing manholes with adhesive:
    - 1) 2.5 mm polyethylene membrane with protective heat-activated adhesive, or
    - 2) 2.5 mm polyethylene membrane heat shrink sleeve and Visco-elastic adhesive liquid sealant, or
    - 3) External rubber sleeve with a minimum thickness of 30 mils, attached with butyl adhesive. Butyl adhesive shall be non-hardening sealant with a minimum thickness of 30 mils.
  - b. Acceptable Manufacturers:
    - 1) WrapidSeal, Canusa-CPS.
    - 2) Approved Equal.
- D. Valve Boxes:
  - 1. Per the Drawings.
- E. Concrete Inlet with Beehive Grate:
  - 1. Per WSDOT Standard Plan B-25.60-02 with beehive grate.
  - 2. Per 2020 WSDOT Standard Specifications Section 7-05.2.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Precast section with damaged joint surfaces or with cracks or damage that will permit infiltration shall not be installed. Replace with undamaged section.
- B. Connections to manholes or vaults shall be made either with manhole adapters providing a transition from the manhole to pipe material or factory fabricated pipe/base unit that provides a watertight and leak proof seal. Voids around manhole adapters shall be thoroughly grouted and sealed inside and outside of the manhole walls, and seals shall be installed in accordance with manufacturer recommendations.
- C. All pipes entering or leaving manholes and vaults shall be placed on firmly compacted bedding. Bedding shall be Imported Material per Sections 02200 and 02221.

## PRECAST CONCRETE VAULT STRUCTURES

- D. Imported Material shall be used as backfill, bedding, and foundation material around the Stream A precast concrete box culvert, vaults, manholes, valve boxes, and pipe connections.
- E. Install vaults plumb and level at the elevations indicated in the Drawings.
- F. Install shrink-wrap on exterior of manholes and vaults to seal frame joints, grade ring joints, and vault section joints. Install shrink-wrap in accordance with manufacturer's instructions.
- G. Coat interior of vaults per manufacturer's recommendations.
- H. Field survey of existing ground surface elevations of all proposed manhole cover and access hatch locations prior to preparing shop drawings per Section 02212. Incorporate surveyed elevations into shop drawing submittal.
- I. Unless otherwise indicated, set manhole frames and covers, grates, and access hatches level. Install rims flush with the pavement and gravel. Restore surface per Drawings.
- J. Adjust all existing manhole rims, drainage structure lids, valve boxes, and utility access structures to finish grade within areas affected by the proposed improvements.

### **3.2 WORKMANSHIP**

- A. All precast concrete manholes and vaults shall be installed in conformance with the manufacturer's written instructions. Manholes and vaults shall be installed plumb.
- B. Entry risers and manhole frames shall be set in mortar of one part cement to 2-1/2 parts of sand by volume.

### **3.3 OPENINGS**

- A. Openings for pipe penetrations shall be accurately located and formed or core drilled.
- B. Pipe penetrations shall be sealed using link seal and non-shrink cementitious grout full thickness of wall.
- C. Connections shall provide a watertight and leak proof seal. Voids shall be thoroughly grouted and sealed inside and outside of the vault walls, and seals shall be installed in accordance with manufacturer's recommendations.

### **3.4 STREAM A PRECAST CONCRETE BOX CULVERT**

- A. Per the Drawings.

### **3.5 VAULTS**

- A. Foundation Earthwork:
  1. Place vault on a foundation of compacted foundation material (permeable ballast) a minimum of 12 inches thick and 6 inches larger than the footprint of the vault on all sides per Section 02200 and 02221.
- B. Unless otherwise indicated, set top slab of vault and access hatches/manhole covers level and flush with existing grade. Install access hatches/manhole rims flush with the existing grade unless indicated otherwise on the Drawings.

### **3.6 MANHOLES**

- A. Placing Manhole Sections:
  1. Foundation earthwork: Place material as indicated in the Drawings.
  2. Place sections plumb and level, trim, to correct elevations, and anchor to base. Precast riser sections and cones shall be set using specified joint sealant or gasket. Priming and preparation of surfaces and installation of jointing material shall be in strict conformance with the manufacturer's instructions.
  3. Cut and fit for pipe or pipe sleeves, and seal with resilient connectors or grout as indicated.
  4. Epoxy grout lift holes from the inside and outside of the manhole prior to backfilling.
  5. Epoxy grout interior and exterior of riser joints, grade ring joints, and cone joints prior to backfilling.
  6. Install shrink-wrap on exterior of manholes to seal frame joint, grade ring joints, cone joints, and riser joints. Install shrink-wrap in accordance with manufacturer's instructions.

## **PRECAST CONCRETE VAULT STRUCTURES**

7. Backfill around manholes and pipe connections per the Drawings and Section 02200. Imported Material shall be used as backfill around manholes and pipe connections.
8. Survey existing ground elevations at proposed manhole cover locations to confirm rim elevations; include surveyed rim elevations in shop drawings submitted for review.
9. Unless otherwise indicated, set manhole frames and covers level and flush with existing grade. Install manhole rims flush with the existing grade unless indicated otherwise on the Drawings. Restore surface per Drawings.

### **3.7 VALVE BOXES**

- A. Per the Drawings.

### **3.8 CONCRETE INLET WITH BEEHIVE GRATE**

- A. General:
  1. Per WSDOT Standard Plan B-25.60-02 with beehive grate.
  2. Per 2020 WSDOT Standard Specifications Section 7-05.3.
- B. Foundation Earthwork:
  1. Place structure on a foundation of compacted foundation material (permeable ballast) a minimum of 12 inches thick and 6 inches larger than the footprint of the structure on all sides per Section 02200 and 02221.

### **3.9 INSPECTION**

- A. Visually inspect the precast concrete structures for cracks and other potential locations of leaks.
  1. No visible leakage will be permitted.
  2. Repair all cracks and potential locations of leaks per manufacturer's recommendations.

**END OF SECTION**

**SECTION 02541**  
**TRENCH PLUGS AND DRAINS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes requirements for trench plugs and trench cutoff drain pipes for the water transmission pipeline.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. Product technical data including acknowledgement that products submitted meet requirements of standards referenced.
  - 2. Certifications.
  - 3. Test reports.

**PART 2 - PRODUCTS**

**2.1 TRENCH PLUGS**

- A. Materials for trench plugs below the pipe springline shall be wet CDF conforming to Section 02210.
- B. Materials for trench plugs above the pipe springline shall be dry or wet CDF conforming to Section 02210.

**2.2 PVC PIPE AND FITTINGS**

- A. Solid wall and slotted PVC pipe shall be Schedule 40, conforming to ASTM D2241 or ASTM D1785.
- B. Fittings shall be Schedule 40 socket weld type in accordance with ASTM D2855. Pipe and fittings shall be manufactured with 2 percent titanium dioxide for ultraviolet protection.
- C. Slotted PVC pipe shall have 0.102-inch wide slots at 0.25-inch spacing.

**2.3 CORRUGATED POLYETHYLENE PIPE**

- A. Corrugated polyethylene pipe per 2020 WSDOT Standard Specifications Section 9.05.2(7). AASHTO M252 Type S and Type SP with Class 1 perforations.
  - 1. Pipe, Couplings, and Fittings shall meet the requirements of AASHTO M252.
  - 2. Pipe dimensions per Drawings.

**2.4 CUTOFF DRAIN DISCHARGE PAD**

- A. Material for cutoff drain discharge pads shall be as indicated in the Drawings.

**2.5 GEOTEXTILE FILTER FABRIC**

- A. Geotextile filter fabric material shall be as specified in Section 02200.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Provide trench plugs and drain pipes for water transmission pipeline as indicated in the Drawings.

**3.2 POLYETHYLENE FOAM CUSHIONING**

- A. Prior to placing concrete, wrap the pipe with polyethylene foam cushioning. The cushioning will minimize cracking of the concrete and/or abnormal stresses on pipe.

**3.3 TRENCH PLUG CUTOFF INTO NATIVE SOIL**

- A. Extend the trench plug a minimum distance into the native soil on the bottom and sides of the collar as indicated in the Drawings.

**3.4 PVC DRAINS AND CUTOFF DRAIN DISCHARGE PADS**

- A. Install drains and cutoff drain discharge pads at locations indicated and where directed by the District.

**3.5 GRAVEL BACKFILL**

- A. Install material backfill around PVC drains as indicated in the Drawings and in conformance with Section 02200.

**END OF SECTION**

**SECTION 02643**  
**WATER PIPELINE TESTING AND DISINFECTION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies flushing, testing, and disinfection of potable water pipelines and appurtenances. Contractor is responsible for these activities.
- B. District will be responsible for operating any existing valves on the existing 24-inch-diameter water transmission pipeline to assist the Contractor with supply of water for testing flushing and disinfection.
- C. District will perform bacteriological testing to determine acceptance of pipeline.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Chlorination and dechlorination shall be performed by competent individuals knowledgeable and experienced in the operation of the necessary application and safety equipment in accordance with applicable local, state, and federal laws and regulations.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications of personnel performing flushing, testing, disinfection, and dechlorination of potable water pipelines.
- C. Water Pipeline Testing and Disinfection Plan.
- D. Provisions for testing and disinfection with pipe shop drawings if Contractor proposes to modify the design or add connections to accommodate testing equipment.
- E. Test results for pressure and bacteriological testing.

**1.4 WATER PIPELINE TESTING AND DISINFECTION PLAN**

- A. Prepare a detailed plan for flushing, testing, disinfection, and dechlorination of potable water pipelines that includes the following:
  - 1. Written narrative describing the testing and disinfection procedures including method of flushing, type of chlorine, injection location(s), sampling locations, means and rate of neutralization, and disposal of large quantities of chlorinated water. Include calculations to indicate how dechlorination will be completed before any water reaches surface waters, ditches, or wetlands to comply with the NPDES Construction Stormwater General Permit per Section 01060.
  - 2. Drawings for all temporary connections showing:
    - a. Equipment used for pressure testing and chlorine disinfection including bulkheads, end caps, blind flanges, pumps, piping, valves, pressure gauges, air relief, and taps.
    - b. Catalogue cuts sheets for temporary testing equipment.
    - c. Approved test results for reduced pressure backflow assembly (RPBA).
    - d. Locations for filling pipe and proposed location of water source from District's supply.

**1.5 DISTRICT BACTERIOLOGICAL TESTING PROTOCOL AND SCHEDULE**

- A. The District will perform laboratory testing of samples for bacteria to determine if a line is ready for service. The District has established the following general protocol for the disinfection and testing process. This is not to dictate the Contractor's testing plan, but it is to inform the Contractor of approximate schedule and turnaround times for bacterial testing.
  - 1. Day 1:
    - a. Chlorinate to 50 ppm.

- b. Stand for 24 hours with a residual chlorine level of 25 ppm.
- 2. Day 2:
  - a. Flush and wait 16 hours.
- 3. Day 3:
  - a. Take Water Sample No. 1.
  - b. After 15 minutes, take Water Sample No. 2.
  - c. Ship to laboratory for testing.
- 4. Day 4:
  - a. Results 18 to 24 hours after sampling.
  - b. Results available between 8 AM and 8 PM.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. The delivery, storage, and handling of materials shall be performed in accordance with Code of Federal Regulations (CFR) 1910.120 Hazardous Waste Operations and Emergency Response and CFR 49.172 Hazardous Materials Regulations.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. All test equipment, temporary valves, bulkheads, pipes, or other water control equipment and materials shall be selected and furnished by the Contractor, subject to the District's review.
- B. No materials shall be used which would be injurious to the construction or its future function.

### **2.2 SODIUM HYPOCHLORITE (LIQUID)**

- A. Contractor shall provide sodium hypochlorite for disinfection. Sodium hypochlorite is available in liquid form in glass or plastic containers, ranging in size from 0.95 liter (1 qt.) to 18.93 liter (5 gal). The solution contains approximately 10% to 15% available chlorine.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Flushing, pressure testing, disinfection, and neutralization of the chlorinated water is the responsibility of the Contractor.
- B. All pipelines shall be tested and visually inspected under pressure prior to Pipeline Completion.
- C. Unless otherwise indicated, water for testing and disinfecting the pipeline will be furnished by the District; however, the Contractor shall make all necessary provisions for conveying the water from the District-designated source to the points of use. Water will be available from the following sources:
  - 1. Select outlet and hydrant locations on the existing 24-inch-diameter water transmission pipeline; see attachment to this Section and the Drawings for available water sources to the Contractor.
  - 2. Existing 24-inch-diameter water transmission pipeline:
    - a. Due to the limited water sources in certain areas of the project, District may allow the Contractor to weld on 4-inch Weld-O-Lets onto the existing 24-inch-diameter water transmission pipeline with prior approval from the District; see attachment to this Section and the Drawings for available locations.
    - b. Contractor shall provide the following at each water source used:
      - 1) Provide reduced pressure backflow assembly and fire hydrant meter to meet District requirements. Fire hydrant meter(s) can be checked out at the District office.
      - 2) Provide a pressure reducing valve if desired by Contractor or required by the District.
  - 3. Existing 36-inch-diameter water transmission pipeline:
    - a. Provide temporary fittings, valves, and connections for filling and disinfection.
    - b. Water will be available from 36-inch if segments are completed, tested, and disinfected.

- D. Closure sections and gasketed joints shall be left open for visual inspection of pipe joints under full test pressure.
- E. Pressure testing and disinfection requirements applies to all appurtenances.

### **3.2 TEST PRESSURES**

- A. Test pressure for Welded Steel Pipe (water transmission pipeline): Varies based on a minimum hydrostatic head elevation of 465 feet AMSL and shall be tested at an elevation of 550 feet AMSL; see Drawing 00G006.
- B. Test pressure for Ductile Iron Pipe: 225 psi.
- C. Test Pressure for PVC Pipe (C909): 235 psi.
- D. Test pressure for Cross-linked Polyethylene distribution lines: 200 psi.
- E. Test pressure for Cross-linked Polyethylene service lines: 80 psi.
- F. Test pressure for brass service lines: 80 psi.

### **3.3 CLEANING AND FLUSHING OF PIPELINES**

- A. Keep pipelines as clean as possible during all phases of construction and make every effort to prevent debris, trench water, and other material from falling, washing, or blowing into the pipelines. All openings to the pipelines shall be plugged when construction is not in progress.
- B. Inspect and clean pipelines of loose and suspended material by hand prior to flushing. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
- C. The pipelines shall be flushed with water at a velocity of not less than 2.5 feet per second until clear of suspended solids and color.
- D. Flushing shall occur after pressure testing is completed but before final connections are made.

### **3.4 PRESSURE TESTING OF PIPELINES**

- A. Maximum length of the water transmission pipeline that can be tested at one time: 8,000 linear feet.
- B. Furnish, assemble, and operate all testing equipment including measuring devices for pressure testing. The District will witness the tests.
- C. Test pipeline either in sections or as a unit. No section of the pipeline shall be tested until all field-placed concrete has attained an age of 7 days. The test shall be made by placing temporary bulkheads or flanges in the pipe and filling the line slowly with water. Be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to or movement of the adjacent pipe. Any unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test to avoid movement and damage to piping and equipment.
- D. Provide sufficient temporary air taps in the pipelines and top of the welded steel pipe bumped ends to allow for evacuation of all entrapped air in each pipe segment to be tested. After completion of the tests, taps shall be permanently plugged. Care shall be taken to see that all air vents are open during filling.
- E. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section has been filled, it shall be allowed to stand under a slight pressure for at least 4 hours to allow the escape of air from any air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the District shall be taken before testing can continue.
- F. Pressure Testing of Water Transmission Pipeline:
  - 1. Notify the District 5 working days prior to testing.
  - 2. Before any section of the pipe is filled with water, inspect the piping and remove all foreign material.
  - 3. The Contractor shall not operate any existing valves on the District's system.

4. Provide the necessary pumps, shutoff valves, check valves, plumbing, meter, pressure gages with petcocks, and other equipment necessary to complete the pressure testing. Furnish and install any temporary bulkheads, blocking, or anchorage necessary to hold the pipe in position during the test. No direct connections to active water pipes will be allowed for supplying makeup water.
  5. Open the valves at the high points to release air.
- G. Pipelines that fail to pass the prescribed leakage test will be considered defective Work, and the Contractor shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall retest the pipelines. All leaks and defects shall be corrected by the Contractor to the satisfaction of the District at no cost to the District. Any exposed joint showing visible leakage shall be repaired to zero leakage.
- H. Pressure Test Acceptance Criteria:
1. Welded Steel Pipe: The pressure test shall consist of holding the test pressure on the pipeline for a period of 2 hours with no discernible pressure loss after air is removed from the pipeline. All leaks shall be repaired in a manner acceptable to the District.
  2. Ductile Iron Pipe: The pressure test shall consist of holding the test pressure on the pipeline for a period of 2 hours at a leakage rate not exceeding criteria in WSDOT Standard Specifications Section 7-09.3(23).
  3. PVC Pipe (C909): The pressure test shall consist of holding the test pressure on the pipeline for a period of 2 hours with no discernible pressure loss after air is removed from the pipeline. All leaks shall be repaired in a manner acceptable to the District.
  4. Cross-Linked Polyethylene distribution lines: The pressure test shall consist of holding the test pressure on the pipeline for a period of 2 hours with no discernible pressure loss after air is removed from the pipeline. All leaks shall be repaired in a manner acceptable to the District.
  5. Cross-Linked Polyethylene service lines: The pressure test shall consist of holding the test pressure on the pipeline for a period of 2 hours with no discernible pressure loss after air is removed from the pipeline. All leaks shall be repaired in a manner acceptable to the District.
  6. Brass service lines: The pressure test shall consist of holding the test pressure on the pipeline for a period of 2 hours with no discernible pressure loss after air is removed from the pipeline. All leaks shall be repaired in a manner acceptable to the District.

### **3.5 DISINFECTION**

- A. Coordinate with the District to perform disinfection.
- B. Disinfection of pipeline shall not proceed until all appurtenances and any necessary sample ports have been installed, and the District provides authorization.
- C. Pipeline shall be disinfected for its entire length following a successful pressure test and prior to completing the interconnection to the existing distribution system.
- D. The District will provide personnel to supervise disinfection of the pipeline. The Contractor shall properly dispose of disinfection wastewater.
- E. All piping, valves, fittings, and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5 percent sodium hypochlorite disinfecting solution prior to installation.
- F. Water pipes under construction that become flooded by storm water, runoff, or ground water shall be cleaned by draining and flushing with potable water until clear water is evident. Upon completion, the entire main shall be disinfected using a method approved by the District.

### **3.6 DISINFECTION METHOD**

- A. Sodium Hypochlorite Solution (Liquid):
  1. Sodium hypochlorite solution shall be used for cleaning and swabbing piping and appurtenances immediately prior to installation and for disinfecting all components of connections to the District's existing system.

2. Sodium hypochlorite solution may be used for the initial disinfection of newly installed water mains. The solution shall be applied at a terminus of the system to be chlorinated using an injector which can adjust the amount of solution being injected into the piping system. The solution shall be injected in the appropriate concentration to achieve the specified concentration range of chlorine throughout the entire piping system. Where pumping equipment is used in conjunction with an injector, a District approved and tested backflow prevention device shall be installed and connected to the potable water supply.
3. Pumping equipment, piping, appurtenances and all other equipment in contact with potable water shall be disinfected prior to use.
4. Sodium hypochlorite solution may also be used to increase the total chlorine residual if the concentration from the initial chlorination of the system is found to be low. The solution shall be added to the system in sufficient amounts at appropriate locations to insure that the disinfecting solution is present at a concentration within the specified range throughout the piping system.

### **3.7 PROCEDURE FOR DISINFECTING WATER MAINS AND APPURTENANCES**

- A. The pipeline shall be filled at a rate not to exceed 300 GPM or a velocity of 1 foot per second, whichever is less.
- B. Disinfection shall result in an initial total chlorine concentration of 50 mg/L. This concentration shall be evenly distributed throughout the system to be disinfected.
- C. All valves shall be operated with the disinfection solution present in the pipeline. All appurtenances shall be flushed with the treated water a sufficient length of time to allow a chlorine concentration within the specified range in all components of each appurtenance.
- D. The District will verify the presence of the disinfection solution by sampling and testing for acceptable chlorine concentrations at the various appurtenances or at the test ports provided by the Contractor. Areas of the system found to be below the specified chlorine concentration level shall receive additional flushing as noted above and additional disinfection solution as necessary. Addition of disinfection solution after the initial charging of the line shall be made by the sodium hypochlorite method.
- E. The chlorinated water shall be retained in the system for a minimum of 24 hours. The District will test the total chlorine residual. The system shall contain a total chlorine residual of not less than 80% of the initial total chlorine residual before the 24-hour soaking period began. If the total chlorine residual has decreased more than 20%, the system shall be soaked for an additional 24-hour period. If the total chlorine residual has not decreased after this additional 24-hour period, the system shall be flushed in accordance with the procedure detailed herein. If the total chlorine residual has decreased, the system shall be flushed in accordance with the procedure detailed herein and shall be re-disinfected.
- F. Following a successful retention period as determined by the District, the chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source designated by the District. Flushing shall continue until the replacement water in the new system is equal in chlorine residual to the potable source of supply and the turbidity level is 0.5 NTUs or less.
- G. Contractor to collect samples for bacteriological tests, and District will pay for testing.

### **3.8 DISCHARGE OF CHLORINATED WATER**

- A. Indiscriminate onsite disposal or discharge to storm drains, drainage courses, or surface waters is prohibited. Be solely responsible to evaluate, obtain, and comply with State and local laws concerning disposal of chlorinated water. Provide copies of all reports and monitoring information to the District. All discharges shall be in accordance with the NPDES Construction Stormwater General Permit requirements.
- B. The Contractor hereby agrees to indemnify and hold harmless the District from and against any and all claims, demands, losses, or liabilities of any kind or nature which the District may sustain or incur for noncompliance.
- C. The environment to which the chlorinated water is to be discharged shall be examined by the District. Any indication that the discharge of chlorinated water may cause damage to the environment shall require

the neutralizing of the chlorine residual by means of a reducing agent in accordance with AWWA C651 and the requirements of this Section.

- D. Where chlorine neutralization is required, the reducing agent shall be applied to the water as it exits the piping system. The Contractor shall monitor the chlorine residual during the discharge operations.
- E. The various methods of dechlorination available can remove residual chlorine to concentrations below standard analytical methods of detection, 0.02 mg/L. The Contractor shall perform all necessary tests to ensure that the total residual chlorine effluent limitations are met.
- F. Discharge of water from testing and disinfection may occur anywhere along the pipeline as long as all of the water quality requirements are met.

### **3.9 DISINFECTING TIE-INS AND CONNECTIONS**

- A. Complete all testing and disinfection on new distribution and transmission pipelines before connecting them to existing pipelines. All materials must be available on the jobsite for inspection and acceptance prior to scheduling of connections. The Contractor shall have on site all personnel, material, and equipment necessary to carry each connection through as a continuous operation before shutting down any pipe in service.
- B. Pipes, fittings, valves and all other components incorporated into connections with the District's existing system shall be spray disinfected or swabbed with a liquid chlorine solution in accordance with AWWA C651 and as specified herein.
- C. Closure sections to connect to existing pipelines shall be left accessible to allow visual inspection for leaks after the system is placed in service.

**END OF SECTION**

**ATTACHMENT 1**

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## Judy Reservoir to Mount Vernon Transmission Pipeline, Phase 2 – Existing Water Sources

**Contractor-Installed Water Source No. 1 of 5:** Three hydrants on the south side of SR-538 are not useable due to there being no existing culvert available to temporarily cross the SR-538. In lieu of this, the District may allow the Contractor to weld on 4-inch Weld-O-Lets onto the existing 24-inch-diameter water transmission pipeline with prior approval from the District in the location shown in the image below.

**Hydrant Location Elevation:** 56 AMSL

**Hydrant Location Available Pressure:** 68 PSI

**Can push water to existing Hydraulic Grade Level 459**



**Existing Water Source No. 1:** Close up of the 7th Day Adventist Church Hydrant

**Hydrant Location Elevation:** 56 AMSL

**Hydrant Location Available Pressure:** 68 PSI

**Can push water to existing Hydraulic Grade Level 214**



**Existing Water Source No. 2:** Existing 2-inch flushing assembly located in the NE Corner of the Slavic Church parcel.

**Hydrant Location Elevation:** 117 AMSL

**Hydrant Location Available Pressure:** 103 PSI

**Can push water to existing Hydraulic Grade Level 356**



**Contractor-Installed Water Source No. 2 of 5:** The existing 24-inch-diameter water transmission pipeline crossing under the old RR grade and State Route 9 has a significant length within an existing casing. This potential Contractor-installed water source will have to be located outside of the existing casing. The District may allow the Contractor to weld on 4-inch Weld-O-Lets onto the existing 24-inch-diameter water transmission pipeline with prior approval from the District in the location shown in the image below.

**Hydrant Location Elevation 53 AMSL**

**Hydrant Location Available Pressure 176 PSI**

**Can push water to existing Hydraulic Grade Level 459**



**Existing Water Source No. 3:** Existing Hydrant on Austin Road where the new 36-inch-diameter water transmission pipeline crosses Austin Road.

**Hydrant Location Elevation:** 41 AMSL

**Hydrant Location Available Pressure:** 140 PSI

**Can push water to existing Hydraulic Grade Level 365**

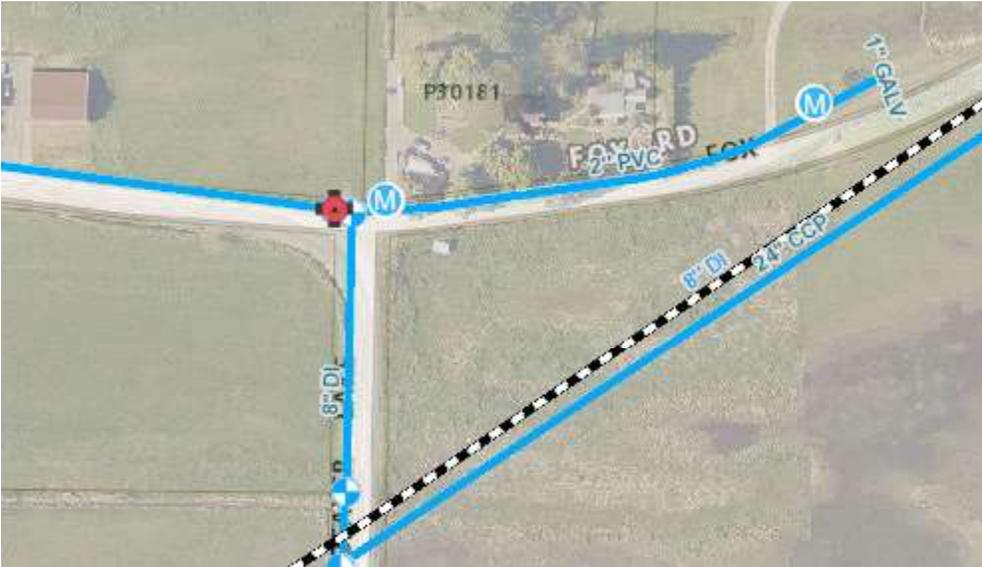


**Existing Water Source No. 4:** Existing Hydrant at the Intersection of Beaver Lake Road and Fox Road.

**Hydrant Location Elevation:** 41 AMSL

**Hydrant Location Available Pressure:** 140 PSI

**Can push water to existing Hydraulic Grade Level 365**



**Existing Water Source No. 5: Existing Hydrant on Wayward Way**

**Hydrant Location Elevation: 296 AMSL**

**Hydrant Location Available Pressure: 69 PSI**

**Can push water to existing Hydraulic Grade Level 459**

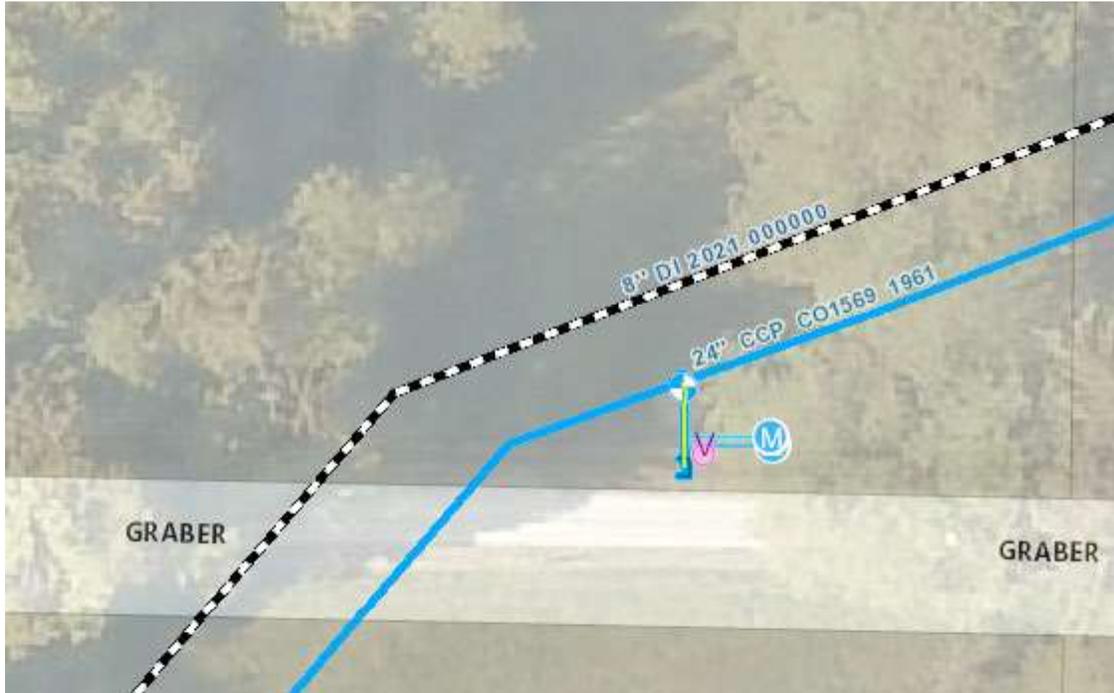


**Existing Water Source No. 6:** Existing 2-Inch Flushing Assembly N. of Graber Lane.

**Flushing Assembly Location Elevation:** 330 AMSL

**Flushing Assembly Location Available Pressure:** 56 PSI

**Can push water to existing Hydraulic Grade Level 459**

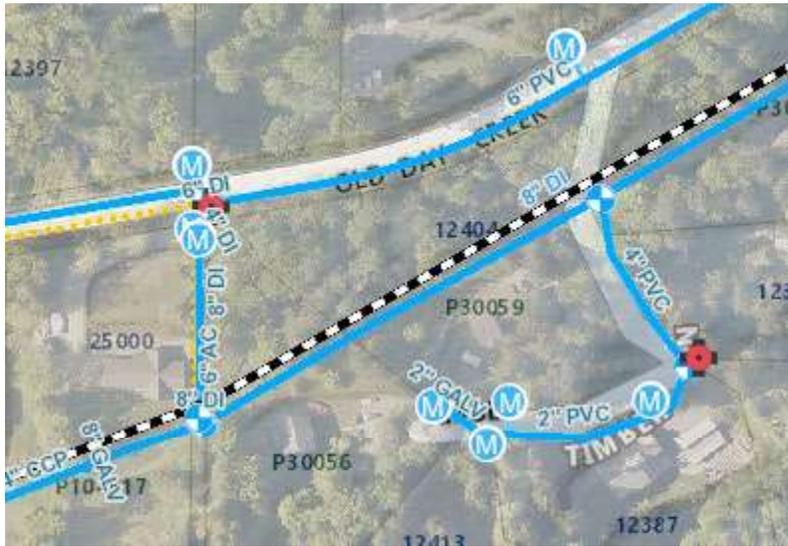


**Existing Water Source No. 7: Existing Hydrant on Old Day Creek Rd**

**Hydrant Location Elevation: 383 AMSL**

**Hydrant Location Available Pressure: 33 PSI**

**Can push water to existing Hydraulic Grade Level 459**



**Existing Water Source No. 8:** Existing Hydrant on Timber Lane

**Hydrant Location Elevation:** 350 AMSL

**Hydrant Location Available Pressure:** 46 PSI

**Can push water to existing Hydraulic Grade Level 459**



**Existing Water Source No. 9:** Existing Hydrant west of the Raw Water Pump Station.

**Hydrant Location Elevation:** 430 AMSL

**Hydrant Location Available Pressure:** 11 PSI

**Can push water to existing Hydraulic Grade Level 459**



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**SECTION 02831**  
**FENCING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies wood and wire-type new fences or removal and replacement of existing fences. This Section also specifies requirements for livestock fences.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Manufacturer's product information designating specific materials provided.
- C. Survey data and field notes for fences required to be removed and replaced in pre-construction locations: Submit per Section 02212.

**PART 2 - MATERIALS**

**2.1 GENERAL**

- A. Unless otherwise indicated, provide fencing and gates to match existing.
- B. Unless otherwise indicated, fencing shall be 6 feet high or required to match existing.
- C. Unless otherwise indicated, all applicable fencing materials shall be equivalent to existing fence which is to be replaced.
- D. All replacement materials and components shall be new, first quality items specifically manufactured for the intended application.
- E. Existing fence materials may only be reused if acceptable to the District and private property owner.

**2.2 FENCE**

- A. **Fence Type A: Barbed Wire Fence** - 4-foot-high five-strand barbed wire fence with metal t-bar posts.
1. Barbed wire shall conform to the requirements of AASHTO M 280, Type Z, and shall consist of two strands of 12 1/2-gage wire, twisted with four point 14-gage barbs with barbs spaced 5 inches apart (Design 12-4-5-14R). Galvanizing shall be Class 3.
  2. T-bar posts shall be galvanized in accordance with the requirements of AASHTO M 111, with anchor plates being Grade 55.
  3. End, corner posts, and posts at intersecting fence posts shall be 6-inch x 6-inch x 8-ft pressure treated Hemlock. Cross bracing at corner posts shall match post material. Gate posts shall be per gate detail.
  4. Preservative shall be per 2020 WSDOT Standard Specifications Section 9-09.3.
- B. **Fence Type B: Hog Wire Fence** - 5-foot-high welded wire mesh with 2-inch x 4-inch x 10-ft pressure treated wood posts.
1. Wire mesh shall be 14 ga galvanized rolled wire mesh with 2-inch x 4-inch spacing.
  2. Top rail shall be 2-inch x 4-inch pressure treated Hemlock.
  3. End, corner posts, and posts at intersecting fence posts shall be 4-inch x 4-inch x 10-ft pressure treated Hemlock. Cross bracing at corner posts shall match post material. Gate posts shall be per gate detail.
  4. Preservative shall be per 2020 WSDOT Standard Specifications Section 9-09.3.
- C. **Fence Type C: Electric Fence** - 4-foot-high electric fence with 8-ft total length No. 1 grade railroad tie posts with a minimum of 8-ft post spacing with two galvanized 14 gauge electrified wires.

1. End, corner posts, and posts at intersecting fence posts shall be 8-ft minimum length No. 1 grade railroad tie posts. Cross bracing at corner posts shall match post material. Gate posts shall be per gate detail.
- D. **Fence Type D: Temporary Livestock Fence** - 4-foot-high electric fence with metal t-bar posts.
  1. A minimum of two galvanized 14 gauge electrified wires. Each segment shall be electrified by a solar-powered Gallagher S16 Solar Energizer or Approved Equal and include all appurtenances for a fully functioning electrified fence for each segment as indicated in the Drawings.
- E. **Fence Type E: Chain link Fence** - 8-foot-high chain link fence as per Detail 2/04C012.

### **2.3 DISTRICT GATE FOR MAINTENANCE ACCESS**

- A. Fence gates to allow for maintenance access to the pipeline shall be installed where indicated in the Drawings and where directed by the District in the field. Gates shall be heavy duty, 16 feet long, and galvanized.
  1. Behlen #40129169.
  2. Or Approved Equal.

### **2.4 CONCRETE**

- A. Fence post concrete: 2020 WSDOT Standard Specifications Section 9-16.1(1)F.

## **PART 3 - EXECUTION**

### **3.1 SURVEY OF EXISTING FENCES**

- A. Survey in permanent fence location prior to removal of existing fence to ensure that the fence is placed at its pre-construction location per Section 02212.
- B. Existing fences to be removed and replaced in the pre-construction locations are indicated in the Drawings.

### **3.2 FENCE REMOVAL**

- A. Remove existing fences where required for waterline construction.
- B. Posts: Remove and salvage posts. Remove footing.

### **3.3 FENCE AND GATE INSTALLATION**

- A. Damaged fencing located outside the construction limits or specifically identified as to be protected in the Drawings shall be replaced.
- B. Install replacement fences in the pre-construction locations unless indicated otherwise. All earth, brush, or other obstructions which interfere with the proper alignment of construction of fences shall be removed and disposed of at the expense of the Contractor.
- C. Line posts shall be spaced to match existing. Post spacing shall not exceed 10-foot intervals for chain link fence, 8-foot intervals for wood fence, 14-foot intervals for wire fence with metal posts, and 8-foot intervals for wire fence with wood posts. Intervals shall be measured from center to center of the posts and generally parallel to the ground slope. Posts shall be set plumb and shall be centered in 12-inch-diameter concrete encasement extending 36 inches into the ground.
- D. Gate posts shall be provided with concrete foundation. Gate post foundations shall be designed to properly support gate.
- E. Changes in the fence lines, where the horizontal angle is 15 degrees or more, shall be considered as corners, and corner posts shall be installed.

- F. Bracing shall be provided at all end, gate, and corner posts, the latter in both directions. Horizontal brace rails shall be set midway between top rail and ground running from the corner, end, or gate post to first line post. Diagonal tension members shall connect tautly between posts below horizontal braces.
- G. Corner posts shall be installed in lieu of line posts at intervals not exceeding 500 feet and shall be braced horizontally in both directions.
- H. The chain-link fabric shall be fastened on the side of the posts to match existing. The fabric shall be stretched and securely fastened to the posts, and, between the posts, the top and bottom edges of the fabric shall be fastened to the top rail and tension wire, respectively. The tension wires shall be stretched tight with turnbuckles at the end and corner posts. The bottom tension wire shall be installed on a straight grade between posts.
- I. The chain-link fabric shall be fastened to the end, corner, and gate posts with stretcher bars and stretcher bar bands spaced at approximately 14 inches on line posts and at approximately 18 inches on tension wires.
- J. Encasement concrete for footings shall be placed immediately after mixing in a manner such that there will be no concentration of the large aggregates. The concrete shall be consolidated by tamping or vibrating. Concrete for footings may be placed without forms, providing the ground is firm enough to permit excavation to neat line dimensions. Prior to placing the concrete, the earth around the hole shall be thoroughly moistened. The concrete shall completely fill the hole and top surfaces of the concrete encasement shall be sloped outward to shed water and shall have a neat appearance.
- K. Any galvanized coating damaged during construction of the fencing shall be repaired by application of molten Galvo-Weld; Galvinox; or Approved Equal.

#### **3.4 TEMPORARY LIVESTOCK FENCE**

- A. Coordinate with property owner for location and type of temporary livestock fence and management of animals during construction per the Drawings and Section 01060.

**END OF SECTION**

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**SECTION 02832**  
**LANDSCAPE GRAVITY BLOCK WALLS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies requirements for the landscape gravity block walls, concrete leveling course, drainage media, and perforated drain pipe behind the walls.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Manufacturer: Company specializing in manufacturing manufactured modular retaining wall systems with minimum three years documented experience.
  - 2. Installer: Company specializing in performing work of this Section with minimum five years documented experience, and, when applicable, approved or certified by manufacturer as verified for installation.
- B. Perform precast work in accordance with requirements of PCI MNL-116S, PCI MNL-123, PCI MNL-120.
- C. Perform required manufactured modular retaining walls work in accordance with NCMA, TR 127A and TR 146.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Design walls for locations and to overall dimensions indicated in the Drawings.

**1.4 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications.
- C. Shop Drawings:
  - 1. Landscape Gravity Block Walls (Manufactured Modular Wall - Modular Units and Support):
    - a. Indicate type of wall, location, length, top elevation, bottom of footer elevation, cross-sections including backfill material type and limits and quantities.
    - b. Show complete layout plans and fabrication details for precast wall units, and step-by-step erection instructions.
  - 2. Temporary Support System: Detail specific load bearing falsework, underpinning, needling, or shoring layout and support members appropriate for Project conditions.
- D. Product Data: Submit data for cast modular units and related accessories.
- E. Samples:
  - 1. Submit two samples of each cast modular unit type to be used in wall construction to illustrate profile, finish, texture and color.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Check materials upon delivery to assure receipt of proper material. Inspect for damage. Replace damaged materials.
- B. Handle, store, and ship units to avoid chipping, cracking, and fracturing and to prevent contamination that may affect performance.
- C. Protect materials from damage during storage and installation. Remove and replace damaged units.

## **1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Per Section 01560.
- B. Do not install foundation when subgrade is wet or frozen.

## **1.7 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

## **1.8 COORDINATION**

- A. Coordinate work with wall penetrations, connection to storm water system, affected utility companies, and utility adjustments.
- B. Coordinate work with the District and private property owner.

## **PART 2 - PRODUCTS**

### **2.1 CONCRETE LEVELING COURSE**

- A. Concrete: Per Section 03002.

### **2.2 LANDSCAPE GRAVITY BLOCK WALL SYSTEM**

- A. Modular Face and Tieback Units:
  - 1. Product Description: ASTM C1372 precast solid concrete units, zero slump molded under high vibration and pressure, with finish that is acceptable to the private property owner:
    - a. Standard units: Closed face containing off-set tongue and groove for self-battering, chamfered unit facing to create random block appearance and form exterior facia.
    - b. Coping units: Same as standard units without tongue.
    - c. Tie-back Units: Manufacturer's standard reinforced unit as required.
  - 2. Concrete Materials:
    - a. Per Section 03002.
    - b. Portland Cement: ASTM C150, White, Gray or Buff color Portland, Type 1.
    - c. Aggregates:
      - 1) Aggregate, sand, water, fibers, admixtures: determined by precast fabricator, as appropriate to design requirements, no slag, no admixtures containing chlorides.

### **2.3 BACKFILL AND DRAINAGE SYSTEM**

- A. Drainage Media:
  - 1. Coarse Aggregate Backfill: ASTM D448, AASHTO Size No. 57 hard, durable, angular gravel, crushed gravel, or crushed stone, or combination of gravel, crushed gravel, or crushed stone, no slag.
- B. Geotextile Filter Fabric:
  - 1. Per Section 02200, non-biodegradable, non-woven, polyester filter fabric suitable of segregation of particulate materials.
- C. Foundation Drain Pipe:
  - 1. Perforated Drain Pipe:
    - a. 6" CPEP Type SP per Section 02541.

## **PART 3 - EXECUTION**

### **3.1 DEWATERING**

- A. Per Section 02140.

### **3.2 EXCAVATION**

- A. Per Section 02221.

### **3.3 DRAINAGE AND BACKFILL**

- A. Set geotextile filter fabric against back of first wall unit, over prepared foundation, and extend along bottom towards back of excavation, up excavation face and back over top of the drainage media to the landscape gravity block wall, or as indicated in Drawings.
- B. Place perforated drain pipe footing as indicated in the Drawings and in accordance with Sections 02200, 02221, and 02541. Lay pipe at minimum gradient of 0.5 percent to ensure drainage to free outlets. Incorporate drain pipe encased in filter sock.
- C. Place and compact drainage media material in maximum 12-inch lifts.
- D. Place and compact soil backfill material above drainage media and geotextile from top of wall to finished ground in maximum 8-inch lifts.
- E. Maintain optimum or less moisture content of backfill materials to attain required compaction density.
- F. Allow no heavy compaction equipment within three feet of back of wall facia.
- G. Restore ground from top of wall to existing grade per the Drawings.

### **3.4 INSTALLATION OF MODULAR UNITS**

- A. Assemble units as shown on shop drawings and in accordance with manufacturer's recommendations.
- B. Connect tie-back units to standard facing units by interlocking tongue and groove and support in rear with standard units. Align tie backs vertically in alternate courses on 8 FT centers.
- C. Place first course of precast concrete modular retaining wall units on concrete footing. Ensure that wall modules are aligned properly, leveled from side to side and front to back and are in complete contact with footer.
- D. Place wall modules above bottom course such that tongue and grove arrangement provides design batter of wall face. Place successive courses to create running bond pattern with edge of units being approximately aligned with middle of unit in course below it.
- E. Place units side by side for full length of wall alignment. Ensure correct retaining wall lines, curves, jogs, and steps for first course.
- F. Sweep excess material and remove burrs from top of units before placing additional levels to ensure that no dirt, concrete or other foreign materials become lodged between successive lifts of wall modules. Install next course maintaining required vertical alignment as shown on shop drawings. Stagger full bearing of concrete units over vertical joints below. Do not use blocks, wedges, or other devices for permanent shimming of wall units.
- G. Place maximum of three courses of wall units above level of drainage material at any time.
- H. Check level of wall modules with each lift to ensure that no gaps are formed between successive lifts.
- I. Repeat erection sequence until grades indicated on Drawings are achieved.
- J. Secure coping units to top of wall with two 3/8 IN beads of flexible concrete adhesive positioned 2 IN in front and behind tongue of last course of retaining wall units.
- K. Handle and erect concrete units carefully so as to avoid damage to units. Replace any members damaged to extent where their aesthetics or structural integrity is compromised.

**END OF SECTION**

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**SECTION 02900**  
**LANDSCAPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies all landscaping (except for lawns and grasses), which includes soil preparation, fine grading, plant removal, plant installation, plant protection, fertilizing, desiccant, staking, cleanup, warranty, and maintenance work.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
1. Manufacturer:
    - a. Materials to be provided under this Section are to be the product of firms regularly engaged in the cultivation of the specified species or manufacture of a specified material.
  2. Installers:
    - a. Shall be specialists possessing sufficient technical competence, skills, resources and ability to complete the work specified under this Section with a requisite degree of competence.
    - b. Shall have experience installing native plants under supervision of a qualified supervisor.
  3. Landscaping Superintendent: Shall have similar experience on a minimum of eight projects in the last five years.
  4. Arborist: Certified by the International Society of Arboriculture (ISA) and licensed by the state of Washington.
  5. Commercial Pesticide Applicator: Shall have license from the Washington State Department of Agriculture (WSDA) for applying pesticides.
  6. Commercial Pest Control Consultant: WSDA license.
  7. Automatic Irrigation System Designer: Shall have similar experience on a minimum of eight projects in the last five years.
  8. Nursery: Specializing in growing and cultivating native plants with license from WSDA or Oregon Department of Agriculture.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications:
1. Landscaping Superintendent: List of project experience and owner contact information.
  2. Arborist: ISA certification and Washington State license number.
  3. Commercial Pesticide Applicator: WSDA license number.
  4. Commercial Pest Control Consultant: WSDA license number.
  5. Automatic Irrigation System Designer: List of project experience and owner contact information.
- C. Plant Establishment Plan.
- D. Supplier and supplier's type designation for all fertilizers and commercial products.
- E. Materials List:
1. A complete list of proposed materials demonstrating conformance with the requirements indicated.
  2. Include names and addresses of all suppliers.
- F. Plant schedule and plant material sources.
- G. Written verification and approval of plant material layout in field by District prior to installation of plants.
- H. Bark or Wood Chip Mulch: 0.25 cubic foot representative samples of imported mulch.

- I. Compost and Soil Amendment (Fine Compost): 1.0 cubic foot sample and test results for organic amendment proposed for the project.
- J. Maintenance Schedule:
  - 1. Areas Located Outside of Wetlands: Schedule of watering and maintenance activities to be performed by Contractor during the 1-year plant establishment period of the Contract.
  - 2. Wetlands: Schedule of watering and maintenance activities to be performed by Contractor during the 1-year plant establishment period of the Contract and the 2-year maintenance period after Substantial Completion.
  - 3. The schedule shall delineate specific activities and their frequency and shall be submitted prior to Initial Acceptance of Planting.
- K. Closeout information:
  - 1. Warranty.
  - 2. Maintenance data.

#### **1.4 PLANT ESTABLISHMENT PLAN**

- A. The Plant Establishment Plan shall describe activities necessary to ensure continued health and vigor of planted and seeded areas in accordance with the requirements of Sections 8-02.3(12) and 8-02.3(13) of the 2020 WSDOT Standard Specifications. Should the plan become unworkable at any time during the 1-year plant establishment period (and 2-year maintenance period for wetlands), submit a revised plan prior to proceeding with further Work. The Plant Establishment Plan shall show the scheduling, frequency, dates, materials and equipment utilized, whichever may apply, for all plant establishment activities including, but not limited to, the following:
  - 1. Plant Establishment Activities:
    - a. Weed Control for Target Weeds within Planting Areas.
    - b. Fertilizing.
    - c. Watering.
    - d. Litter and Debris Removal.
    - e. Pruning.
    - f. Insect and Disease Control.
    - g. Erosion Control Methods and Procedures.
    - h. Plant Replacement.
  - 2. Supervisor/Responsible Contact Name:
    - a. Local address.
    - b. Local telephone number.
    - c. Sign and date the Plant Establishment Plan.
- B. Failure to comply with the Plant Establishment Plan or to revise the plan as needed or to comply with corrective steps outlined by the District will increase the duration of the plant establishment period and will result in a suspension of time for the plant establishment period.
- C. Any such suspension of time will not be lifted until all unsatisfactory conditions have been corrected to the satisfaction of the District.

#### **1.5 SCHEDULE AND COORDINATION**

- A. Install plants and cuttings after final grading is complete during the Planting Season.
- B. Do not install plants during freezing weather or when ground is frozen.
- C. Existence of proper grades shall be verified prior to beginning planting operations.

#### **1.6 WARRANTY**

- A. Warranty Period:

1. Areas Located Outside of Wetlands: Warranty Period shall be one year from Initial Acceptance of Planting.
  2. Wetlands: Warranty Period shall be two years after Substantial Completion.
- B. Conduct maintenance of all plantings per this Section.
- C. Remove and replace distressed, diseased, dying, or dead plants with new plants per plant materials, planting operations, and maintenance specifications.
- D. Plants replaced under warranty will not have a second warranty, except:
1. If originally planted material is distressed, diseased, dying, or dead the following spring, replace material immediately during months of March and May.
  2. If plants fail again during growing season, replace again between October 1 and March 31.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery and Storage:
1. Furnish standard products in manufacturer’s standard containers bearing original labels showing quantity, analysis, and name or manufacturer.
  2. Store products with protection from weather or other conditions which would damage or impair the effectiveness of the product.
  3. Plants that cannot be planted within one (1) day after arrival shall be “heeled-in” or otherwise stored temporarily in accordance with accepted horticultural practice and in a manner that does not compromise the health of the plant material.
  4. Cuttings and Emergent Stock: Take necessary precautions to prevent rot or drying out during delivery and storage. Plant stock shall remain securely wrapped, protected, and moist, shall be stored in moist sawdust, and shall be kept cool, using cold storage if necessary.
  5. Plants stored under temporary conditions shall be protected from extreme weather conditions and shall be kept moist.
- B. Handling:
1. Do not drag plant material without proper root and branch protection.
  2. Lift container plants by container.
  3. Do not drop any plant material or damage root system.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Manufacturer:
1. Materials to be provided under this Section are to be the product of companies regularly engaged in the cultivation of the specified species or manufacture of a specified material.

### **2.2 MATERIALS**

- A. Topsoil:
1. Topsoil shall consist of a uniform blend composed by volume of 60 percent to 70 percent Sandy Loam and 30 percent to 40 percent Fine Compost.
  2. Sandy Loam:
    - a. Sandy Loam shall be as defined by the US Department of Agriculture Natural Resource Conservation Services Soil Texture Triangle. Testing shall be performed by a Washington State Department of Ecology accredited testing laboratory approved through the North American Proficiency Testing Performance Assessment Program (NAPT-PAP) on a sample size of no less than 2 pounds. Testing shall not occur more than 90 days prior to installation and shall be submitted to the District for approval a minimum of 14 days prior to use or installation.
    - b. The Sandy Loam analysis shall meet the following requirements:

Tested Item	Method*	Units	Specification Range
pH 1:1	S-2.20	S.U.	5.5 – 7.5
E.C. 1:1	S-2.20	mmhos/cm	≤ 2
Nitrate Nitrogen	S-3.10	mg/Kg	***
Ammonium Nitrogen	S-3.50	mg/Kg	***
Organic Matter	S-9.10	%	3 – 10
Phosphorus (P)	S-4.20 (Bray)	mg/Kg	***
Calcium (Ca)	S-5.10 (NH4OAC)	meq/100g	***
Magnesium (Mg)	S-5.10 (NH4OAC)	meq/100g	***
Sodium (Na)			***
Potassium (K)	S-6.11 (DTPA/Sorbitol)	Mg/Kg	***
Zinc (Zn)			***
Manganese (Mn)	S-6.11 (DTPA/Sorbitol) EPA 908/S-10.10	Mg/Kg meq/100g	***
Copper (Cu)			***
Iron (Fe)			***
Sulfur (SO4-S)			***
Boron (B)			***
Molybdenum (Mo)			***
Cation Exchange (CEC)			5 Min.
Total Nitrogen			AOAC 990.3
Total Carbon	AOAC 972.3	%	***
C:N Ratio			20:1 or less
Exchangeable Sodium Percentage (ESP)	ESP	%	10 Max.
Particle Size Analysis (Sand, Clay, Silt)	S-14.10 (Hydrometer)	%	Sandy Loam
Heavy Metals Testing	EPA 6010D	mg/Kg	From WAC 173-350-220 Table 220-B unless otherwise noted
Arsenic			≤ 20
Cadmium			≤ 10
Chromium			≤ 42**
Copper			≤ 100**
Lead			≤ 150

Tested Item	Method*	Units	Specification Range
Molybdenum			≤ 9
Nickel			≤ 100**
Selenium			≤ 18
Zinc			≤ 270**
Mercury	EPA 7473		≤ 8

\*Methods are from "Soil, Plant, and Water Reference Methods For the Western Region" 2005, 3rd Ed., Dr. R. Gavlak, Dr. D. Horneck, Dr. R.O. Miller.

\*\*From WAC 173-340-900 Table 749-2 for Unrestricted Land Uses

\*\*\*Testing for soil-testing laboratory recommendations for soil treatments and amendments

- c. The soil-testing laboratory shall state recommendations for soil treatments and soil amendments to be incorporated based on the results of the tests. Recommendations shall be in pounds per acre, or volume per cu. yd. for nitrogen, phosphorus, potash nutrients, and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
- 3. Mixing Requirements:
  - a. Topsoil shall be thoroughly mixed by the supplier prior to delivery to the site. The Contractor shall submit certification from the supplier that the Topsoil has been mixed according to the above percentages at the point of delivery.
  - b. Acceptance of Topsoil for use on a project shall be on the basis of visual verification by the District that the delivered material is representative of the laboratory analysis documentation and certification.
- B. Plant materials:
  - 1. Species and size indicated.
    - a. As indicated in the Drawings.
    - b. No substitutions without written approval of the District.
  - 2. Sound, healthy, vigorous, with normal top and root systems.
  - 3. No substitution of root ball types are to be made without written approval of the District.
  - 4. Free from mildew, fungus, diseases, and insect pests or their eggs.
  - 5. Nursery grown stock, freshly dug.
  - 6. No heeled-in, cold storage, or collected stock.
  - 7. Grown in same or colder climatic zone as Project.
- C. Trees:
  - 1. Single leader, straight trunk (unless otherwise indicated).
  - 2. Well branched, free of branches up to 5 foot high (unless otherwise indicated).
  - 3. Symmetrical growth.
- D. Balled and burlapped plants (B&B): Firm, natural balls of soil wrapped with burlap or strong cloth and tied.
- E. Container grown plants (CG):
  - 1. Containers shall not contain weeds.
  - 2. Roots well established in soil, but not root bound or girdled.
  - 3. Grown in container for at least one growing season and less than two growing seasons.
- F. Bark or Wood Chip Mulch: Fir/Hemlock bark of approved commercial grade. 3-inch minus particle or standard size.
- G. Compost and Soil Amendment (Fine Compost):
  - 1. Compost products shall be the result of the biological degradation and transformation of organic materials under controlled conditions designed to promote aerobic decomposition. Compost shall be stable with regard to oxygen consumption and carbon dioxide generation. Compost shall be mature

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with regard to its suitability for serving as a soil amendment or an erosion control BMP as defined below. The compost shall have a moisture content that has no visible free water or dust produced when handling the material. Compost production and quality shall comply with Chapter 173-350 WAC and for biosolids composts, Chapter 173-308 WAC. Compost products shall meet the following physical criteria:

- a. Compost material shall be tested in accordance with U.S. Composting Council Testing Methods for the Examination of Compost and Composting (TMECC) 02.02-B, "Sample Sieving for Aggregate Size Classification".
    - 1) 1" sieve size: 100% minimum passing.
    - 2) 5/8" sieve size: 90% minimum – 100% maximum passing.
    - 3) 1/4" sieve size: 75% minimum – 100% maximum passing.
  - b. The pH shall be between 6.0 and 8.5 when tested in accordance with U.S. Composting Council TMECC 04.11-A, "1:5 Slurry pH".
  - c. Manufactured inert material (plastic, concrete, ceramics, metal, etc.) shall be less than 1 percent by weight as determined by U.S. Composting Council TMECC 03.08-A "Classification of Inerts by Sieve Size".
  - d. Minimum organic matter shall be 40 percent by dry weight basis as determined by U.S. Composting Council TMECC 05.07A "Loss-On Ignition Organic Matter Method (LOI)".
  - e. Soluble salt contents shall be less than 4.0 mmhos/cm when tested in accordance with U.S. Composting Council TMECC 04.10 "Electrical Conductivity".
  - f. Maturity shall be greater than 80 percent in accordance with U.S. Composting Council TMECC 05.05-A, "Germination and Root Elongation".
  - g. Stability shall be 7-mg CO<sub>2</sub>-C/g OM/day or below in accordance with U.S. Composting Council TMECC 05.08-B "Carbon Dioxide Evolution Rate".
  - h. The compost product shall originate from organic waste as defined in Chapter 173-350 WAC as "Type 1 Feedstocks", "Type 2 Feedstocks", and/or "Type 3 Feedstocks". The Contractor shall provide a list of feedstock sources by percentage in the final compost product.
  - i. The Engineer may also evaluate compost for maturity using U.S. Composting Council TMECC 05.08-E "Solvita® Maturity Index". Fine compost shall score a number 6 or above on the Solvita® Compost Maturity Test. Medium and coarse compost shall score a 5 or above on the Solvita® Compost Maturity Test.
2. Compost and soil amendment shall be compatible with use within the riparian area. All test data will be required to show that the amendment meets specifications.
- H. Landscape Boulders:
1. Salvaged on site.
  2. Size: 2-5 "man" rock.
  3. Utilize salvaged boulders smooth and free of cracking, flaking and machine marks.
- I. Herbicide:
1. Pre-emergent/Post-emergent: Commercial grade conforming to State and Federal regulations.
- J. Tree stakes: 5-foot, round pine stake with an outer diameter of 2-inches.
- K. Guying wire: 12-gage wire.
- L. Rubber hose: Black
- M. Tree supplemental watering bag:
1. Constructed of UV treated, reinforced polyethylene material with a nylon toothed zipper.
  2. Constructed so they can be attached around a tree with a zipper that extends from the top to bottom of the bag.
  3. Each bag capable of holding at least 20 gallons of water
- N. Water:
1. Provide water necessary to ensure an adequate supply to meet the needs of this Contract. District will provide fill location with meter (at hydrant) for Contractor to fill water trucks.

## HYDROSEEDING

2. Provide necessary hose, equipment, attachments, and accessories for the adequate watering of plant areas as may be required to complete the work as specified.
3. Costs incurred for water during the Contract period shall be borne by the Contractor.

### **2.3 PLANT LIST AND PLANT SCHEDULE**

- A. As indicated in the Drawings.

### **2.4 LONG TERM EROSION CONTROL MATTING**

- A. Per Section 02935.

## **PART 3 - EXECUTION**

### **3.1 SITE GRADING AND SOIL PREPARATION**

- A. Prior to planting operations, the Contractor shall:
1. Review and identify work areas with the District.
  2. Notify the District immediately of excessive compaction, debris, or other conditions preventing initiation of work.
  3. Replace stockpiled topsoils as the final grade material.
  4. Scarify disturbed and excessively compacted areas to be planted to a depth of at least 8 inches prior to seeding and planting.
  5. Remove rocks, clods, roots, pieces of wood and plastic, pieces of metal or wire and other construction related debris over two inches in any dimension. Provide for legal off-site disposal; submit information on disposal site and quantities per Section 02221.
- B. Wetlands:
1. Within wetlands and buffers, final grades shall be surveyed and confirmed to match pre-construction survey per Section 02227. Final grades shall not include depth of mulch. Final grades shall be confirmed prior to placement of mulch.
  2. Replaced salvaged topsoil within excavations per Sections 02100 and 02227.
  3. Rough grade to a smooth finish, restoring contours and drainage patterns to match pre-construction condition as documented through the preconstruction survey; see Section 02227.
- C. Installation of plant material shall constitute acceptance of final grade elevations and site conditions by the Contractor.
- D. Provide a consistent, smooth planting bed.
- E. Compact subgrade and topsoil fill at 85 percent maximum density per ASTM D1557.
- F. Soils shall not be worked in the presence of standing or ponding water, saturated soil, or frozen soils.
- G. Install uniform 3-inch depth of bark or wood chip mulch across all plant zones and planting beds where balled and burlapped trees are installed as indicated in the Drawings.

### **3.2 LONG TERM EROSION CONTROL MATTING**

- A. Per Section 02935.

### **3.3 PLANTING OPERATIONS**

- A. General:
1. Provide the quantity and sizes of trees and shrubs as indicated in the Drawings.
  2. Provide quantity and sizes of balled and burlapped trees as indicated in the Drawings.
  3. Transport plant materials to their final location with care.
  4. Tie down branches, if necessary, and protect bark with burlap bags to prevent damage from chafing by ropes and wires.
  5. Do not drag plants on the ground.

## **HYDROSEEDING**

6. Properly place in a manner which provides complete protection for the roots and branches.
  7. Plant trees during normal periods for such work, as determined by the season, weather, and accepted practice.
  8. Remove rejected plants from the site immediately.
  9. Notify the District if obstructions or other conditions detrimental to plant establishment are encountered.
- B. Planting Season: Between October 1 and March 31.
- C. Planting Time: Planting of trees and shrubs shall be done only during periods that are normal for such work as determined by weather conditions and accepted practice:
1. Do not plant or work soils when there is a presence of ponded water in areas to be worked.
  2. Do not plant when ground is frozen or temperature is below 32 degrees Fahrenheit.
- D. Layout: Stake all plant material locations and layout bedlines prior to beginning installation. The District is required to provide written verification and approval of plant material layout and make adjustments to plant material locations to meet field conditions prior to installation of plants.
- E. Excavate materials without additional cost.
- F. Prepared soil:
1. Place 3 inch depth of soil amendment on imported topsoil per this Section or existing soil that has received clearing and grubbing treatment and is designated for planting.
  2. Incorporate soil amendment into imported topsoil or existing soil to a depth of 10 inches.
- G. Trees and shrubs:
1. Removal:
    - a. Ball and burlap plants.
    - b. Dig with firm natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant.
    - c. Firmly wrap with burlap and bound with twine or wire mesh.
    - d. Where necessary to prevent breaking or cracking of the ball during the process of planting, secure the ball to a platform.
    - e. No plant will be accepted if the ball is cracked or broken before or during planting operations.
  2. Planting: Use pocket planting technique.
    - a. Create planting pockets of prepared soils large enough to sustain the newly installed landscape materials.
    - b. Use reasonable care to dig planting pockets and prepare soil prior to moving plants to their respective locations for planting to ensure that they will not be unnecessarily exposed to drying elements or to physical damage.
    - c. Dig circular pockets with vertical sides. Diameter of pits for trees and "B&B" shrubs shall be at least 2-feet greater than the diameter of the ball.
    - d. Remove burlap, rope, wires, etc., from balls.
    - e. Set plants straight or plumb, at such level that after settlement they bear same relationship to final grade as they did in their former setting.
    - f. The depth of pockets for trees and shrubs shall be enough to accommodate the ball when the plant is set to final grade allowing for a minimum of 6-inches of compacted prepared topsoil in the bottom of the pit.
    - g. The final grade level of the plant after settlement shall be the same as that at which the plant was grown.
    - h. Place the plants carefully in the prepared planting pockets.
    - i. Remove binding of upper 1/3 of the ball and loosen burlap.
    - j. Remove all burlap over irrigation systems.
    - k. Prepare topsoil to fill planting pit 2/3 deep and tamp into place with foot.
    - l. Add water sufficient to flood hole.
    - m. When surface drains off, fill hole to proper depth with topsoil and form a 2-inch basin around each tree exceeding the diameter of the planting pocket.
    - n. Add bark mulch and flood with water again to thoroughly soak basin.

- o. When surplus water drains away, tamp soil firmly and add mulch as required to fill depressions and give a neat appearance.
- H. Mulching:
- 1. Mulch tree planting pit after saucer has been shaped to depth of 3 inches with bark mulch.
    - a. Keep mulch off of tree trunk.
  - 2. In massed plantings, mulch entire area uniformly to depth of 4 inches with bark mulch.
  - 3. If mulching is delayed and soil has dried out, water plants thoroughly before spreading mulch.
- I. Staking:
- 1. Immediately stake each tree, making sure the rubber protector provides adequate protection for the tree trunk.
  - 2. Set stakes securely at an angle.
  - 3. For deciduous trees smaller than 3-inches: Two stakes spaced opposite sides of tree.
  - 4. Remove staking and guying within one year.
- J. Site cleanup:
- 1. Remove all waste materials including plant labels, containers, and litter from the site after planting is complete.
  - 2. Recycle or properly dispose of waste materials.
  - 3. Areas shall be kept clean during progress of work and until Initial Acceptance of Planting. Water, dirt, and rubbish shall be kept off of paved areas. Remove surplus material and rubbish from planting beds. Wash paved areas.
- K. Inspection:
- 1. Upon completion of planting, submit request to the District for inspection of planting work.
  - 2. During inspection, record a punch list of observed unsatisfactory conditions.
  - 3. The District will grant Initial Acceptance of Planting once all unsatisfactory conditions are addressed.

### **3.4 INITIAL ACCEPTANCE OF PLANTING AND MAINTENANCE**

- A. General:
- 1. Warranty Period:
    - a. Areas Located Outside of Wetlands: Warranty Period will commence upon receiving Initial Acceptance of Planting and when the Plant Establishment Plan has received a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED per Section 01300.
    - b. Wetlands: Warranty Period will commence after Substantial Completion.
  - 2. Warranty Period shall consist of providing adequate maintenance and proper care of all plant materials and planting areas to ensure the resumption of growth of transplanted material and weed free conditions.
  - 3. Areas Located Outside of Wetlands:
    - a. Provide maintenance for at least one year (plant establishment period) after Initial Acceptance of Planting and complete quarterly inspections with the District.
  - 4. Wetlands:
    - a. Provide maintenance for the plant establishment period and at least two years after Substantial Completion and complete quarterly inspections with the District.
  - 5. Watering shall be sufficient to supplement natural rainfall for all plants at a minimum rate of one (1) inch of water per week.
  - 6. Maintain trees and shrubs in a vigorous, thriving condition through watering, pruning, cultivating, spraying, and other necessary operations for the total period of time the plant material is temporarily held.
  - 7. Maintain landscaped and staging areas in a clean, neat, and orderly manner at all times.
  - 8. Maintain landscape area in a weed free condition through final inspection.
  - 9. Protect trees and shrubs from damage by erosion or trespassing. Erect proper safeguards.
  - 10. Maintain water levels within tree supplemental watering bags to maintain trees in a vigorous and thriving state.
  - 11. Maintain new and transplanted materials for one year from Initial Acceptance of Planting.

12. Protect existing native vegetation in place. Repairs to any area, including access routes, disturbed by landscape construction shall be repaired by the Contractor at no cost to the District.
13. No fertilizer or chemicals shall be used in wetland or riparian areas unless approved by the District and the responsible regulatory agency.

### **3.5 FINAL CLEANUP**

- A. Remove deleterious material and debris from all areas.
- B. Neatly rake planting areas to an even fine grade.
- C. Wash and clean hard surfaces.

### **3.6 FINAL INSPECTION AND ACCEPTANCE**

- A. Areas Located Outside of Wetlands: Following the completion of the one-year Warranty Period, conduct a final inspection (maintenance walkthrough) of all project-installed landscape elements with the District.
- B. Wetlands: Following the completion of the Warranty Period, conduct a final inspection (maintenance walkthrough) of all project-installed landscape elements with the District.
- C. Final inspection shall determine completion of Contract work. Final inspection will be made by the District no earlier than two (2) days after receipt of due notice requesting such inspection.
- D. The site shall be thoroughly cleaned and work shall be completed at the time of final inspection.
- E. Final inspection shall determine completion of Contract work, and be completed by the District.
- F. Upon Final Acceptance or after the specific time period as stated herein, the District or private property owner will assume landscape maintenance.

**END OF SECTION**

**SECTION 02935**  
**HYDROSEEDING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes hydroseeding, and hand seeding areas disturbed by construction, and associated lawn establishment.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Product technical data including:
  - 1. Signed copies of vendor's statement/certification for required grass seed mixtures, indicating percentage by weight and percentages of purity, germination, and weed seed for each grass species.
  - 2. Certification that each container of seed delivered will be labeled in accordance with Washington State seed laws and meets or exceeds specification requirements.
  - 3. Manufacturer's installation instructions.
  - 4. Source and location of seed materials.
- C. Copies of delivery invoices or other proof of quantities of mulch, tackifier, fertilizer, and composition of the seed mix.

**1.3 SEQUENCING AND SCHEDULING**

- A. Installation Schedule:
  - 1. Show schedule of when seeded areas are anticipated to be planted.

**1.4 JOB CONDITIONS**

- A. Lawn establishment re-seeding shall be required for lack of coverage due to erosion and drainage problems resulting from rough grading.
- B. Confine work to areas designated. Do not disturb existing vegetation outside of construction limits.
- C. Repair or replace vegetation damaged as a result of Contractor's operations.
- D. Provide necessary safeguards for the protection of planted areas for such time as is required to assure vigorous establishment of the plant material.

**1.5 LAWN ESTABLISHMENT**

- A. Lawn establishment shall be provided for seeded areas in accordance with 2020 WSDOT Standard Specifications Section 8-02.3(10)C.

**PART 2 - PRODUCTS**

**2.1 SEED**

- A. Seed shall be clean, delivered in original unopened packages, and bearing an analysis of the contents.
- B. Guaranteed 95 percent pure with minimum germination rate of 85 percent.
- C. Furnished in standard containers that show the following information: common seed name, lot number, net weight, percentage of purity, germination, weed seed, and inert material.
- D. Seed that has become wet, moldy, or otherwise damaged will not be accepted.
- E. Percentage of weed seed content and inert material shall be clearly marked for each kind of seed in accordance with applicable state and Federal laws.

- F. Grass seed of the type herein specified shall conform to the standards for “Certified” grade seed or better as outlined by the State of Washington Department of Agriculture “Rules for Seed Certification”, latest edition.
- G. Submit duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed testing laboratory within twelve months before the date of delivery on the Project.

**2.2 SEED MIXTURE**

- A. Seed mixes: Seed shall be mixed by the vendor. Submit the vendor's statement/certification of the composition of the required grass seed mixtures indicating the percentage by weight and percentage of purity, germination, and weed seed for each grass species. Seed shall be composed of the following varieties mixed in the properties indicated:

KIND AND VARIETY OF SEED IN MIXTURE	PERCENT BY WEIGHT	MINIMUM PERCENT PURE SEED	MINIMUM PERCENT GERMINATION
<b>Wetland Seed Mix 1</b>			
Short-awn foxtail ( <i>Alopecurus aequalis</i> )	30	98	85
Tufted hairgrass ( <i>Deschampsia cespitosa</i> )	30	97	90
Red fescue ( <i>Festuca rubra</i> )	30	95	80
Soft rush ( <i>Juncus effusus</i> )	10	97	85
<b>TOTAL</b>	<b>100%</b>		

Note: Total weed seed for mixture shall not exceed 1 percent. In addition, seed shall be free of weed seeds listed as noxious by the Washington State Seed Law singularly or collectively in excess of the labeling tolerance specified by the Washington State Seed Law.

KIND AND VARIETY OF SEED IN MIXTURE	PERCENT BY WEIGHT	MINIMUM PERCENT PURE SEED	MINIMUM PERCENT GERMINATION
<b>Wetland Seed Mix 2 (Pasture)</b>			
Short-awn foxtail ( <i>Alopecurus aequalis</i> )	33	98	85
Tufted hairgrass ( <i>Deschampsia cespitosa</i> )	33	97	90
Red fescue ( <i>Festuca rubra</i> )	34	95	80
<b>TOTAL</b>	<b>100%</b>		

Note: Total weed seed for mixture shall not exceed 1 percent. In addition, seed shall be free of weed seeds listed as noxious by the Washington State Seed Law singularly or collectively in excess of the labeling tolerance specified by the Washington State Seed Law.

KIND AND VARIETY OF SEED IN MIXTURE	PERCENT BY WEIGHT	MINIMUM PERCENT PURE SEED	MINIMUM PERCENT GERMINATION
<b>Upland Seed Mix</b>			
Red fescue ( <i>Festuca rubra</i> )	10	95	80
Perennial ryegrass ( <i>Lolium perenne</i> )	40	97	90
Redtop bentgrass ( <i>Agrostis alba</i> )	40	98	85
White dutch clover ( <i>Trifolium repens</i> )	10	97	85
<b>TOTAL</b>	<b>100%</b>		

Note: Total weed seed for mixture shall not exceed 1 percent. In addition, seed shall be free of weed seeds listed as noxious by the Washington State Seed Law singularly or collectively in excess of the labeling tolerance specified by the Washington State Seed Law.

KIND AND VARIETY OF SEED IN MIXTURE	PERCENT BY WEIGHT	MINIMUM PERCENT PURE SEED	MINIMUM PERCENT GERMINATION
<b>Pasture Seed Mix</b>			
Red fescue ( <i>Festuca rubra</i> )	10	95	80
Perennial ryegrass ( <i>Lolium perenne</i> )	40	97	90
Kentucky bluegrass ( <i>Poa pratensis</i> )	40	98	85
White dutch clover ( <i>Trifolium repens</i> )	10	97	85
<b>TOTAL</b>	<b>100%</b>		

Note: Total weed seed for mixture shall not exceed 1 percent. In addition, seed shall be free of weed seeds listed as noxious by the Washington State Seed Law singularly or collectively in excess of the labeling tolerance specified by the Washington State Seed Law.

KIND AND VARIETY OF SEED IN MIXTURE	PERCENT BY WEIGHT	MINIMUM PERCENT PURE SEED	MINIMUM PERCENT GERMINATION
<b>Sod Lawn Seed Mix</b>			
Pavilion Perennial Ryegrass	24.69	95	90
Banfield Perennial Ryegrass	24.66	97	90
Fiesta 4 Perennial Ryegrass	19.88	98	90
Windward Chewings Fescue	14.82	87	85
Garnet Creeping Red Fescue	14.76	95	85
<b>TOTAL</b>	<b>100%</b>		

Note: Total weed seed for mixture shall not exceed 1 percent. In addition, seed shall be free of weed seeds listed as noxious by the Washington State Seed Law singularly or collectively in excess of the labeling tolerance specified by the Washington State Seed Law.

## 2.3 FERTILIZER

- A. Fertilizer containing phosphorus shall not be applied within 200 feet of flowing streams, rivers, or areas of standing water.
- B. Fertilizer shall be commercial, chemical type, uniform in composition, free-flowing conforming to state and federal laws, and suitable for application with equipment designed for that purpose.
- C. Fertilizer for seed mixes shall be one of the following:
  - 1. Acceptable Manufacturers:
    - a. Meister 18-7-11 plus micronutrients controlled release NPK fertilizer, Wolfkill Seed and Fertilizer Corp., P.O. Box 578 Monroe, WA.
    - b. Woodace 18-8-9 plus micronutrients controlled release NPK fertilizer, Vigoro Industries, Inc., P.O. Box 512 Winterhaven, FL.
    - c. Nutricote 18-6-8 plus micronutrients controlled release NPK fertilizer, Plantco, Inc., 314 Orenda Rd. Brampton, Ontario.
    - d. Wil-Gro Pro Balance 50 (16-16-16), Wilbur-Ellis, 13586 Bayview Edison Rd., Mount Vernon, WA.
    - e. Or Approved Equal.
- D. Provide nitrogen in a form that will be available for seeded areas during initial period of growth. At least 50 percent of nitrogen shall be in organic form. Super phosphate shall be a soluble mixture of treated minerals with 20 percent of phosphoric acid available seeded areas. The controlled release period shall be greater than 6 months.
- E. Mulch shall meet the requirements of 2020 WSDOT Standard Specifications Section 9-14.5(2)a.

## 2.4 TACKIFIER

- A. Tackifier shall meet the requirements of 2020 WSDOT Standard Specifications Section 9-14.5(7).

## 2.5 LONG TERM EROSION CONTROL MATTING

- A. Erosion control matting shall be a biodegradable product coconut fiber matting, Geocoir DeKowe 700 manufactured by Belton Industries or Approved Equal, 12-foot wide rolls.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. All disturbed areas within stream and wetland buffers, including access roads and staging areas, shall be hydroseeded within 48 hours of completion.
- B. All areas to be seeded except the sod lawn seed mix areas shall have a min. of 3 inches of reclaimed existing topsoil or imported 3-way topsoil (compost, sand, sandy loam). For the designated sod lawn seed mix areas, the depth of reclaimed existing topsoil or imported 3-way topsoil (compost, sand, sandy loam) shall be 4-inches. The reclaimed existing or imported 3-way topsoil is considered incidental to the res

### 3.2 SOIL PREPARATION

- A. Hydroseeding:
  - 1. Avoid disturbing existing established vegetation to remain. Soil shall not be worked when the ground is frozen, wet, or in a condition detrimental to seed germination and growth.
  - 2. Immediately before hydroseed installation, lightly rake the seedbed.
  - 3. If soil is dry, lightly sprinkle with water before hydroseed installation.
- B. Preparation for Hand Seeding:
  - 1. Loosen surface to minimum depth of 8 inches.
  - 2. Remove stones over 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter.

3. Correct any surface irregularities in order to prevent pocket or low areas which will allow water to stand.
4. Distribute fertilizer uniformly over work areas to be seeded:
  - a. For seeded areas: 200 lbs per acre.
5. Incorporate fertilizer into soil to a depth of at least 2 inches by raking, or other methods if acceptable to the District.

### **3.3 LONG TERM EROSION CONTROL MATTING**

- A. In areas to be seeded with slopes steeper than 2 horizontal to 1 vertical, or as acceptable to the District, prepare soil for hydroseeding before placing erosion control matting.
- B. Spread erosion control matting and secure the matting per the manufacturer's instructions and as indicated in the Drawings.
- C. Matting shall be placed over disturbed soil and laid paralleling the direction of drainage.
- D. Hydroseeding shall be done under the matting. Planting of shrubs and trees (where indicated to be required with erosion control matting) shall occur after installation of the erosion control matting.

### **3.4 PERMANENT SEEDING AND EROSION CONTROL SEEDING**

- A. Notify the District not less than 24 hours in advance of any seeding operation and do not begin the work until areas prepared or designated for seeding have been accepted. Following the District's acceptance, seeding of the accepted areas shall begin immediately.
- B. Seeding shall not be done during windy weather or when the ground is frozen, excessively wet, or otherwise untillable. When, in the opinion of the District, environmental conditions are not conducive to satisfactory result from seeding operations, suspend the work and resume it only when desirable results are likely to be obtained. Unfavorable environmental conditions include wind strong enough to carry the seed/slurry mix away and rain that will wash seed from slopes.
- C. Seeding shall occur during the following seeding seasons unless otherwise acceptable to the District:
  1. March 1 through May 15.
  2. September 1 through October 1.
- D. Seed, mulch, and fertilizer shall be applied together by a mechanical seeder (hydroseeder) that uses water as the carrying agent and maintains continuous agitation through paddle blades. The seeder shall have an operating capacity sufficient to agitate, suspend, and mix into homogeneous slurry the specified amount of seed, mulch, fertilizer and water. Distribution and discharge lines shall be large enough to prevent stoppage and shall be equipped with a set of hydraulic discharge spray nozzles which will provide a uniform distribution of the slurry. The fertilizer shall be placed in the hydroseeder tank no more than 30 minutes prior to application.
- E. Application rates:
  1. Seed Mix:
    - a. Wetland Seed Mix 1: 60 pounds per acre.
    - b. Wetland Seed Mix 2 (Pasture): 60 pounds per acre.
    - c. Upland Seed Mix: 120 pounds per acre.
    - d. Pasture Seed Mix: 120 pounds per acre.
    - e. Sod Lawn Seed Mix: 120 pounds per acre.
  2. Fertilizer: 410 pounds per acre.
  3. Mulch: 2,000 pounds per acre.
  4. Tackifier:
    - a. Slopes 2 horizontal to 1 vertical and flatter: 40 pounds per acre.
    - b. Slopes steeper than 2 horizontal to 1 vertical: 80 pounds per acre.
    - c. Ravelling or highly erosive steep slopes: 120 pounds per acre.
- F. Prevent drift and displacement of mixture outside areas to be seeded. Remove seed mix from road surfaces, signs, and other areas not to be seeded.

- G. Care and Protection of Seeded Areas: Protect areas that have been hydroseeded against vehicle and pedestrian traffic.

### **3.5 INITIAL ACCEPTANCE AND MAINTENANCE (LAWN ESTABLISHMENT)**

- A. Begin maintenance of seeded areas immediately after each portion is planted and continue until Final Acceptance or for a specific time period as stated below, whichever is the longer.
- B. District will review seeded areas after installation for Initial Acceptance.
- C. Maintain seeded areas for a minimum of 90 days following Initial Acceptance for lawn establishment.
  - 1. Maintain seeded areas as required to establish healthy stands, by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, and replanting as required to establish a smooth, uniform stands of grass, free of weeds and eroded or bare areas.
    - a. Uniform stands of grass will be defined as seeded areas with no bare spots over 6 inches square at the time of Initial Acceptance. All areas failing to vigorously establish within 90 days after germination, for any reason whatsoever, shall be reseeded.
  - 2. Replace unacceptable materials with materials and methods identical to the original specifications, unless otherwise accepted by the District.
  - 3. As identified in this Section, mow seeded areas as soon as there is enough top growth to cut with mower set at 4 inches.
    - a. Mowing of seeded areas with interplanted shrubs and trees or wet native seed areas within the Project is not required to meet lawn establishment requirements.
    - b. Repeat mowing as required to maintain height.
    - c. Do not delay mowing until grass blades bend over and become matted.
    - d. Do not mow when grass is wet.
    - e. Do not mow lower than 1-1/2 inch.
  - 4. Remulch with new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose.
  - 5. Replant bare areas using same materials specified.
  - 6. Maintain repaired areas for remainder of maintenance period or until acceptable to the District, whichever is the longer period.

### **3.6 FINAL ACCEPTANCE**

- A. Following a 90 day lawn establishment period, request final inspection of seeded areas. Provide notification at least five working days before requested inspection date.
  - 1. Seeded areas shall be accepted provided all requirements, including maintenance, have been complied with and seeded areas are well established and exhibit a vigorous growing condition.
  - 2. Areas failing to show a uniform stand of grass shall be reseeded.
- B. Upon Final Acceptance or after the specific time period as stated herein, the District or private property owner will assume lawn maintenance.

**END OF SECTION**

**SECTION 02950**  
**DIVERSION AND CARE OF WATER**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section describes requirements related to the diversion and care of water to allow open trench crossing of streams and roadside ditches. Contractor may use a gravity bypass or pump system to convey stream flows beyond the work area.
- B. Diversion of flows required to complete the work include the following locations at a minimum:
  - 1. Stream A – Approximately Station 151+60.
  - 2. Turner Creek Canal – Approximately 222+00 to Station to Station 223+60.
  - 3. Clear Lake Tributary – Approximately Station 263+40.
  - 4. Miscellaneous roadside ditches crossing the pipeline.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Bypass System Designer:
    - a. Professional Engineer registered in the state of Washington with a minimum of three years of experience in designing bypass gravity and pump systems similar to systems proposed in this Contract.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications:
  - 1. Bypass System Designer.
- C. Diversion and Care of Water Plan.
- D. Turbidity Curtain:
  - 1. Drawing detailing product information, installation and removal procedures, equipment and workforce needs, maintenance plans, and emergency repair/replacement plans.
- E. Water Quality Test Results.

**1.4 DESIGN CRITERIA**

- A. The bypass at Stream A shall be sized for the following conditions:
  - 1. Peak Flow: 2.5 cubic feet per second (CFS).
  - 2. 15% Peak Flow (July to September): 0.5 CFS.
- B. The bypass at Turner Creek Canal shall be sized for the following conditions:
  - 1. Peak Flow: 1.0 CFS.
  - 2. 15% Peak Flow (July to September): 0.5 CFS.
- C. The bypass at Clear Lake Tributary shall be sized for the following conditions:
  - 1. Peak Flow: 44 CFS.
  - 2. 15% Peak Flow (July to September): 7 CFS.

**1.5 DIVERSION AND CARE OF WATER PLAN**

- A. Diversion and Care of Water Plan shall be prepared, stamped, dated, and signed by the Bypass System Designer.

- B. Provide drawings indicating the location, size, and construction details of water quality protection items such as cofferdams, bypass pipe(s), berms, dikes, ditches, and sumps as well as water collection methods, pumps, pipe and fitting types and sizes for process water systems. Drawings shall also include the following:
  - 1. Plans for gravity bypass pipe and energy dissipation.
  - 2. Plans for all process water systems showing pumps, piping, valves, metering, and turbidity sampling locations.
  - 3. Plans for showing anchors and supports for the system.
  - 4. Plans for showing method of pump and system control.
  - 5. Plans for showing storage, treatment, and disposal features (tanks, filters and valves).
- C. Manufacturers' literature on each of the elements described in this Section showing the equipment meets the design criteria.
- D. Calculations showing all items meet design criteria.
  - 1. Sizing and designing the elements of the water conveyance, treatment, and disposal systems.
- E. Procedures for operating and maintaining water treatment facilities including sediment tanks and filters, if needed.
- F. Any system the Contractor may add that is not noted in this Section shall be designed, submitted, installed, and tested using the design criteria noted in this Section. The Contractor shall obtain acceptance from the District of plans, installation tests, and ongoing performance. Any failure will result in rejection of the submittal or shutdown of the system and any related and dependent work.

## **1.6 DESIGN REQUIREMENTS**

- A. The pumping, piping, and treatment systems shall be designed by the Bypass System Designer. Diversion and Care of Water Plan submittal shall include stamped calculations and drawings.
- B. Systems shall be capable of meeting water quality standards and permit requirements per Section 01560.
- C. Pumps shall be capable of meeting head, flow, and solids handling requirements. The piping systems shall not exceed the NPSH capability of the pumps.
- D. Valves for flow control shall be capable of operating in partially open positions for flow throttling.
- E. Dispersion and erosion control shall be provided at release points sufficient to ensure the force and velocity of flow does not cause erosion. See Section 02270.
- F. Systems shall be designed with provisions for redundancy for equipment failure and power loss.

## **1.7 TESTING AND MAINTENANCE OF SYSTEMS**

- A. The District may observe initial testing of the system.
- B. The Contractor shall not be allowed to proceed until these systems operate to the satisfaction of the District. In the event of system failure or malfunction, the District may issue a stop work order for all work that depends on proper functioning of the failed system.

## **PART 2 - PRODUCTS**

### **2.1 PUMPS, PIPE, FITTINGS AND HOSES**

- A. Diversion System Pressure Pipe:
  - 1. The pipe shall have a manufacturer's recommended hydrostatic design stress rating of at least 2 times the working pressure for the system. Joints shall be thrust restrained.
  - 2. Pipe to be sized appropriately to match system requirements for pump capacity, flows, and head loss.
- B. Diversion System Gravity Pipe:
  - 1. Pipe to be sized appropriately to match system requirements for flows and head loss.
- C. Pumps:

1. Portable pumps shall be of sufficient capacity and head to meet anticipated flows and pressure requirements.
  2. Electric pumps are required for pumping near streams, rivers, and wetlands. No fuel operated, direct drive equipment shall be used near streams, rivers, and wetlands.
- D. Hose shall meet pressure requirements and be sized to allow for flow velocity within its capability. Hose shall be free from leaks.

## **2.2 VALVES**

- A. All valves shall be compatible with the associated piping and fittings and rated for the pressure and other loads they are subjected to.

## **2.3 POWER**

- A. The Contractor shall make arrangements for power service for pumping and other equipment.
- B. Power source may be portable or from utility at Contractor's option. Be responsible for providing backup power in the event of utility power failure.

## **2.4 TREATMENT EQUIPMENT**

- A. Treatment equipment shall be manufactured modular units supplied by a company regularly engaged (5 year minimum) in the manufacture and maintenance of such equipment.
- B. Flow rates shall not exceed the peak nameplate filtering capacity of the equipment.
- C. Equipment shall be capable of meeting the water quality criteria per Section 01560.

## **2.5 TURBIDITY CURTAIN**

- A. Per 2020 WSDOT Standard Specifications Section 8-01.3(1)C7.

# **PART 3 - EXECUTION**

## **3.1 CONTROL OF SURFACE RUNOFF**

- A. Be responsible for the protection of the public water supply, water supply facilities, surface water features and the environment from impacts due to the work and related activities.
- B. Discharge of sediment-laden water to surface waters without proper treatment is not allowed. Sediment laden water must be controlled and directed to a treatment facility, or to defined infiltration areas, subject to the acceptance of the District.
- C. Perform turbidity testing as required for permit compliance.

## **3.2 CONSTRUCTION REQUIREMENTS**

- A. Be responsible for operating and maintaining the water treatment and disposal systems to meet specified water quality and environmental protection requirements. The systems shall be designed to convey and treat all water generated or redirected by the Project.
- B. Pressure pipe and hose used in the water treatment and dispersal systems may be buried or laid on the surface at the Contractor's option. The pipe and hose shall be appropriately restrained to prevent damage due to pressure surges, water hammer, or any other force on or in the pipe. The pipe and hose shall be protected from damage by the construction equipment and vehicle traffic.
- C. Comply with requirements of Section 01560 and the NPDES Construction Stormwater General Permit.

## **3.3 TURBIDITY CURTAIN**

- A. Per 2020 WSDOT Standard Specifications Section 8-01.3(1)C7.

### **3.4 DIVERSION AND WATER SYSTEM TESTING AND ACCEPTANCE**

- A. Piping shall be tested by pumping non-turbid water prior to use during construction. The District may attend the test prior to use during construction.
- B. Correct any failures or leaks detected. Should the tested section fail during test use, locate and repair the defects and then retest to ensure that the pipe is in a satisfactory condition.
- C. The test shall be rerun whenever it is necessary to replace defective material or correct the workmanship. Testing shall be repeated until satisfactory test results are obtained.

### **3.5 CARE OF WATER SYSTEM OPERATIONS AND MANAGEMENT**

- A. Filters shall be operated by an operator with current license issued by the Washington State Department of Ecology. During filter operation, it is the Contractor's responsibility to monitor influent and effluent turbidity and ensure proper operation of the treatment system.
- B. Be responsible for monitoring turbidity during pumping and treatment operations. Provide chitosan filters if required based on the turbidity level of pump discharge prior to treatment.

**END OF SECTION**

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**SECTION 03002**  
**CONCRETE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section includes cast-in-place concrete for thrust blocks, anchor blocks, plugs, pads, sidewalks, driveways and miscellaneous concrete restoration.
- B. The Section does not apply to concrete for the bridge over the East Fork Nookachamps Creek. Refer to Section 05125.

**1.2 QUALITY ASSURANCE**

- A. Quality Control:
  - 1. Do not begin concrete production until proposed concrete mix design has been accepted by Engineer.
    - a. Acceptance of concrete mix design by Engineer does not relieve Contractor of responsibility to provide concrete that meets the requirements of this Section.
  - 2. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant. Do not use revised concrete mixes until submitted to and accepted by Engineer.
  - 3. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.
- B. Qualifications:
  - 1. Ready mixed concrete batch plant certified by National Ready Mixed Concrete Association (NRMCA).
  - 2. Formwork and shoring to be designed by a professional structural engineer currently registered in Washington State.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. Concrete mix designs proposed for use. Concrete mix design submittal to include the following information:
    - a. Sieve analysis and source of fine and coarse aggregates.
    - b. Test for deleterious aggregate per ASTM C289.
    - c. Proportioning of all materials.
    - d. Type of cement with mill certificate for cement.
    - e. Slump.
    - f. Air content.
    - g. Brand, type, ASTM designation, and quantity of each admixture proposed for use.
    - h. 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
  - 2. Product technical data including:
    - a. Acknowledgement that products submitted meet requirements of standards referenced.
  - 3. Reinforcing steel: Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details:
    - a. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
  - 4. Strength test results of cast-in-place concrete including slump, air content and concrete temperature.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Form coating:
    - a. Richmond "Rich Cote."
    - b. Industrial Lubricants "Nox-Crete Form Coating."
    - c. Protex "Pro-Cote."
    - d. Approved Equal.
  - 2. Prefabricated forms:
    - a. Simplex "Industrial Steel Frame Forms."
    - b. Symons "Steel Ply."
    - c. Universal "Uniform."
    - d. Approved Equal.

### **2.2 MATERIALS**

- A. Portland Cement: Conform to ASTM C150 Type II.
- B. Fly Ash:
  - 1. ASTM C618, Class F or Class C.
  - 2. Non-staining.
  - 3. Hardened concrete containing fly ash to be uniform light gray color.
  - 4. Maximum loss on ignition: 4 percent.
  - 5. Compatible with other concrete ingredients.
  - 6. Obtain proposed fly ash from a source approved by WSDOT for use in concrete for bridges.
- C. Admixtures:
  - 1. Air entraining admixtures: ASTM C260.
  - 2. Water reducing, retarding, and accelerating admixtures:
    - a. ASTM C494 Types A through E.
    - b. Conform to provisions of ACI 212.3R.
    - c. Do not use retarding or accelerating admixtures unless specifically accepted by Engineer.
    - d. Follow manufacturer's instructions.
    - e. Use chloride free admixtures only.
  - 3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
    - a. 0.10 all concrete.
  - 4. Do not use calcium chloride.
  - 5. Pozzolanic admixtures: ASTM C618.
  - 6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.
- D. Water: Potable, clean, free of oils, acids and organic matter.
- E. Aggregates:
  - 1. Normal weight concrete: ASTM C33, except as modified below.
  - 2. Fine aggregate: Clean natural sand.
    - a. No manufactured or artificial sand.
  - 3. Coarse aggregate: Crushed rock, natural gravel, or other inert granular material.
    - a. Maximum amount of clay or shale particles: 1 percent.
  - 4. Gradation of coarse aggregate:
    - a. Lean concrete and concrete topping: Size #7.
    - b. All other concrete: Size #57 or #67.
- F. Reinforcing Steel:

1. Reinforcing bars: ASTM A615, Grade 60.
2. Welded wire fabric: ASTM A185.
  - a. Minimum yield strength: 60,000 psi.

G. Forms:

1. Prefabricated or job built.
2. Wood forms:
  - a. New 5/8 or 3/4 inch 5-ply structural plywood of concrete form grade.
  - b. Built-in-place or prefabricated type panel.
  - c. 4 x 8 foot sheets for built-in-place type except where smaller pieces will cover entire area.
  - d. When acceptable, plywood may be reused.
3. Form ties: Removable end, permanently embedded body type with cones on outer ends not requiring auxiliary spreaders.
  - a. Cone diameter: 3/4 inch minimum to 1 inch maximum.
  - b. Embedded portion 1 inch minimum back from concrete face.
  - c. If not provided with threaded ends, constructed for breaking off ends without damage to concrete.
4. Form release: Non-staining and shall not prevent bonding of future finishes to concrete surface.

**2.3 CONCRETE MIXES**

A. General:

1. All concrete to be ready mixed concrete conforming to ASTM C94.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.

B. Strength:

1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH*
Concrete	Normal weight	4000 psi

\* Minimum 28-day compressive strength.

C. Slump - 4 inch maximum, 1 inch minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
3. Pumped concrete:
  - a. Provide additional water at batch plant to allow for slump loss due to pumping.
  - b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified above.
4. Determine slump per ASTM C143.

D. Selection of Proportions:

1. General:
  - a. Proportion ingredients to:
    - 1) Produce proper workability, durability, strength, and other required properties.
    - 2) Prevent segregation and collection of excessive free water on surface.
2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

MINIMUM CEMENT, LB/CY				MAXIMUM WATER
SPECIFIED STRENGTH	MAXIMUM 1/2	AGGREGATE 3/4	SIZE, IN 1	CEMENT RATION BY WEIGHT
4000	517	517	517	0.45

3. Substitution of fly ash:
    - a. Maximum of 25 percent by weight of cement at rate of 1 LB fly ash for 1 LB of cement.
  4. Normal weight concrete:
    - a. Proportion mixture to provide desired characteristics using one of methods described below:
      - 1) Method 1 (Trial Mix): Per ACI 318, Chapter 5, except as modified herein:
        - a) Air content within range specified above.
        - b) Record and report temperature of trial mixes.
        - c) Proportion trial mixes per ACI 211.1.
      - 2) Method 2 (Field Experience): Per ACI 318, Chapter 5, except as modified herein:
        - a) Field test records must be acceptable to Engineer to use this method.
        - b) Test records shall represent materials, proportions and conditions similar to those specified.
  5. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Paragraph 5.3 of ACI 318 using the standard deviation of the proposed concrete production facility as described in Paragraph 5.3.1 of ACI 318.
- E. Allowable Shrinkage: 0.048 percent per ASTM C157.

### **PART 3 - EXECUTION**

#### **3.1 DELIVERY, STORAGE, AND HANDLING**

- A. Storage of Material:
  1. Reinforcing steel:
    - a. Support and store all rebar above ground.
- B. Delivery:
  1. Concrete:
    - a. Prepare a delivery ticket for each load for ready-mixed concrete.
    - b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.
    - c. Ticket to show:
      - 1) Mix identification mark.
      - 2) Quantity delivered.
      - 3) Amount of each material in batch.
      - 4) Outdoor temperature in the shade.
      - 5) Time at which cement was added.
      - 6) Numerical sequence of the delivery.
      - 7) Amount of water added.
  2. Reinforcing steel:
    - a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.
    - b. Mark numbers to match Shop Drawing mark number.

#### **3.2 FORMING AND PLACING CONCRETE**

- A. Formwork:
  1. Contractor is responsible for design and erection of formwork.
  2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position:
    - a. Allowable tolerances: As recommended in ACI 347R.
  3. Tighten forms to prevent mortar leakage.
  4. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.
- B. Reinforcement:
  1. Position, support and secure reinforcement against displacement.
  2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.

3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
5. Extend reinforcement to within 2 inch of concrete perimeter edges:
  - a. If perimeter edge is earth formed, extend reinforcement to within 3 inch of the edge.
6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
7. Do not weld reinforcing bars.

C. Placing Concrete:

1. Place concrete in compliance with ACI 304R and ACI 304.2R.
2. Place in a continuous operation within planned joints or sections.
3. Begin placement when work of other trades affecting concrete is completed.
4. Place concrete by methods which prevent aggregate segregation.
5. Do not allow concrete to free fall more than 4 foot.
6. Where free fall of concrete will exceed 4 foot, place concrete by means of tremie pipe or chute.

D. Consolidation:

1. Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.

E. Protection:

1. Protect concrete from physical damage or reduced strength due to weather extremes.
2. In cold weather comply with ACI 306R except as modified herein:
  - a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.
  - b. Minimum concrete temperature at the time of mixing:

OUTDOOR TEMPERATURE AT PLACEMENT (IN SHADE)	CONCRETE TEMPERATURE AT MIXING
Below 30 degF	70 degF
Between 30-45 degF	60 degF
Above 45 degF	50 degF

- c. Do not place heated concrete that is warmer than 80 degF.
  - d. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 degF for 7 days or 70 degF for 3 days.
  - e. Do not allow concrete to cool suddenly.
3. In hot weather comply with ACI 305R except as modified herein:
  - a. At air temperature of 90 degF and above, keep concrete as cool as possible during placement and curing.
  - b. Do not allow concrete temperature to exceed 90 degF at placement.
  - c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.
  - d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 lbs/sf/hr as determined from ACI 305R, Figure 2.1.5.

F. Curing:

1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.
2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.
3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.
4. Provide curing for minimum of 7 days.
5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.

CONCRETE

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6. In hot weather follow curing procedures outlined in ACI 305R.
  7. In cold weather follow curing procedures outlined in ACI 306R.
  8. If forms are removed before 7 days have elapsed, finish curing of formed surfaces by one of above methods for the remainder of the curing period.
  9. Curing vertical surfaces with a curing compound: Cover vertical surfaces with a minimum of two coats of the curing compound:
    - a. Allow the preceding coat to completely dry prior to applying the next coat.
    - b. Apply the first coat of curing compound immediately after form removal.
    - c. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.
    - d. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.
- G. Form Removal:
1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.

### 3.3 CONCRETE FINISHES

- A. Tolerances:
1. Class B: 1/4 inch in 10 foot.
- B. Surfaces Not Exposed to View:
1. Patch voids, air pockets and honeycomb areas with cement grout.
  2. Fill tie holes with non-shrink nonmetallic grout.
- C. Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

### 3.4 FIELD QUALITY CONTROL

- A. Tests During Construction:
1. Strength test - procedure:
    - a. Three cylinders, 6 inch diameter x 12 inch high, will be taken from each sample per ASTM C172 and ASTM C31.
    - b. Cylinders will be tested per ASTM C39:
      - 1) One at 7 days.
      - 2) Two at 28 days.
  2. Strength test - frequency:
    - a. Not less than one test each day concrete placed.
    - b. Not less than one test for each 50 cy or major fraction thereof placed in one day.
    - c. Not less than one test for each type of concrete poured.
    - d. Not less than one test for each concrete structure exceeding 2 cy volume.
  3. Slump test: Per ASTM C143:
    - a. Determined for each strength test sample.
  4. Air content: Per ASTM C231, ASTM C173, and ASTM C138:
    - a. Determined for each strength test sample.
  5. Temperature: Determined for each strength test sample.
- B. Evaluation of Tests:
1. Strength test results: Average of 28-day strength of two cylinders from each sample.
    - a. If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be tested.
    - b. If both cylinders show any of above defects, test will be discarded and a new test started.
- C. Acceptance of Concrete:
1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
    - a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.

- b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.
- 2. If tests fail to indicate satisfactory strength level, perform additional tests and corrective measures as accepted by Engineer:
  - a. Perform additional tests and corrective measures at no additional cost to Owner.

**END OF SECTION**

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**SECTION 03600**  
**GROUTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies grout for use in applications including grouts for manhole masonry units, joints between precast concrete sections, and filling tie holes.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Manufacturer's data for the following:
1. Non-shrink cementitious grout.
  2. Epoxy grout.
  3. Admixtures for cement grout.
  4. Certified Test Reports: Before delivery of materials or grout, submit certified reports of the tests specified herein. Accompany the certified reports on previously tested materials with the manufacturer's certified statement that the previously tested material is of the same type, quality, manufacture, and make as that proposed for use in this Contract. Certified test reports are required for the following:
    - a. All cement grout constituents, including cement and aggregates.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Grout mixes and admixtures shall not contain more than 0.05 percent chloride ions.
- B. Water for washing aggregate, for mixing, and for curing:
1. Free from oil and deleterious amounts of acids, alkalis, and organic materials
  2. Contain no more than 1,000 mg/L of chlorides as Cl, nor more than 1,300 mg/L of sulfates as SO<sub>4</sub>.
  3. Shall not contain an amount of impurities that may cause a change of more than 25 percent in the setting time of the cement nor a reduction of more than 5 percent in the compressive strength of the grout at 14 days when compared with the result obtained with distilled water.
  4. Water used for curing shall not contain an amount of impurities sufficient to discolor the grout.

**2.2 GROUT**

- A. Non-shrink Cementitious Grout:
1. Cementitious grout that conforms to ASTM C1107, CRD-C-621, "Corps of Engineers Specification for Non-Shrink Grout", and the following requirements:
    - a. Non-metallic aggregate.
    - b. Acceptable manufacturers:
      - 1) Euclid Chemical Co., "Euco NS".
      - 2) BASF, "Masterflow 713 Plus".
      - 3) Five Star Grout Co., "Five-Star Grout".
      - 4) Approved Equal.
- B. Epoxy Grout:
1. Multi-component, 100 percent solids compound conforming to the following requirements:
    - a. Suitable for use on dry or damp surfaces.
    - b. Comply with ASTM C881.
    - c. Acceptable manufacturers:
      - 1) Euclid Chemical Co., "DuralBond".

- 2) Sika Chemical Co, "Sikadur 35 Hi-Mod LV".
- 3) BASF, "SCB Concrecive 1380".
- 4) Approved Equal.

C. Cement Grout:

1. A mixture of one part Portland cement, 1 to 2 parts fine aggregate, and with sufficient water to impart workability but not such that the grout will flow.
  - a. Cement:
    - 1) Portland cement, ASTM C150 Type II or Type V.
    - 2) Low alkali cement, containing less than 0.60 percent alkalis.
  - b. Fine aggregate:
    - 1) Conform to ASTM C33.
    - 2) Non-reactive and washed before use. Hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine.
    - 3) When tested in accordance with ASTM C136, gradation of fine aggregate shall be such that 100 percent by weight will pass a standard No. 8 mesh sieve and no less than 45 percent by weight will pass a standard No. 40 mesh sieve.
    - 4) Variation from the specified gradations in individual tests of fine aggregates will be accepted if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below.
    - 5) Comply with ASTM C33 as modified herein.

U.S. STANDARD SIEVE SIZE	PERMISSIBLE VARIATION, PERCENT
30 or coarser	2
50 or finer	0.5

- 6) Other tests shall be in accordance with the following specifications:

TEST METHOD	TEST	REQUIREMENTS
ASTM C40	Organic Impurities	Color lighter than standard
ASTM C117	Passing 200 sieve	3 percent max.
ASTM C88	Soundness	10 percentage max loss with sodium sulfate
ASTM C289	Reactivity	Innocuous aggregate
ASTM D2419	Sand Equivalent	Minimum 80

- 7) When sources of aggregate are changed, provide test reports for the new material. Perform the tests specified prior to commencing grout work.

D. Admixtures:

1. Compatible with the grout and shall conform to the following requirements:
  - a. Calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions are not permitted.
  - b. Use admixtures in accordance with the manufacturer's recommendations and add separately to the grout mix.
  - c. Chemical admixtures for flowing concrete grout shall comply with ASTM C1017.
  - d. Do not use calcium chloride.
  - e. Water reducing, retarding admixture:
    - 1) The admixture shall comply with ASTM C494 Type D requirements.
    - 2) Use chloride free admixtures only.
    - 3) Acceptable manufacturers:
      - a) Euclid Chemical Co., "Eucon Retarder-75".
      - b) BASF, "Pozzolith 100 XR".
      - c) Sika Corporation, "Plastiment".
      - d) Approved Equal.

2. Manufacturer shall certify that each admixture shall be compatible with all other admixtures used in each concrete mix design.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Mix, place and cure in accordance with the manufacturer's instructions.

### **3.2 EXAMINATION**

- A. Inspect concrete surfaces to receive grout or mortar and verify that they are free of ice, frost, dirt, grease, oil, curing compounds, paints, impregnations, and all loose material or foreign matter likely to affect the bond or performance of grout or mortar.
- B. Confirm that newly placed concrete has been cured sufficiently to attain its design strength and limit further shrinkage.
- C. Verify that temperature of cementitious or epoxy grout does not exceed manufacturer's recommendations.

### **3.3 PREPARATION**

- A. Surface Preparation:
  1. Roughen all concrete surfaces by heavy sandblasting, chipping, or other mechanical means to assure bond. Loose or broken concrete shall be removed.
  2. All grease, oil, dirt, curing compounds, laitance, and other deleterious materials that may affect bond that were identified in the inspection process shall be completely removed from concrete and bottoms of base plates. All metal surfaces should have a 2 to 3 mil peak-to-valley profile for epoxy grouts.
  3. For cementitious mortars and grouts, concrete shall be saturated surface damp. Any standing water shall be removed prior to placing grouts.
  4. For epoxy grouts, do not wet concrete surfaces with water. Instead, where required, wet surfaces with epoxy for horizontal work or epoxy gel for vertical or overhead work prior to placing epoxy grouts.
- B. Forms and Headboxes for Cementitious or Epoxy Grouts:
  1. Forms for grouts shall be built of material with adequate strength to withstand the placement of grouts.
  2. Forms must be rigid and liquid tight. All cracks and joints shall be caulked with an elastomeric sealant. All forms shall be lined with polyethylene for easy grout release. Forms carefully waxed with two coats of heavy-duty paste wax shall also be acceptable.
  3. Forms shall be 4 to 6 inches higher than the base plate on one side of the base plate configuration when using head pressure for placement.
  4. A sufficient number of headboxes shall be built to facilitate placement of grouts.
  5. Air relief holes a minimum 1/8 inch in diameter shall be provided when required by a base plate configuration to avoid entrapping air underneath.

### **3.4 NON-SHRINK CEMENTITIOUS GROUT**

- A. Prepare concrete surfaces in accordance with the grout manufacturer's instructions.
- B. Do not retemper grout by adding more water after stiffening.

### **3.5 EPOXY GROUT**

- A. Prime concrete in accordance with the grout manufacturer's instructions.
- B. Epoxy grouts shall be mixed in complete units. Do not vary the ratio of components or add solvent to change the consistency of the mix.
- C. Mix until aggregate is uniformly wetted. Over mixing will cause air entrapment in the mix.

### **3.6 CURING**

- A. Cementitious Grouts:

1. Clean equipment and tools as recommended by the grout manufacturer.
  2. Cure grouts in accordance with manufacturer's specifications and recommendations. Keep grout moist for a minimum of 3 days. The method needed to protect grouts will depend on temperature, humidity, and wind. Wet burlap, a soaker hose, sun shading, ponding, and, in extreme conditions, a combination of methods shall be employed.
  3. Grouts shall be maintained above 40 degrees Fahrenheit until they have attained a compressive strength of 3,000 pounds per square inch, or above 70 degrees Fahrenheit for a minimum of 24 hours to avoid damage from subsequent freezing.
- B. Epoxy Grouts:
1. Cure grouts in accordance with manufacturers' specifications and recommendations. Do not wet cure epoxy grouts.
  2. Consult the manufacturer for appropriate cure schedule. In no case should any surface in contact with epoxy grout be allowed to fall below 50 degrees Fahrenheit for a minimum of 48 hours after placement.

### **3.7 TESTING**

- A. To ensure compliance with the specified requirements for grout, provide the services of an independent testing laboratory that complies with the requirements of ASTM E329, ASTM C109, and ASTM C579, Method B.
- B. The testing laboratory will sample and test grout materials and submit results to the Project Representative.
- C. During the course of construction, the Project Representative may take separate field samples of the following materials for confirming tests:
  1. Cement.
  2. Aggregates.
  3. Cement grout mixture.
  4. Commercially manufactured grout products.

**END OF SECTION**

## SECTION 05125

### BRIDGE CROSSING AT EAST FORK NOOKACHAMPS CREEK

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
1. All labor, materials, and equipment for the East Fork Nookachamps Creek Bridge Crossing, including site preparation, piling installation, abutment construction, and superstructure construction including all optional, temporary structures between Station 169+82.75 to 172+37.25.
  2. Bridge construction work includes all fabrication and erection of a steel truss bridge including bridge bearings, bridge railing, maintenance deck, maintenance deck railing, compression seal, maintenance access fencing and gates and maintenance concrete pad according to the specifications and plan details.
  3. All labor, materials, and equipment for furnishing steel piling and pile tips.
  4. All labor, materials, and equipment for pile driving.
  5. All labor, materials, and equipment for approach railing construction and installation.
  6. All labor, materials, and equipment for approach construction, including site preparation and construction, from Station 168+86.81 to 169+82.75 and 172+37.25 to 173+16.25.
  7. All labor, materials, and equipment for settlement raft construction.
- B. Refer to WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, 2020, for the basis of the bridge construction specifications. Refer to this Specification Section 01025 for Measurement and Payment, which supersedes the WSDOT Standard Specifications for Measurement and Payment requirements. Labor, materials, and equipment for piping, piping installation, appurtenances, fiber-optic cable, and approach trail are not included in this Section.

##### 1.2 QUALITY ASSURANCE

- A. Refer to WSDOT Standard Specifications Section 6-03-Steel Structures for quality, workmanship and construction requirements for the steel truss bridge.
- B. Refer to WSDOT Standard Specifications Section 6-02-Concrete Structures for quality, workmanship and construction requirements for the concrete bridge abutments and maintenance access pad.
- C. Refer to WSDOT Standard Specifications Section 6-05-Piling for quality, workmanship and construction requirements for the concrete bridge steel piling.
- D. Refer to the American Disabilities Act (ADA) Standards for Transportation Facilities by the Department of Transportation (2006).

##### 1.3 FABRICATOR QUALIFICATIONS AND DESIGN DEVIATIONS

- A. Minimum of five years' experience designing and manufacturing steel truss bridges for pedestrian and maintenance vehicle loads.
1. Employ a structural engineer currently registered in the State of Washington.
  2. Structural Steel fabricator shall be an AISC certified steel bridge fabricator, advanced bridges category with fracture critical supplement.
  3. Steel truss bridge may be sourced from a prefabricated bridge manufacturer.
    - a. Prefabricated bridge manufactures may have alternative details or preferred method of fabrication different to those shown on the plans. Any modifications or deviation from details to the ones shown in the plans shall be submitted to the Engineer for review prior to beginning fabrication.
    - b. All proposed deviations must have working drawings and supporting calculations stamped by a structural engineer licensed in the state of Washington.
    - c. No substitution of bridge type will be allowed.

## **1.4 BRIDGE ERECTOR QUALIFICATIONS**

- A. Qualified bridge erector shall have a minimum of 5 years' of experience in the construction of prefabricated bridges.
  - 1. Structural steel erectors shall be an AISC Certified Steel Erector (CSE).
  - 2. Employ a licensed professional engineer registered in the State of Washington.
  - 3. The erection engineer will be at minimum responsible for, but not limited to the following:
    - a. Designing all falsework, formwork, and shoring towers.
    - b. Developing the erection plan and erection procedures.

## **1.5 DEFINITIONS**

- A. Refer to WSDOT Standard Specifications Section 1-1 for bridge definitions.
- B. Working Drawings – Working drawings shall be defined as and submitted in accordance with Section 1-05.3 of the WSDOT Standard Specifications.

## **1.6 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Bridge Erector Qualifications.
- C. Refer to WSDOT Standard Specifications Section 6-02.3, 6-03.3, and 6-05.3 for concrete structure, steel structure, and piling submittal requirements respectively.

## **PART 2 - PRODUCTS**

### **2.1 STEEL TRUSS BRIDGE**

- A. Materials, equipment, and accessories specified in this Section shall conform to the requirements of Section 6-03 of the WSDOT Standard Specifications.
- B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  - 1. 6-03 Steel Structures.
  - 2. 6-06 Bridge Railings.
  - 3. 9-06 Structural Steel and Related Materials.

### **2.2 COMPRESSION SEALS**

- A. Materials, equipment, and accessories for compression seals shall be:
  - 1. D.S. Brown JP-Series sealing system; 1-801-928-7123;
  - 2. Emseal DSM system; 1-916-716-1685;
  - 3. Or other approved equal ADA compliant compression seal.
- B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  - 1. 6-02.3(13)B Compression Seal Expansion Joint System.
- C. Manufacturer's installation procedures to provide an ADA walking surface supersede the WSDOT Standard Specifications.

### **2.3 STRUCTURAL METALS**

- A. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  - 1. 6-03 Steel Structures.
  - 2. 9-06 Structural Steel and Related Materials.
  - 3. And as specified on the plans.

### **2.4 HIGH TENSILE STRENGTH NUTS, BOLTS, AND WASHERS**

- A. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  - 1. 6-03 Steel Structures.
  - 2. 9-06 Structural Steel and Related Materials.

B. Use bolts, nuts, and washers displaying the manufacturer's markings.

## **2.5 BRIDGE BEARING ASSEMBLIES**

A. Materials, equipment, and accessories specified in this Section shall be products of:

1. D.S. Brown; 1-903-677-4383.
2. Scougal Rubber; 1-206-763-2650.
3. Or other approved equal.

B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:

1. 6-02.3(19) Bridge Bearings.
2. 6-02.3(20) Grout for Anchor Bolts and Bridge Bearings.
3. 6-03.3(37) Setting Steel Bridge Bearings.
4. 9-31 Fabricated Bridge Bearing Assemblies.

## **2.6 ANCHOR BOLTS**

A. Related WSDOT Standard Specification Sections include but are not necessarily limited to:

1. 6-02.3(18) Placing Anchor Bolts.
2. 6-02.3(20) Grout for Anchor Bolts and Bridge Bearings.
3. 6-03.3(35) Setting Anchor Bolts.
4. 9-06.5(4) Anchor Bolts and Anchor Rods.

## **2.7 STRUCTURAL CONCRETE DECKING**

A. Materials, equipment, and accessories for Structural Concrete Decking shall conform to the requirements of Section 6-02 of the WSDOT Standard Specifications.

B. Materials, equipment, and accessories for concrete inserts shall be:

1. Amifast; 1-800-835-5581.
2. MeadowBurke; 1-877-518-7665.
3. Fastenal; 1-877-507-7555.
4. Or other approved equal.

C. Related WSDOT Standard Specification Sections include but are not necessarily limited to:

1. 6-02 Concrete Structures.
2. 9-01 Cement.
3. 9-07 Reinforcing Steel.

D. Structural concrete decking shall conform to the requirements of concrete class 4000 and be precast.

E. Thickness of deck shall be as shown on the plans.

F. Decking shall be removable.

1. Bolts shall meet the requirements of ASTM F3125 Type 3 for weathering steel.

G. Provide gap between panels up to a nominal 3/8" and a maximum of 1/2" (which includes construction tolerances). Do not grout gaps between deck panels.

## **2.8 CONCRETE STRUCTURES**

A. Related WSDOT Standard Specification Sections include but are not necessarily limited to:

1. 6-02 Concrete Structures.
2. 9-01 Cement.
3. 9-07 Reinforcing Steel.

## **2.9 STEEL H-PILING**

A. Materials, equipment, and accessories for Steel H-Piling and Steel H-Piling Shoes shall conform to the requirements of Section 6-05.2 of the WSDOT Standard Specifications.

B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:

1. 6-05 Piling.
2. 9-10.4 Steel Pile Tips and Shoes.

### **BRIDGE CROSSING AT EAST FORK NOOKACHAMPS CREEK**

3. 9-10.5 Steel Piling.

## **2.10 CHAIN LINK FENCING AND GATES**

- A. Materials, equipment, and accessories for Chain Link Fencing and Gates conform to the requirements of Section 8-12 and 9-16 of the WSDOT Standard Specifications.
- B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  1. 8-12 Chain Link Fence and Wire Fence.
  2. 9-02 Concrete.
  3. 9-08.1(2)B Paint.
  4. 9-16.1 Chain Link Fence and Gates.
  5. 9-20.3 Grout.

## **2.11 MAINTENANCE DECK**

- A. Materials, equipment, and accessories for Steel Bar Grating shall be:
  1. McNichols; 855-982-2785.
  2. Grating Pacific; 1-800-243-3939.
  3. Grating Fabricators; 1-800-650-0886.
  4. Or other approved equal.
- B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  1. 6-03 Steel Structures.
  2. 9-06 Structural Steel and Related Materials.

## **2.12 APPROACH WALLS AND ACCESS WALLS**

- A. Materials, equipment, and accessories for gravity block walls shall be:
  1. Ultrablock; 800-377-3877.
  2. Redi-Rock; 816-437-0716.
  3. Or other approved equal.
- B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  1. 6-02 Concrete Structures.
  2. 6-13 Structural Earth Wall.
  3. 8-24 Rock and Gravity Block Wall and Gabion Cribbing.
  4. 9-01 Cement.
  5. 9-03 Aggregates.

## **2.13 SETTLEMENT RAFT**

- A. Materials, equipment, and accessories for the settlement raft shall be:
  1. Geosynthetic Reinf. – UX1600MSE Structural Geogrid manufactured by Tensar Corporation, or other approved equal.
  2. Geotextile for separation – Mirafi 160N manufactured by TenCate Geosynthetics Americas, or other approved equal.
- B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  1. 9-01 Cement.
  2. 9-03 Aggregates.
  3. 9-33 Construction Geosynthetic

## **2.14 APPROACH RAILING**

- A. Materials, equipment, and accessories for Approach Railing shall be in accordance with Section 9-06.18 of the WSDOT Standard Specifications.
- B. Related WSDOT Standard Specification Sections include but are not necessarily limited to:
  1. 6-03 Steel Structures.
  2. 6-06 Bridge Railings.
  3. 9-06 Structural Steel and Related Materials.

### **BRIDGE CROSSING AT EAST FORK NOOKACHAMPS CREEK**

4. 6-02 Concrete Structures.
5. 9-01 Cement.
6. 9-03 Aggregates.

**PART 3 - EXECUTION**

**3.1 DESIGN**

- A. Verify that the dimensions, elevations, and geometry in the plans are consistent with the truss bridge to be used at the site. Submit Geometry Verification to the Engineer for approval before beginning construction of the substructure.
- B. Contractor shall design structures for erection and temporary conditions. Include locations of any temporary shoring structure(s), design details, and equipment and methods proposed. Submit Working Type 2E drawings and supporting calculations in accordance with the WSDOT Standard Specifications.
- C. Contractor shall design approach walls using gravity block walls. Submit Working Type 2E drawings and supporting calculations in accordance with the WSDOT Standard Specifications. The following geotechnical design parameters shall be used for the design of the walls:

Wall Name or No: [ Wall 1, 2, 3 & 4 ]

Soil Properties	Wall Backfill	Retained Soil	Foundation Soil
Unit Weight (pcf)	130	130	120
Friction Angle (deg)	36	36	30 (drained) 0 (undrained)
Cohesion (psf)	0	0	0 (drained) 700 (undrained) Weighted average

For the Service Limit State, the wall shall be designed to accommodate a differential settlement of 2-inches per 100 feet of wall length.

For the Extreme Event I Limit State, the wall shall be designed for a horizontal seismic acceleration coefficient  $k_h$  of 0.18g and a vertical seismic acceleration coefficient  $k_v$  of 0.0g.

- D. Construct settlement raft in accordance with the details on the plans.
  1. Settlement raft shall be min 3'-0" thick consisting of gravel borrow for structural earth walls.
  2. 3 layers of geosynthetic reinforcement shall be placed between equal lifts of backfill.
    - a. Geosynthetic reinforcement shall be placed such that the strong axis of the geosynthetic reinforcement is perpendicular to the alignment.
  3. Place a geotextile separation layer between bottom of settlement raft and gravel borrow.

**3.2 DIMENSIONS AND REQUIREMENTS**

- A. Clearance beneath bridge: The lowest point on the bridge truss superstructure shall be no lower than elevation 49.00.
- B. Openings: Gaps between concrete deck panels are limited to 1/2" in maximum, which includes construction tolerances. Refer to Chapter 3 of the ADA Standards for details.
- C. Camber: the bridge structure shall be cambered to account for 100% of the full dead load and pedestrian live loading deflections.

### **3.3 FABRICATION**

- A. Welding electrodes for self-weathering, corrosion-resistance steel shall have the same weathering characteristics as the base metal.
- B. For shipping purposes, the bridge may be fabricated in sections. Sections shall be field assembled using bolted splice connections and/or field welding. Bolted splice connection details shown on the Drawings are optional. Contractor to determine the actual number of splices and location of splices.
- C. Weathering Steel:
  - 1. Construct so that erection marks on the steel are not visible after the structure is completed.
  - 2. Commercially blast all exposed surfaces in accordance with the Steel Structures Painting Council (SSPC), Surface Preparation Specification No. 6, latest edition (SSPC-SP6), Commercial Blast. Exposed surfaces of steel are defined as those surfaces seen from the deck or from the outside and bottom of the structure.
  - 3. Develop even patinas on weathering steel at completion of welding repair and after surface has been accepted by Engineer.

### **3.4 ERECTION**

- A. Maintain responsibility for all aspects of structure erection during all stages of construction including the protection of structural steel members, the workers, and the traveling public.
- B. Provide any additional materials that are required to keep both the temporary and final stresses within the allowable limits used in design.
- C. Protect the compression seal and its components during construction. Subsequent damage to the system will be repaired at the contractor's expense. After work is complete, clean exposed surfaces with a suitable cleaner that will not harm or attack the finish.

### **3.5 SEQUENCING AND RESTRICTIONS**

- A. Prior to installation of abutment, the embankment at the abutments will be preloaded to reduce long term settlements and improve stability of the embankment supporting the approaches. This is expected to require up to 9 months.
- B. Temporary support for erection of the bridge truss is within the ordinary high water mark of East Fork Nookachamps Creek. Placement and removal of the temporary supports is dictated by the Hydraulic Project Approval. Refer to Section 01313 Construction and Schedule Constraints.
- C. Construction of bridge will have to be coordinated installation of pipeline. Bridge has been designed to allow erection of steel transmission pipeline before bridge deck is installed and all stringers are in place.

**END OF SECTION**

**SECTION 05500**  
**FABRICATED METALWORK AND CASTINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes custom fabricated metal items, including but not limited to pipe support brackets, pipe slide assemblies, and steel pipe saddles on bridge.
- B. This Section also covers design and fabrication of miscellaneous metals for pipeline appurtenances indicated in the Drawings, such as pipe supports, and ladders.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards: This Section incorporates by reference the latest revision of the following documents. These references are a part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section shall prevail.
  - 1. American Association of State Highway and Transportation Officials (AASHTO):
    - a. LRFD Bridge Design Specifications.
    - b. LRFD Bridge Construction Specifications.
  - 2. American Institute of Steel Construction (AISC):
    - a. 303, Code of Standard Practice for Steel Buildings and Bridges.
    - b. 360, Specifications for Structural Steel Buildings (referred to herein as AISC Specification).
    - c. Quality Certification Program for Fabricators.
  - 3. Research Council on structural connections (RCSC):
    - a. Specifications for structural joints using high-strength bolts.
  - 4. ASTM International (ASTM):
    - a. A6, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
    - b. A36, Standard Specification for Carbon Structural Steel.
    - c. A47, Standard Specification for Ferritic Malleable Iron Castings.
    - d. A48, Standard Specification for Gray Iron Castings.
    - e. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
    - f. A108, Standard Specification for Steel Bars, Carbon and Alloy, Cold Finished.
    - g. A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - h. A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - i. A240, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
    - j. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
    - k. A276, Standard Specification for Stainless Steel Bars and Shapes.
    - l. A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
    - m. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
    - n. A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
    - o. A496, Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
    - p. A500, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
    - q. A501, Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

- r. A536, Standard Specification for Ductile Iron Castings.
  - s. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
  - t. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  - u. A668, Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use.
  - v. A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
  - w. A786, Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates.
  - x. A992, Standard Specification for Steel for Structural Shapes.
  - y. D4014, Standard Specification for Plain and Steel-Laminated Elastomeric Bearings for Bridges.
  - z. F467, Standard Specification for Nonferrous Nuts for General Use.
  - aa. F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.
  - bb. F593, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
  - cc. F1554, Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
  - dd. A563, Standard Specification for Carbon and Alloy Steel Nuts
  - ee. F436, Standard Specification for Hardened Steel Washers
5. American Welding Society (AWS):
    - a. A5.1, Standard Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
    - b. D1.1, Structural Welding Code Steel.
    - c. D1.6, Structural Welding Code Stainless Steel.
  6. Occupational Safety and Health Administration (OSHA):
    - a. 29 CFR 1910, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
  7. Building Code:
    - a. International Code Council (ICC):
      - 1) International Building Code and associated standards, latest edition including all amendments, referred to herein as Building Code.
  8. Washington State Department of Transportation
    - a. 2020 Standard Specifications for Road, Bridge, and Municipal Construction (referred to herein as WSDOT Standard Specifications)
- B. Qualifications:
1. Qualify welding procedures and welding operators in accordance with AWS.
  2. Fabricator shall have minimum of 10 years' experience in fabrication of metal items similar to those specified.
  3. Design engineer for Contractor-designed systems and components: professional structural engineer licensed in the State of Washington.

### 1.3 DEFINITIONS

- A. Installer or Applicator:
  1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
  2. Installer and applicator are synonymous.
- B. Hardware: As defined in ASTM A153.
- C. Galvanizing: Hot-dip galvanizing per ASTM A123 or ASTM A153 with minimum coating of 2.0 ounces of zinc per square foot of metal (average of specimens) unless indicated otherwise or dictated by standard.

### 1.4 SUBMITTALS

- A. Procedures: Section 01300.
- B. Shop Drawings:
  1. Fabrication and/or layout drawings and details:
    - a. Submit drawings for all fabrications and assemblies. Include erection drawings, plans, sections, details and connection details.

## FABRICATED METALWORK AND CASTINGS

- b. Identify materials of construction, field and shop coatings, and third party accessories.
- 2. Product technical data including:
  - a. Acknowledgement that products submitted meet requirements of standards referenced.
  - b. Manufacturer's installation instructions.
  - c. Provide manufacturer's standard allowable load tables for the following:
    - 1) Expansion anchor bolts.
    - 2) Adhesive anchor bolts.
    - 3) Castings and accessories.
- 3. Written certification from manufacturer of steel reinforced elastomeric bearing pads stating that bearing pads conform to the requirements of the AASHTO LRFD Specifications and the requirements specified for this Project.
- C. Certification of welders and welding processes:
  - 1. Indicate compliance with AWS.
- D. Certification of Personnel locating steel reinforcement:
  - 1. Provide training and experience for field personnel using steel reinforcing location equipment.
- E. Certification of Fabricator:
  - 1. Provide record of experience of fabrication of metal items similar to those specified for bridge.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Store above ground on skids or other supports to keep items free of dirt and other foreign debris, protect coatings, and protect against corrosion.

## **PART 2 - PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Castings and accessories:
    - a. Neenah Foundry Co.
    - b. Deeter Foundry Co.
    - c. McKinley Iron Works.
  - 2. Galvanizing repair paint:
    - a. High zinc dust content paint for regalvanizing welds and abrasions.
    - b. Dried film shall contain not less than 93 percent zinc dust by weight.
    - c. VOC: 0 pounds per gallon.
    - d. Acceptable Manufacturers:
      - 1) ZRC by ZRC Products
      - 2) Or equal.

### **2.2 MATERIALS**

- A. Steel:
  - 1. Structural: W-shapes and WT-shapes: ASTM A992, Grade 50. MC-shapes: either ASTM A992, Grade 50, or ASTM A36. All other plates and rolled sections: ASTM A36.
  - 2. Pipe: ASTM A53, Types E or S, Grade B or ASTM A501.
  - 3. Structural tubing: ASTM A500, Grade B (46 ksi minimum yield).
  - 4. Bolts, nuts and washers, high strength: ASTM A325. Provide two (2) washers with all bolts.
  - 5. Bolts and nuts: ASTM A307, Grade A.
  - 6. Welding electrodes: AWS D1.1, E70 Series.
  - 7. Steel forgings: ASTM A668.
- B. Iron:
  - 1. Ductile iron: ASTM A536.
  - 2. Gray cast iron: ASTM A48 (minimum 30,000 psi tensile strength).
  - 3. Malleable iron: ASTM A47 and ASTM A197.

#### **FABRICATED METALWORK AND CASTINGS**

- C. Stainless Steel:
  - 1. Minimum yield strength of 30,000 psi and minimum tensile strength of 75,000 psi.
    - a. Bars, shapes: ASTM A276, Type 316.
    - b. Tubing and pipe: ASTM A269, ASTM A312 or ASTM A554, Type 316.
    - c. Strip, plate and flat bars: ASTM A666, Type 316, Grade A.
    - d. Bolts and nuts: ASTM F593, Type 316.
  - 2. Minimum yield strength of 25,000 psi and minimum tensile strength of 70,000 psi.
    - a. Strip, plate and flat bar for welded connections, ASTM A666, Type 316L.
  - 3. Welding electrodes: In accordance with AWS for metal alloy being welded.
- D. Washers: Washers, Nuts, and Threaded Rods are per 2020 WSDOT Standard Specs 9-06.5(4) “Anchor Bolts”.
- E. Threaded Rods at Pipe Support Brackets:
  - 1. ASTM F1554, Grade 105, including Supplemental Requirements S2, S3, and S4.
  - 2. Nuts: ASTM A563, Grade DH.
  - 3. Washers: ASTM F436.
- F. Embedded Anchor Bolts:
  - 1. ASTM F1554, Grade 36, including Supplemental Requirements S2 and S3.
  - 2. Nuts: ASTM A563, Grade A.
  - 3. Washers: ASTM F436.
- G. Sleeve Anchors:
  - 1. Manufacturers and Products:
    - a. ITW Ramset/Red Head, Wood Dale, IL; Dynabolt Hex Nut Sleeve Anchor.
    - b. Powers Rawl, New Rochelle, NY; Hex Head Power-Bolt Anchor.
    - c. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Sleeve-All Hex Head Anchor.
    - d. Wej-It Corp., Tulsa, OK; Wej-It Sleeve Anchor.
- H. Adhesive Anchors: Unless otherwise indicated, all drilled, concrete or masonry anchors shall be adhesive anchors. No substitutions will be considered unless accompanied with ICBO report verifying strength and material equivalency.
  - 1. Threaded Rod:
    - a. ASTM F593 stainless steel threaded rod, diameter as shown on Drawings.
    - b. Length as required, to provide minimum depth of embedment.
    - c. Clean and free of grease, oil, or other deleterious material.
    - d. For hollow-unit masonry, provide galvanized or stainless steel wire cloth screen tube to fit threaded rod.
  - 2. Adhesive:
    - a. Two-component, designed to be used in adverse freeze/thaw environments, with gray color after mixing.
    - b. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.
    - c. Nonsag, with selected viscosity base on installation temperature and overhead application where applicable.
  - 3. Packaging and Storage:
    - a. Disposable, self-contained cartridge system capable of dispensing both components in the proper mixing ratio and fitting into a manually or pneumatically operated caulking gun.
    - b. Store adhesive cartridges on pallets or shelving in covered storage area, in accordance with manufacturer’s written instructions.
    - c. Cartridge Markings: Include manufacturer’s name, product name, material type, batch or serial number, and adhesive expiration date.
    - d. Dispose of cartridges if shelf life has expired.
  - 4. Manufacturers and Products:
    - a. ITW Ramset/Red Head, Wood Dale, IL; Epcon Ceramic 6 Epoxy or A7 Adhesive Anchor System. (Use only Epcon A7 Adhesive System for hollow masonry.)

FABRICATED METALWORK AND CASTINGS

- b. Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System, HIT HY 150 (HIT HY 20 for hollow masonry).
- c. Powers Rawl, New Rochelle, NY; Power Fast Epoxy Injection Gel Cartridge System.
- d. Simpson Strong-Tie Co., Inc., Pleasanton, CA; Epoxy-Tie Adhesive ET or Acrylic-Tie Adhesive. (Use only Acrylic-Tie Adhesive for temperatures below 40 degrees F.)
- e. Covert Operations, Inc., Long Beach, CA; CIA-Gel 7000 Epoxy Anchors.
- f. U.S. Anchor, Pompano Beach, FL; Ultrabond 1.
- g. Unitex, Kansas City, MO; Pro-Poxy 300 and Pro-Poxy 300 Fast Epoxy Adhesive Anchors.

I. Iron and Steel Hardware: Galvanized in accordance with ASTM A153 when required to be galvanized.

## 2.3 MANUFACTURED UNITS

- A. Pipe Slide Bearing Assembly:
  - 1. Pedestal Plate, ASTM A36, size as indicated on Drawings.
  - 2. Built-up Steel Channel and Built-up Diaphragm, ASTM A36 or ASTM A992, Grade 50, size as indicated on Drawings.
  - 3. Steel Pipe Saddle Bearing Plate, ASTM A36, size as indicated on Drawings.
- B. Polytetrafluoroethylene (PTFE) Sheet: 3/32 inch minimum thickness, manufactured from pure virgin unfilled TFE resin conforming to the material requirements of AASHTO LRFD Bridge Construction Specifications, 3<sup>rd</sup> Edition, Section 18.8.2.
  - 1. Recess and bond the sheets to the substrate plates:
    - a. Recess PTFE sheets into substrate plates for at least half of their thickness.
    - b. Shoulders of the recesses are to be sharp and square.
    - c. Bond PTFE sheets to substrate plates with an epoxy adhesive material stable from -100° F to +250° F.
  - 2. The PTFE surfaces are to be smooth and free from blisters and bubbles after completion of the bonding operations.
  - 3. The static and dynamic coefficients of friction for stainless steel sliding on PTFE sheets are to be less than 0.08.
- C. Welding of Fabricated Pipe Saddle: In accordance with AWS D1.1, unless otherwise noted in this Section.
- D. If not called out as galvanized, paint all ASTM A36 steel.

## 2.4 FABRICATION

- A. Verify field conditions and dimensions prior to fabrication.
- B. Form materials to shapes indicated with straight lines, true angles, and smooth curves.
  - 1. Grind smooth all rough welds and sharp edges.
    - a. Round all corners to approximately 1/32 - 1/16 inch nominal radius.
- C. Provide drilled or punched holes with smooth edges:
  - 1. Punch or drill for field connections and for attachment of work by other trades.
- D. Weld Permanent Shop Connections:
  - 1. Welds to be continuous fillet type unless indicated otherwise.
  - 2. Full penetration butt weld at ladder side rails.
  - 3. Weld structural steel in accordance with AWS D1.1 using Series E70 electrodes conforming to AWS A5.1.
  - 4. All headed studs to be welded using automatically timed stud welding equipment.
  - 5. Grind smooth welds that will be exposed.
- E. Conceal fastenings where practicable.
- F. Fabricate work in shop in as large assemblies as is practicable.
- G. Tolerances:
  - 1. Rolling:

### FABRICATED METALWORK AND CASTINGS

- a. ASTM A6.
- b. When material received from the mill does not satisfy ASTM A6 tolerances for camber, profile, flatness, or sweep, the Contractor is permitted to perform corrective work by the use of controlled heating and mechanical straightening, subject to the limitations of the AISC Specifications.
- 2. Fabrication tolerance:
  - a. Member length:
    - 1) Both ends finished for contact bearing: 1/32 inch.
    - 2) Framed members:
      - a) 30 feet or less: 1/16 inch.
      - b) Over 30 feet: 1/8 inch.
  - b. Member straightness:
    - 1) Compression members: 1/1000 of axial length between points laterally supported.
    - 2) Non-compression members: ASTM A6 tolerance for wide flange shapes.
  - c. Specified member camber (except compression members):
    - 1) 50 feet or less: Minus 0/plus 1/2 inch.
    - 2) Over 50 feet: Minus 0/plus 1/2 inch (plus 1/8 inch per 10 feet over 50 feet).
    - 3) Members received from mill with 75 percent of specified camber require no further cambering.
    - 4) Fabricate beams/trusses without specified camber so after erection, camber is upward.
    - 5) Measure camber in fabrication shop in unstressed condition.
  - d. At bolted splices, depth deviation shall be taken up by filler plates.
    - 1) At welded joints, adjust weld profile to conform to variation in depth.
    - 2) Slope weld surface per AWS requirements.
  - e. Finished Members: Free from twists, bends, and open joints.
    - 1) Sharp kinks, bends and deviation from above tolerances are cause for rejection of material.
- H. Fabricate using steel, galvanized and painted after fabrication.
  - 1. Finish:
    - a. Steel: Mill finished unless scheduled or otherwise specified or, if accepted by Engineer, finished in manufacturer's standard.
    - b. Coat or otherwise separate surfaces in contact with dissimilar materials.
    - c. Pipe Support Brackets as shown in the Drawings: Weathering steel surfaces to match bridge.

## 2.5 SOURCE QUALITY CONTROL

- A. Responsibilities of Contractor's Testing Agency (Testing Firm):
  - 1. Inspect shop and field welds in accordance with AWS Code, Section 6 including the following non-destructive testing:
    - a. Visually inspect all welds.
    - b. In addition to visual inspection, test 50 percent of full penetration welds and 20 percent of fillet welds with liquid dye penetrant.
  - 2. Inspect structural steel which has been erected.
  - 3. Prepare and submit inspection and test reports to Engineer.
    - a. Assist Engineer to determine corrective measures necessary for defective work.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prior to installation, inspect and verify condition of substrate.
- B. Provide the results of field survey of existing bridge and calculations that verify or require modification to dimensions and details of the pipe support brackets.
- C. Correct surface defects or conditions which may interfere with or prevent a satisfactory installation.

### FABRICATED METALWORK AND CASTINGS

### 3.2 INSTALLATION

- A. Set metal work level, true to line, plumb.
  - 1. Shim and grout as necessary.
- B. Bolt Field Connections: Where practicable, conceal fastenings.
- C. Grind welds smooth where field welding is required. Repair coatings.
- D. Remove all burrs and radius all sharp edges and corners of miscellaneous plates, angles, framing system elements, etc.
- E. Unless noted or specified otherwise:
  - 1. Connect steel members to steel members with 7/8 inch diameter ASTM A325 high strength bolts.
  - 2. Provide washers for all bolted connections.
  - 3. Where exposed, bolts shall extend a maximum of 3/4 inch and a minimum of 1/2 inch above the top nut.
    - a. If bolts are cut off to required maximum height, threads must be dressed to allow nuts to be removed without damage to the bolt or the nuts.
- F. Provide bearing type connections for all bolted connections, unless specified otherwise or required to be slip-critical by the RCSC Specification for Structural Joints Using High-Strength Bolts.
  - 1. Provide hardened washers for all ASTM A325 bolts.
    - a. Provide the hardened washer under the element (nut or bolt head) turned in tightening.
- G. Do not field splice fabricated items unless said items exceed standard shipping length or change of direction requires splicing.
  - 1. Provide full penetration welded splices where continuity is required.
- H. Provide each fabricated item complete with attachment devices as indicated or required to install.
- I. Anchor such that work will not be distorted nor fasteners overstressed from expansion and contraction.
- J. Set base plates accurately on non-shrink cementitious grout as indicated on Drawings.
  - 1. See Section 03600 for non-shrink cementitious grout.
  - 2. Set and anchor each base plate to proper line and elevation.
    - a. Use metal wedges, shims, or setting nuts for leveling and plumbing.
      - 1) Wedges, shims and setting nuts to be of same metal as base plate they support.
      - 2) Tighten nuts on anchor bolts.
    - b. Fill space between bearing surface and bottom of base plate with non-shrink cementitious grout.
      - 1) Fill space until voids are completely filled and base plates are fully bedded on wedges, shims, and non-shrink cementitious grout.
    - c. Do not remove wedges or shims.
      - 1) Where they protrude, cut off flush with edge of base plate.
    - d. Fill sleeves around anchor bolts solid with non-shrink cementitious grout.
- K. Tie anchor bolts in position to embedded reinforcing steel or embedded standees using templates and wire.
  - 1. Tack welding prohibited.
  - 2. Coat bolt threads and nuts with heavy coat of clean grease.
  - 3. Anchor bolt location tolerance:
    - a. 1/16 inch.
    - b. Provide sturdy templates for all anchor bolts.
- L. Repair damaged galvanized surfaces in accordance with ASTM A780.
  - 1. Prepare damaged surfaces by abrasive blasting or power sanding.
  - 2. Apply galvanizing repair paint to minimum 6 mils DFT in accordance with manufacturer's instructions.

### **3.3 CLEANING**

- A. After erection, installation or application, clean all miscellaneous metal fabrication surfaces of all dirt, weld slag and other foreign matter.
- B. Provide surface acceptable to receive field applied paint coatings per the paint coating manufacturer's recommendations.

**END OF SECTION**

**SECTION 13110**  
**CATHODIC PROTECTION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section defines the material and construction requirements for the installation of a new impressed current deep anode groundbed cathodic protection system. The new cathodic protection system will be located on the south side of Highway 9 near the intersection of Babcock Road. Final location of cathodic protection equipment will be field determined.
- B. The work of this project includes: installation of one new transformer rectifier, installation of one new deep anode groundbed (8-inches in diameter x 375-feet deep), fabrication and installation of one anode junction box, installation of a positive header cable routed between the anode junction box and positive terminal lug within the rectifier, a single negative header cable connection to the pipeline, installation of an AC power drop to the rectifier pole, and installation of pipeline monitoring, interference, casing, and isolation test stations .
- C. AC power will be supplied from a power pole located along the pipeline right-of-way. The Contractor will coordinate with the power company to provide a service drop.
- D. The Contractor shall furnish and install all materials and equipment and provide all labor required to complete the work indicated in the drawings and described within these specifications, and all other work items not specifically mentioned but reasonably inferred for the installation. The Contractor shall be responsible for securing all licenses, permits, and insurance certificates required for the work of this project. A copy of all licenses and permits are to be provided 10 days prior to the start of the project.

**1.2 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Contractor: Perform all cathodic protection work with qualified, experienced personnel working under continuous, competent supervision. The supervisor or foreman shall have experience with at least three (3) deep anode groundbed installations within the last five years.
  - 2. Contractor's Corrosion Engineer: The Corrosion Engineer retained by the Contractor for testing purposes shall be experienced with buried water line cathodic protection and be a NACE International Certified Cathodic Protection Specialist or a NACE International Certified Corrosion Specialist.
  - 3. Drillers shall be licensed in accordance with Chapter 173-162 WAC.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications.
  - 1. NACE International Cathodic Protection Specialist or Corrosion Specialist credentials for Contractor's Corrosion Engineer.
  - 2. Driller's experience statement. Include name of individual(s) who will operate the drilling equipment and a copy of their current driller's license.
  - 3. Brief description of three similar jobs completed by the Contractor and Driller in the past five years.
  - 4. A copy of the Driller's logs used for deep anode installations.
- C. Manufacturer's Catalog Cuts of the following items:
  - 1. Rectifier.
  - 2. Anode, including lead wires.
  - 3. Coke breeze.
  - 4. Anode junction box.

5. Test stations.
  6. Header cables.
  7. Standpipe.
  8. Vent pipe.
  9. Thermite welding materials.
  10. Weld caps.
  11. Warning tape.
  12. Stationary reference electrode.
  13. Wax tape.
  14. Electrical isolation equipment.
  15. Insulating flange kits.
- D. Well Logs.
- E. Permits and licenses required for work:
1. Submit under Section 01060.
- F. Field Test Reports:
1. Submitted under Section 15000.

## **PART 2 - MATERIALS**

### **2.1 RECTIFIER**

- A. General. This project will require the installation of one new rectifier, location as indicated in the Drawings. The rectifier shall be supplied as described below.
- B. Air cooled rectifier constructed on slide out racks for servicing. Rectifier to be capable of operating continuously at ambient temperature of 50° C and 110% of rated input without damage to the rectifier components.
- C. AC Input: 115/230 volts, single phase, and 60 hertz. Use a suitably sized magnetic type circuit breaker mounted on the rectifier's front panel. Rectifier to be wired for low voltage input.
- D. Transformer: Two winding, insulation type, meeting the requirements of NEMA, UL, and CSA. Provide with Fine and Course secondary taps with rectifier output controlled by a minimum of 24 evenly divided steps of adjustment.
- E. Rectifying Elements: Full wave bridge, silicon diode stack with efficiency filter and current-limiting devices for over-voltage and over-current protection of the stack.
- F. DC Output Rating: 60 volts, 50 amps.
- G. Lighting Protection: Furnish lightning protection for AC input and DC output.
- H. Meters: Separate analog DC voltage and current meters. Meters shall display DC voltage and DC amperage within 2% accuracy, minimum. Field test meters for accuracy, replace inaccurate meters.
- I. External Shunt: Holloway type shunt mounted on the rectifier's front panel in series with the ammeter. Voltage and current rating of the shunt shall be clearly identified on the shunt body.
- J. Enclosure: 11-gauge galvanized steel, NEMA 3R enclosure suitable for exterior pole mounting. Furnish with hinged doors on the front and both sides to allow suitable access. Furnish with adequate ventilation.
- K. Panelboard: Nonmetallic, suitable for mounting meters, shunt, circuit breaker, fuses, and output terminals. Clearly engrave or identify with a permanent marking system the polarity of the output terminals, transformer settings, meters, and fuses.
- L. Convenience Outlet: Provide a 120 volt AC Ground Fault Interrupting (GFI) convenience outlet installed on the rectifier panel.

- M. Current Interrupter: Install a solid state timing device to interrupt the secondary current. Interrupter shall be capable of continuous operation. A “Test-Normal” toggle switch shall be installed for operation of the current interrupter.
- N. Mounting Hardware: Studs, bars, nuts, washers, and other mounting hardware shall be suitably sized brass or tin-plated copper.
- O. Certification of the rectifier unit by a Nationally Recognized Testing Laboratory verifying that the rectifier meets the requirements of the National Electrical Code.
- P. Nameplate: Engraved metal plate mounted on the interior side of the front door listing the manufacturer name, model number, serial number, and AC and DC input and output ratings.
- Q. Manufacturer: Universal Rectifiers, Inc. Rosenberg, TX or approved equal. Model number: ASAI 60 50 AA CFRRXYZ (Z = Current Interrupter).

**2.2 IMPRESSED CURRENT ANODES**

- A. General: A total of 20 impressed current anodes will be installed in the groundbed as part of this project. Provide anodes meeting the following requirements.
- B. Mixed Metal Oxide (MMO) Tubular Anode:
  - 1. MMO anode shall be a titanium tube with a crystalline electrically-conductive coating.
  - 2. Each tubular anode shall be 1-inch in diameter and 60-inches long.
  - 3. Acceptable manufacturers:
    - a. ELTECH Systems Corporation, Chardon, OH, Type Lida One.
    - b. Approved equal.
- C. Each anode shall have an individual anode lead wire utilizing a #8 AWG stranded copper conductor with HMWPE type outer insulation.
- D. Wire-to-Anode Connection: Factory installed using manufacturer’s standard and as specified herein. The anode connection shall be stronger than the wire.

**2.3 ANODE CENTRALIZERS**

- A. Metal or plastic assemblies that can be securely attached to the anodes to center them in the drilled hole. Centralizers shall not block the hole or impair the installation of the anodes, anode lead wires, standpipe, vent pipe or coke breeze.

**2.4 POSITIVE AND NEGATIVE HEADER CABLES**

- A. Both positive and negative header cables shall be #4 AWG stranded copper conductor with HMWPE type insulation, black in color. Cables shall be marked with conductor size and insulation type.

**2.5 COKE BREEZE**

- A. Use lubricated, low resistance calcined petroleum coke, suitable for pumping with the following composition:

Fixed Carbon	99 percent, minimum
Ash	0.15 percent, maximum
Volatile Matter	0.02 percent, maximum at 950°C
Moisture	0.07 percent, maximum
Particle Size	Dust free with max. particle size 1.0 mm
Bulk Density	64 – 74 lbs/ft <sup>3</sup>
Resistivity	0.10 ohm-cm at 150 psi

- B. Acceptable Materials:
  - 1. Loresco SC-3 as manufactured by Loresco International, Hattiesburg, MS.
  - 2. Asbury No. 251 as manufactured by Asbury Carbons, Rodeo CA.

## 2.6 GROUNDBED SEALING MATERIAL

- A. Use bentonite clay for sealing the anode hole above the coke breeze column to prevent contamination of underground aquifers. The type of bentonite clay shall be selected by the drilling contractor and must meet all applicable well construction standards.
- B. If bentonite chips are to be top-loaded, the Contractor must install the chips at the rate recommended by the manufacturer (typically 3 – 4 minutes per 50 pound bag for course bentonite chip material).

## 2.7 STANDPIPE

- A. Use a 1-1/4-inch diameter steel standpipe with threaded connections capable of supporting the entire weight of the anode string during hole loading.
- B. Equip the standpipe with a four-inch diameter, 1/4-inch thick steel end plate. Install a tee type fitting at the bottom of the standpipe welded to the steel plate to distribute the coke breeze slurry.
- C. After the loading operation is complete, remove the standpipe located above the coke breeze column from the hole. Use a reverse threaded connection or non-welded joint connection for this purpose.

## 2.8 VENT PIPE

- A. Active Column:
  - 1. Use 1-inch diameter schedule 40 PVC pipe with 0.006-inch x 1-inch long longitudinal slot openings.
  - 2. The slots shall be cut parallel to the longitudinal centerline of the pipe and shall be spaced 6-inches center-to-center.
  - 3. Each slot shall be placed 1-inch in circumferential distance from the preceding slot.
  - 4. Provide a PVC cap or plug at the bottom of the vent pipe as indicated in the Drawings.
  - 5. Acceptable Manufacturers:
    - a. Loresco All-Vent.
    - b. Approved Equal.
- B. Inactive Column: Use solid (non-slotted) 1-inch schedule 40 PVC pipe.
- C. Surface Vent Pipe: ASTM A 53 standard steel pipe, 1-inch diameter with 180 degree fabricated gooseneck at the top, hot-dip galvanize after fabrication; or schedule 40 PVC pipe with a 180 degree bend to discourage the ingress of water or debris.

## 2.9 SURFACE CASING (IF REQUIRED)

- A. Surface or PVC may be used for the surface casing.
  - 1. Steel Casing: ASTM A53, standard weight steel pipe. If steel surface casing is used, it must maintain a minimum vertical separation of twenty (20) feet from the active anode column.
  - 2. Non-Metallic Casing: PVC, nontoxic and resistant to water and soil, able to withstand installation, grouting, and operating stresses. The PVC casing will not be allowed to extend into the active anode column.

## 2.10 ANODE JUNCTION BOX AND ASSOCIATED HARDWARE

- A. The anode junction box shall be 16" x 12" x 8" deep NEMA type 4X 316L stainless steel. The box shall have a solid front cover with quick-release latches. Equip box with the following:
  - 1. Phenolic, Lexan, or Micarta back panel to fit box mounting holes. Panel to be minimum 1/4-inch thick.
  - 2. Copper bus bar measuring 1/4-inch thick x 1-inch wide x required length.
  - 3. 0.001 ohm, 25 amp shunt, Holloway Type SS, one per anode.
  - 4. Individual anode labels.
- B. Fabricate anode junction box as indicated in the Drawings.

## 2.11 CONDUIT

- A. Conduit for the belowground DC conductors shall be Schedule 80 PVC.

- B. Conduit for belowground header cable and lead wire runs shall be 2-inches in diameter. Install a maximum of 10 anode lead wires per 2-inch conduit.
- C. Conduit used to transition the positive and negative header cables into the rectifier can be 1.0-inch to 1.5-inch in diameter, PVC or schedule 40 hot dipped galvanized.
- D. AC conduit requirements are to be per the latest edition of the National Electrical Code.

## **2.12 EXOTHERMIC WELD KITS AND WELD COATING**

- A. Weld Kits: Wire-to-pipe connections made by the exothermic welding process. Weld charges and mold size shall be as specified by the manufacturer for various pipe sizes, surface configurations, and pipe material type.
  - 1. Ensure correct charges are used during installation. Steel and Ductile Iron surfaces require different weld metal.
  - 2. Where required, use appropriately sized wire sleeves to cover the copper conductor.
  - 3. Welding charges and molds shall be the product of a manufacturer regularly engaged in the production of such materials.
  - 4. Acceptable manufacturers:
    - a. Erico Products, Inc., (Cadweld).
    - b. Continental Industries, Inc. (Thermo-Weld).
- B. Weld Cap Primer: An elastomer-resin based corrosion resistant primer for underground services:
  - 1. Royston Roybond Primer 747.
  - 2. Approved Equal.
- C. Weld Caps: Pre-fabricated plastic cap filled with formable mastic compound on a base of elastomeric tape.
  - 1. Royston Handy Cap or Handy Cap 2.
  - 2. Approved Equal.

## **2.13 BONDING JUMPERS**

- A. Bonding jumpers installed across individual adjacent joints shall be #4 AWG stranded copper cables with HMWPE type insulation, black in color.
- B. For bonding across non-metallic sections of piping greater than 20-feet in length, use a #2 AWG stranded copper cable with HMWPE type insulation, black in color.

## **2.14 TEST STATIONS**

- A. The cathodic protection test station head shall be constructed of high strength polycarbonate, orange in color. The mounting hardware shall be stainless steel or nickel plated brass.
- B. The test station head shall be securely mounted on a polyethylene post. The polyethylene post shall be white in color and buried a minimum of 2-feet below grade and extend between 3.5 and 4.0 feet above grade.
- C. To resist upward movement, install a cross bar anchor near the bottom portion of the post.
- D. Acceptable manufacturers:
  - 1. Tinker and Rasor Model T-3.
  - 2. Cott, Big Fink.
- E. At-grade test stations shall be constructed as indicated in the Drawings and incorporate a test station terminal board and cap installed within a vault:
  - 1. Tinker and Rasor Model T-3.
  - 2. Cott, Big Fink.
- F. The vault lid shall be cast iron and stamped with "CP TEST" and marked with the station number:
  - 1. Brooks 3-RT
  - 2. Christy G-5.

- G. Surround the vault with a poured concrete pad embedded rebar with the dimensions indicated in the Drawings.

## **2.15 TEST STATION LEAD WIRES**

- A. Monitoring Test Stations:
  - 1. Test station lead wires shall be #10 AWG stranded copper wire with XHHW type insulation, blue in color. A total of two test station lead wires shall be installed per monitoring test station.
- B. For termination on the test station head, use pressure type ring terminal connections. Casing Test Stations:
  - 1. Install a single #10 AWG stranded copper wire and a single #6 AWG stranded copper wire each with XHHW type insulation, blue in color onto the pipeline surface.
  - 2. Install a single #10 AWG stranded copper wire and a single #6 AWG stranded copper wire each with XHHW type insulation, green in color onto the casing surface
- C. Interference Test Stations:
  - 1. Install a single #10 AWG stranded copper wire and a single #6 AWG stranded copper wire each with XHHW type insulation, blue in color. The foreign line crossing company shall install their own test leads in accordance with their company procedures.
- D. Isolation Test Stations:
  - 1. Install a single #10 AWG stranded copper wire and a single #6 AWG stranded copper wire each with XHHW type insulation, blue in color onto the protected pipeline surface.
  - 2. Install a single #10 AWG stranded copper wire and a single #6 AWG stranded copper wire each with XHHW type insulation, black in color onto the isolated pipeline surface.

## **2.16 WARNING TAPE**

- A. Plastic warning tape: Polyethylene, minimum 3 inch width, labeled "CAUTION CATHODIC PROTECTION CABLE BURIED BELOW".

## **2.17 STATIONARY COPPER-COPPER SULFATE REFERENCE ELECTRODE**

- A. A stationary copper-copper sulfate reference electrode shall be installed at the test station location. The reference electrode shall have the following properties:
  - 1. Reference electrode assembly shall be prepackaged within a non-polarizing low resistance backfill media.
  - 2. Stability shall be  $\pm 10$  millivolts with a 3.0 microamp load.
  - 3. Minimum 20 year in-service life.
  - 4. Lead wire shall be #14 AWG with RHH/RHW type insulation, yellow in color with length as required. Splices in the reference electrode lead wire will not be allowed.
- B. Acceptable manufacturers:
  - 1. GMC Electric, model CU-1-UG.
  - 2. Electrochemical Devices, Incorporated, model UL-CUG.

## **2.18 WAX TAPE**

- A. Wax tape rated for underground installation shall be installed over all buried insulating flanges to prevent introduction of foreign material between adjacent flange faces.
- B. Wax tape rated for underground installation shall be installed over all buried metallic fittings and appurtenances where indicated.
- C. Conform to the minimum requirements of AWWA C217.
- D. Wax tape shall incorporate corrosion inhibitors saturated into the tape material.
- E. Acceptable manufacturers:
  - 1. Trenton - #1 Wax Tape for Below Ground Use.
  - 2. Denso Densyl Tape.
  - 3. Approved equal.

## **2.19 INSULATING FLANGE KITS**

- A. Gaskets: Full face Type E with O-ring seal. The flange gasket shall be supplemented with a neoprene facing on each side to accomplish a seal.
- B. Insulating Sleeves: Full length fiberglass reinforced epoxy (NEMA G-10 grade).
- C. Insulating Washers: Fiberglass reinforced epoxy (NEMA G-10 grade).
- D. Steel Washers: Plated, hot-rolled steel, 1/8-inch thick.
- E. Suitable for 250 psi, 210 degrees F.
- F. Acceptable manufacturers:
  - 1. Pikotek.
  - 2. GPT.
  - 3. Approved equal.

## **2.20 DRAIN ANODE**

- A. A zinc drain anode will be installed at each of the two Williams pipeline crossings and will serve as a discharge point should testing indicate the presence of stray current.
- B. Use a prepackaged zinc anode ingot fabricated in accordance with ASTM-B-418 Type II with a nominal weight of 60 pounds. Total prepackaged weight shall be nominal 120 pounds.
- C. The dimensions of the zinc ingot shall be 2" x 2" x 60" long.
- D. Prepackaged backfill material shall consist of 75 percent hydrated gypsum, 20 percent bentonite, and 5 percent sodium sulfate.
- E. The anode lead wire shall be #10 stranded copper conductor with THWN or THHN type insulation, red in color.
- F. Terminate the anode lead wire onto the test station terminal board as shown on the project drawings.

## **2.21 DIELECTRIC SHIELD**

- A. A nonconductive dielectric shield shall be placed between the water transmission pipeline and each of the two Williams pipelines at the crossing location.
- B. A total of three layers of 10-mil thick (minimum 30 mils) polyethylene sheeting shall be centered between the two crossing pipelines.
- C. The width of the polyethylene sheeting shall equal the width of the trench at the crossing location. The sheeting shall extend a minimum of 10-ft beyond the outside edge of each Williams pipeline.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Drawings are diagrammatic and shall not be scaled for exact locations except where dimensions are given. Field conditions, non-interference with other utilities, and mechanical and structural features shall determine exact locations.

- B. The deep anode groundbed will consist of an 8-inch diameter hole drilled to a depth of 375 feet. Daily well logs must be kept and submitted to the District.
- C. Conform to NFPA 70, NACE SP0169, and NACE SP0572.
- D. Nothing in the Drawings or Specifications is to be construed to permit work not conforming to minimum requirements of these standards, regulations, and codes. Where larger size or better grade materials than required by regulations and codes are specified, the Specification and Drawings shall take precedence.

### 3.2 STORAGE OF MATERIAL

- A. Protect cathodic protection materials from damage during shipping and handling. Bring damaged materials to the attention of the District who will determine if the damaged materials are to be used, repaired, or replaced.

### 3.3 DEEP ANODE GROUND BED INSTALLATION

#### A. General:

1. All drilling operations and reporting requirements shall conform to, at a minimum, the Washington Water Well Construction Standard Chapter 173-160 WAC. The driller shall be registered as required per Chapter 173-162 WAC. Well logs, consistent with Chapter 173-160 WAC must be kept and submitted to the District within 14 days of drilling completion. Information that must be included in the log are date, depth, and thickness of all formations penetrated, tools used, depth to water in water bearing zones, and cause for any delays. The District shall have access to the logs at all times.
2. Drilling, lowering of the anodes, coke breeze placement, and backfilling shall be completed as described in this section and shall be observed and verified or directed as needed by the Contractor's Corrosion Engineer.
3. Perform drilling and waste disposal in accordance with the methods and procedures that comply with the rules and regulations of the state, city, county, or other governing bodies having jurisdiction. Seal hole with groundbed sealing material or as required by State well drilling regulations.
4. Take necessary precautions to avoid entrance of foreign matter into the hole, movement of soil strata, or collapsing of the hole during the progress of the work. Should movement of soil strata or collapse of the drilled hole interfere with proper completion of the groundbed, recover the wires and anode strings and ream or re-drill the hole.
5. Maintain a log describing the depth and type of geological formations encountered during drilling.
6. Cutting of the steel casings using a torch or other spark producing device will not be allowed while the anode lead wires are within the casing.

#### B. Drilling:

1. Approximate location of the groundbed is indicated in the Drawings. Notify the regional One Call Center at 811 at least 2 working days, but not more than 14 days, prior to any excavation. Coordinate the final location of the groundbed in the field with the District before drilling begins.
2. Construct the hole and set casing (if required) round, straight, and plumb. It is not the intent of these specifications to require the drilling contractor to use a casing in order to keep the anode groundbed hole open during drilling and anode installation operations. The manner in which the anode groundbed will be drilled (with the exception of the described dimensions) will be at the discretion of the drilling contractor.
3. Collect and store all drilling fluids, water, muds, and spoils in a manner to avoid any releases. The storage vessel will be selected by the Contractor to be compatible with the drilling method and volume of materials generated by the Contractor's selected drilling method. All water, drilling muds and spoils must be contained and collected. Release of water, drilling muds, and spoils is not allowed and the Contractor shall bear all costs to contain and store, and for any penalties, cleanup costs, or fines, if released.
4. Set surface casing (if required) prior to completion of the first 40 feet of the hole. Casing, other than the surface casing, shall not be installed or left in the hole unless in the driller's estimation it is necessary for successful completion of the hole. Plastic casing may be installed in the Inactive Column, at the Contractor's option, but shall not extend into the Active Column.

5. If steel casing is installed in the Active Column, it shall be cut below the surface and the top portion jacked to provide a minimum of 20 feet of vertical separation between the upper casing section and the Active Column. Complete cutting of the steel casing before the anodes are installed is required. Jacking operations may be completed before or after installation of the anode assembly at the Contractor's option.
6. If desired, the Contractor may elect to completely remove the upper portion of the casing above the Active Column.

C. Lowering of Anodes:

1. Notify the District prior to beginning this work.
2. Carefully lay out all anodes, anode cables, and vent pipe and inspect for damage. Bring damaged materials to the attention of the District who will determine if the damaged materials are to be used, repaired, or rejected.
3. Attach a single anode centralizer to each anode. Use steel banding material or appropriately sized steel hose clamps to make the connection.
4. Prepare to load the groundbed by assembling the various components and attach them to the steel standpipe. Securely attach anodes to the standpipe using steel banding material or appropriately sized steel hose clamps. Care shall be taken to ensure that the anodes are not damaged during this process and that the anodes are secured in such a way that they do not move. Secure the vent pipe and anode lead wires to the standpipe using a minimum of five wraps of vinyl electrical tape. Carefully lower the standpipe, with the anode string attached, into the hole. Securely attach each successive anode and other down-hole materials to the standpipe as it is lowered into the hole. Add additional joints of standpipe to the top of the string to accommodate all anodes. Ensure that the weight of the anode string is born by the standpipe and not the vent pipe or anode lead wires.
5. Provide sufficient slack in the anode wires to prevent damage during the anode and coke breeze installation.
6. Damage to anodes or cut, gouged, or scraped wire insulation will not be acceptable. No wire splices will be allowed inside the deep anode groundbed.
7. Fit the standpipe with a reverse-threaded coupling assembly above the top anode so the sections of standpipe above the top anode can be retrieved from the hole after the complete anode string is lowered into the hole, secured, and the coke breeze has been pumped into the groundbed. Other methods of standpipe retrieval from the inactive column must be pre-approved.
8. Locate anodes in the hole with the bottom anode labeled as No. 1 and each successive anode incrementally labeled. The bottom anode shall be placed so that it is five feet from the bottom of the groundbed hole. The remaining anodes shall be spaced nine feet center-to-center. A five-foot layer of coke breeze shall cover the top of the upper anode.
9. If the hole is drilled with mud, the hole shall be flushed with clean water in a continuous process before the anodes are lowered until the return fluid is sufficiently clear to allow proper installation and settlement of the anodes, vent pipe, and coke breeze.
10. Installation of the anodes and coke breeze shall be performed continuously. Lowering of the anodes and backfilling with coke breeze shall be observed by the District.

D. Backfilling of Anode Hole:

1. Notify the District prior to beginning this work.
2. Prepare to pump the hole with coke breeze by mixing several bags of coke breeze with water to form a slurry in an appropriate mixing trough. Control the ratio of the slurry to avoid too thick or too thin mixtures. To reduce the possibility of bridging, bottom loading the coke breeze will be required.
3. Using the standpipe as a pump pipe, begin pumping coke breeze at a steady, continuous rate. Mix and pump coke breeze and water in a continuous operation until the hole is filled to the correct level. Do not stop pumping until all coke breeze has been pumped into the hole.
4. Allow coke breeze to settle for a minimum of 12 hours. Measure the hole depth to the top of the coke column by lowering a weighted tape until it contacts the top of the coke column. Top off the hole as necessary to bring the coke breeze level to the specified height as indicated in the Drawings. If top loading is required to complete the coke breeze column, water shall be poured into the hole concurrently with the dry coke breeze to discourage bridging.

5. Unscrew the standpipe at the top of the coke breeze column and remove it from the hole upon completion of the coke breeze slurry installation.
  6. Once the proper level of coke breeze is reached, install the bentonite clay in dry form to within 24 inches of grade. Installation of the bentonite clay shall be completed as per the manufacturer's recommendations. Use native material to fill the remaining groundbed to grade.
  7. As an alternative, the Contractor will be allowed to install the coke breeze slurry using the tremie method. The Contractor shall ensure that the tremie pipe remains within the coke breeze column during the slurry installation such that bridging does not occur.
  8. At all times during the progress of the work, the Contractor shall protect the groundbed in such a manner as to effectively prevent tampering or entrance of foreign matter.
- E. Anode Lead Wire and Vent Pipe Routing and Termination:
1. Route anode lead wires to the anode junction box within conduits as indicated in the Drawings.
  2. Route the vent pipe to the rectifier pole. Extend the vent pipe 2.0-feet above grade. Install a 180-degree elbow onto the end of the vent pipe to discourage moisture ingress.

### **3.4 RECTIFIER INSTALLATION**

- A. Provide the District with 10 working days' notice prior to the completion of the rectifier and groundbed installation to allow scheduling of the required energizing and testing.
- B. Rectifier Installation:
1. The rectifier shall be mounted such that the top of the cabinet will be 6.0-feet above grade.
  2. Rectifier shall be mounted on a new pole installed as part of the AC service drop requirements. As a minimum, use an 8-inch x 8-inch pressure treated post buried a minimum depth of four-feet below grade. Secure the rectifier using through-post bolts.
  3. Determine final rectifier location with the District prior to installation.

### **3.5 AC POWER SERVICE**

- A. The Contractor shall coordinate with the local power company to provide an AC power drop from an adjacent power pole.
- B. The District will pay local power company fees for power drop.
- C. The rectifier and AC service disconnect can be secured to the same service drop pole.

### **3.6 ANODE JUNCTION BOX**

- A. Fabricate the anode junction box and install on the rectifier pole as indicated in the Drawings.
- B. Connect a single #4 AWG positive header cable and the anode lead wires to their proper terminals located inside the anode junction box using shunts, bus bar, and appropriate fasteners as indicated in the Drawings.
- C. Terminate each anode lead wire on its corresponding shunt located in the anode junction box. Permanently mark the locations of each anode lead wire as indicated in the Drawings. Anodes shall be numbered in consecutive order starting with the bottom Anode No. 1 and moving up the groundbed sequentially. Maintain sufficient slack to keep the wires from being unduly stressed, damaged, or broken during backfill.

### **3.7 NEGATIVE STRUCTURE CONNECTION**

- A. Make a single negative header cable connection to the pipeline using the exothermic weld process. Coat the pipeline connection with primer and install protective cap over the connection. The negative header cable shall be #4 AWG with HMWPE insulation.
- B. Ensure that adequate slack exists in the cable such that backfilling operations will not cause the cable to become detached from the pipeline.

### **3.8 CONDUCTOR ROUTING**

- A. Install and pull conductors in accordance with applicable codes. Conductors shall be housed in PVC conduit from the groundbed location to the anode junction box and from the negative header cable connection to the rectifier. The conduit shall be buried a minimum of 3 feet below grade.
- B. Arrange conductors neatly in the rectifier and anode junction box. Cut to proper length, remove surplus wire and attach to the appropriate terminals as indicated.
- C. Bury warning tape approximately 2 feet above the cable. Align parallel to and within 2 inches of the centerline of the conductor run.

### **3.9 TEST LEAD INSTALLATION**

- A. Install test leads onto the surface of the pipeline using the exothermic weld process. Provide a minimum spacing of 6-inches between adjacent connections. Cover the connections with primer and the specified weld cap. Provide adequate slack in the wires such that backfilling operations will not cause the wires to become detached from the pipe.
- B. For pipeline monitoring stations, install 2 each #10 AWG conductors with XHHW type insulation, blue in color. Terminate lead wires on test station terminal board using properly sized ring type terminal connectors.
- C. For casing test stations, install a single #10 AWG and a single #6 AWG conductor with XHHW type insulation, blue in color, onto the surface of the water pipeline. Install a single #10 AWG conductor and a single #6 AWG conductor with XHHW type insulation, green in color, onto the casing. Terminate lead wires on the test station terminal board using properly sized ring type terminal connectors.
- D. For foreign line crossing stations, a single #10 AWG and a single #6 AWG conductor with type XHHW insulation, blue in color, are to be attached to the pipeline. Terminate the lead wires on the test station terminal board using appropriately sized ring type terminal connectors.
- E. Contact the foreign crossing pipeline company a minimum of 1-week in advance of test lead connections. The Contractor is not allowed to make connections to the foreign pipeline. Coordinate with the foreign pipeline owner to install and mount test leads.
- F. For isolation test stations, install a single #10 AWG and a single #6 AWG conductor with XHHW type insulation, blue in color, onto the protected side of the water pipeline. Install a single #10 AWG conductor and a single #6 AWG conductor with XHHW type insulation, black in color, onto the non-protected side of the piping. Terminate lead wires on the test station terminal board using properly sized ring type terminal connectors.
- G. Route test lead wires to the test station at a minimum depth of 36-inches below grade.
- H. Install warning tape 12-inches over the top of the test lead wires as they transition to the test station.

### **3.10 TEST STATION INSTALLATION**

- A. Install the polyethylene test station tube into the ground a minimum of two feet. The top of the test station shall be between 3.5 and 4.0 feet above grade. Ensure that the tube anchor has been installed to discourage upward movement of the test station.
- B. Land the test lead wires and reference electrode lead wires on the test head terminal board. Coil the wires such that a minimum of 12-inches of slack is available in the wires.
- C. Locate the test station such that it is clear of vehicular traffic.

### **3.11 STATIONARY REFERENCE ELECTRODE**

- A. Install a stationary copper-copper sulfate reference electrode at the location indicated in the Drawings. The reference electrode shall be installed at or below the spring-line of the pipe, 4-inches ( $\pm$  2-inches) from the surface of the pipe.

- B. Surround the reference electrode with backfill material and soak with 5 gallons of fresh water. Ensure that the reference electrode is not watered until it has been surrounded with pipeline backfill material so as not to cause the prepackaged backfill material to separate from the reference electrode assembly.
- C. Measure the electrical potential of the stationary reference electrode relative to a calibrated portable copper-copper sulfate reference electrode. Reject any stationary reference electrode that is not within 10 millivolts DC of the portable reference electrode.
- D. Route the reference electrode lead wire to the test station and terminate.

### **3.12 DRAIN ANODE**

- A. Each of the two drain anodes shall be installed at the invert of the water transmission pipeline. The anodes are to be positioned horizontally, parallel to the transmission pipeline and offset from the pipeline's outer circumference by 6-inches (+/- 2 inches). The anodes can be positioned on either the north or south side of the transmission pipeline.
- B. Terminate each drain anode lead wire on the appropriate terminal located on the test station head.

### **3.13 WIRE INSULATION AND REPAIR**

- A. All wires shall be handled with care. Splices for damage to the wire insulation shall be required by spirally half-lapping two layers of high voltage rubber splicing tape and two half-lapped layers of vinyl electrical tape over the damaged area. Make wire splices with suitable sized compression connectors or mechanically secure and solder with rosin cored 50/50 solder. Splices shall be approved by the District.
- B. No splices shall be allowed in the anode lead wires between the deep anode groundbed and the anode junction box.

### **3.14 EXCAVATION AND BACKFILLING**

- A. Excavation and backfill shall conform to the following:
  1. Trenches for anode lead wires or header cables shall be a minimum of 3-feet deep or as indicated otherwise in the Drawings.
  2. Backfill the trenches with native rock-free excavated material.
  3. Do not use large rocks, stones, boulders or other foreign materials as or in backfill material.
  4. Place the backfill in 6-inch layers and thoroughly and carefully tamp until the wires and conduit have a depth of cover not less than 18 inches. Compacting the backfill with water will not be permitted.

### **3.15 INSTALLATION OF CONDUIT**

- A. Center the PVC conduit on the bedding layer. Place additional bedding material over the conduit in layers not exceeding 6 inches deep and compact. Do not place tree roots, wood scrap, vegetation matter or refuse in the backfill. Place plastic warning tape at a depth of 12 inches below final grade or as indicated in the Drawings.

### **3.16 CONTINUITY BONDING**

- A. The purpose of electrical bonding is to ensure that electrical continuity exists along the entire length of the pipeline. If testing indicates that the piping is not electrically continuous, the Contractor shall determine the location of the defective bonding conductor(s) and expose and repair at no cost to the District.
- B. During installation of the pipe, electrically bond across all pipe joints which are not circumferentially or otherwise welded by exothermic welding of bond cables.
- C. Bond across all buried metallic in-line valves, couplings, thrust harnesses, and bolted flanges with the exception of insulating flanges.
- D. Bond across all ductile iron bell and spigot joints and in-line equipment.
- E. Install jumper bonds across all non-metallic sections of piping. If spacing between adjacent metallic piping exceeds 20-ft, use #2 AWG stranded copper conductors. Otherwise, use #4 AWG stranded copper conductors.

- F. Install all bond wires at minimum lengths that will still allow for maximum deflection of the joint or fitting.
- G. Bond wires can either be attached to the pipe cylinder or directly to the outside edges of flanges that are welded to the pipe. Do not attach bond wires to valve bodies but instead to the valve flange.
- H. Document final bonds and their location for use in the final test report.

### **3.17 INSULATING FLANGE KITS**

- A. Isolate, dielectrically, all piping from all other metals including reinforcing bars in concrete slabs, other pipe lines, and miscellaneous metal.
- B. Make insulated joints (with Insulated Flange Kits) and appurtenant features as indicated in the Drawings. Exercise special care when installing these joints to prevent electrical conductivity across the joint. After the insulated joint is completed, perform an electrical resistance test. Should the test indicate a short circuit, remove the insulating units to inspect for damage, replace all damaged portions, and reassemble the insulating joint. Retest the insulated joint to assure proper insulation.

### **3.18 WAX TAPE**

- A. Coat in accordance with AWWA C217 and with manufacturer's recommendations.
- B. Extend the wax tape coating system over any adjacent pipe coating by a minimum of 2 pipe diameters.
- C. Clean the surfaces to receive the wax tape coating to be free of all dirt, grease, and other foreign material.
- D. Apply the primer by gloved hand or brush onto all exposed metal surfaces.
- E. Cut strips of wax tape and apply them by gloved hand around all bolts, nuts, and other irregular shapes so that there are no voids or spaces under the tape.
- F. Apply a sufficient amount of tape to completely encapsulate all exposed metal surfaces.
- G. Minimum wax tape thickness shall be 70 mils over smooth surfaces and 140 mils over sharp and irregular surfaces, or of a thickness required to fill all voids.
- H. Apply by hand the outer covering consisting of two layers of polyvinylidene chloride, high cling membrane sheet over the wax tape coating by tightly wrapping it around the pipe such that it adheres and conforms to the wax tape. Secure the plastic wrap to the pipe or fitting with adhesive tape.

### **3.19 SYSTEM TESTING**

- A. Notify the District at least 2 days in advance of all tests. Failure to properly notify the District will invalidate all testing performed by the Contractor and testing will have to be repeated. The tests shall be conducted in the presence of the District.
- B. The Owner will provide a NACE Certified Level 3 Coating Inspector to perform holiday testing on the exterior pipeline coating in the vicinity of the Williams Pipeline crossings. Specifically, the holiday testing will be conducted on the portion of piping that is coated with an extra thickness of polyurethane. The holiday testing will be performed in accordance with NACE SP-0188 prior to backfilling operations. The contractor will be required to make any noted repairs to the coating.
- C. Perform all field tests under the supervision of either a NACE International Certified Corrosion Specialist or a NACE International Certified Cathodic Protection Specialist. This testing shall include all insulators, wires, and continuity testing. Correct all deficiencies in the installation observed by these tests and inspections. Pay for all retests made necessary by the corrections. Submit test results and all corrected deficiencies in final construction checkout report.
  - 1. Testing of All Completed Welds: All pipe lead wire connections shall be inspected by the District at his discretion prior to backfilling. At the District's discretion, test to verify the soundness of the wire-to-pipe welds. Tests for this purpose shall consist of striking the weld nugget with a two pound hammer while steadily pulling on the wire. Note that the wire near the weld shall not be unnecessarily cold-worked during installation or testing. Remove and reweld any welds that break loose or show signs of separating as determined by the District:

2. Wire Identification: The District shall be given 2-days' notice to verify that all buried pipe lead wires and anode lead wires are properly identified with labels prior to backfilling the wires and the welded wire-to-pipe connections.
3. Electrical Continuity Tests: Notify the District when the corrosion control system is completely installed. Within two weeks, test buried piping sections with mechanical or push-on pipe joints for electrical continuity in the presence of the District. The Contractor will have the option of verifying electrical continuity by one of the following means:
  - a. Measuring the DC voltage drop between test stations. Potential measurements greater than 2 millivolts indicates that electrical continuity does not exist.
  - b. Potential shift change. Using the new anode groundbed or temporary anode, apply current to the pipeline and cycle the current source. Electrical shifts in the negative direction with the current applied and positive shifts with the current off are an indication of continuity. This testing must be performed with the reference electrode connected to the negative side of the voltmeter and the structure connected to the positive side of the voltmeter.
4. Electrical Isolation Tests: Verify proper operation of the installed electrical flange isolation kits (insulating flange kits). Continuity is verified if the electrical potential across the flange is greater than 2 millivolts DC. Isolation can also be verified using an underground electrical isolation checker Tinker and Rasor Model CE-IT or approved equal.
5. Test Station Checkout: Prior to turning on the rectifier, record native state potentials at each test station, including potentials on foreign piping at the crossing test stations. Data shall be collected using a calibrated portable copper-copper sulfate reference electrode and the installation stationary reference electrode. Also, measure the potential between the calibrated portable and stationary reference electrodes. Turn on rectifier and adjust current output such that the test station potential adjacent to the rectifier is measuring a polarized potential of approximately -1.1 volts. Record both on and instant off potential at all test stations, including the foreign pipelines.
6. Rectifier Checkout: Data to be collected and recorded by the Contractor shall include: Rectifier DC Voltage and DC Amperage at each tap setting starting at Coarse 1 Fine 1 and increasing output by one fine setting until rectifier has reached either voltage or amperage redline value. Do not exceed output rating of the rectifier. Record individual anode current output at when rectifier is operating at approximately 10 and 20 amperes. Verify that native state potential data has been collected at each test station prior to completing rectifier functionality test. Upon completion of testing, turn rectifier off.
7. Provide results of all testing to the District for review and comment; submit under Section 15000.

**END OF SECTION**

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**SECTION 15000**  
**PIPING: GENERAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies general pipe construction requirements. The provisions of this Section shall apply to all sections in Division 15.
- B. The plan and profile drawings define the general layout, configuration, routing, method of support, pipe size, and pipe type; however, these drawings are not for pipe construction. The fabrication drawings submitted under this Section that receive a Review Action of NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED are the drawings for pipe construction.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings: Layout drawings including all necessary dimensions, details, pipe joints, fittings, specials, valves, appurtenances, anchors, guides, and material lists. Shop drawings shall indicate all spool pieces, spacers, adapters, connectors, fittings, and supports to accommodate the equipment and valves in a complete and functional system. Layout drawings shall be provided for the following:
  - 1. 30- and 36-inch-diameter water transmission pipeline (Section 15061).
  - 2. 18-inch-diameter water distribution line (Section 15062).
  - 3. 12-inch-diameter water distribution line (Section 15062).
  - 4. 8-inch-diameter water distribution line (Section 15062).
  - 5. 6-inch-diameter drain piping (Section 15062).
  - 6. 8-inch-diameter water distribution line (Section 15064).
  - 7. 2-inch-diameter water distribution line (Cross-linked Polyethylene (PEX), per this Section).-1.5- and 4-inch-diameter pumped drainage (Section 15064).
  - 8. Vent pipe (Sections 15025 and 15062).
- C. Certifications:
  - 1. All necessary certificates, test reports, and affidavits of compliance.
  - 2. Welding procedures and certifications for all welders involved with installation of steel pipe and fittings per ANSI/AWS D1.1.
- D. Bolting Torque for Gaskets: Provide bolting torques from gasket supplier for proper seating of flange gaskets for each size and pressure rating required.
- E. Product Technical Data including:
  - 1. Copies of manufacturer's written directions regarding material handling, delivery, storage, and installation.
  - 2. Separate schedule sheet for each piping system scheduled in this Section showing compliance of all system components. Attach technical product data on gaskets, pipe fittings, and other components.
- F. Product technical data for pipe markers.
- G. Product technical data for warning tape and tracer wire.
- H. Product Technical Data for the Water Services and Connections indicated in the 06C Drawing Series (see Bill of Materials), including, but not limited to:
  - 1. Water service line pipe material:
    - a. 1- and 2-inch Cross-linked Polyethylene (PEX 200 PSI).
    - b. 1- and 2-inch galvanized.
    - c. Brass.
    - d. 1- and 2-inch PVC, Schedule 80.
  - 2. Polyethylene sheeting.

3. Stiffeners, adapters, nipples, reducers, elbows, tees, unions, caps, brass PAC joint, and couplings.
  4. Double strap clamps and 1-inch clamp.
  5. 1-inch corp.
  6. 1- and 2-inch curb stops.
  7. 1-inch ball valves.
  8. 2-inch ductile iron resilient wedge valve.
  9. 2-inch cast iron resilient wedge valve.
  10. 1-inch pressure reducing valve (high range PRV)
  11. 2-inch pressure reducing valve.
  12. 1-inch combination air valve.
  13. Valve box and cover.
  14. ¾-inch coppersetter
  15. Hose clamp.
  16. Meter (Badger Model M25)
  17. Tracer wire (#10 Solid Copper, Blue Coated for Water and Orange Coated for Fiber Conduit).
  18. Meter box, extension, and lid/cover.
  19. Casing, 6" PVC sewer pipe.
  20. Vault and cover.
  21. Pipe marker.
  22. Metal fence post with spade removed (stub only).
- I. Documentation of each manufacturer's Quality Control Program.
- J. Field test reports:
1. Reports defining results of dielectric testing and corrective action taken.
  2. Reports defining results of testing for corrosion protection and insulating flange and corrective action taken.

## **PART 2 - PRODUCTS**

### **2.1 MINIMUM PRESSURE RATINGS**

- A. Beginning of project to Station 283+80: 250 PSI rated.
- B. Station 283+80 to end of Project: 150 PSI rated.

### **2.2 STEEL FLANGES**

- A. Flanges:
  1. Flanges for steel piping shall conform to AWWA C207 Class D or E as indicated on the Drawings.
  2. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe unless indicated otherwise.
  3. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA C207.
  4. Flanges for miscellaneous small steel pipes shall be in accordance with the standards specified for those pipes.
  5. Flange Classes for Pipe Segments:
    - a. Beginning of project to Station 283+80: Class E Flanges.
    - b. Station 283+80 to end of Project: Class D Flanges.
- B. Blind Flanges:
  1. Blind flanges shall be in accordance with ANSI/AWWA C207, or with the standards for miscellaneous small steel pipes.
  2. All blind flanges for pipe sizes 12 inches and greater shall be provided with lifting eyes in the form of welded eye bolts.
- C. Flange Coating:
  1. All machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.

2. Coating shall be NSF-61 rated for contact with drinking water.

D. Flange Bolts:

1. ASTM A194 Grade 2H Heavy Hex nuts.
2. ASTM A193 Grade B7 bolts.
3. Studs and bolts shall extend through the nuts a minimum of 1/4-inch.
4. All-thread studs shall be used on all valve flange connections where space restrictions preclude the use of regular bolts. All-thread studs shall be of the same grade as bolts.

E. Flange Bolt Pattern:

1. Bolt circle, bolt size, and spacing shall conform to the drilling pattern per ANSI B16.1 Class 125.

F. Insulating Flanges: Insulated flanges shall have bolt holes 1/4-inch diameter greater than the bolt diameter.

G. Flange Gaskets:

1. Gaskets for flanged joints shall be full face gaskets, 1/8-inch thick, fiber with nitrile binder, ASTM D1330 Grade I & II.
2. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange.
3. Manufacturer shall provide bolting torques for proper seating of flange gaskets for each size and pressure rating required.
4. Acceptable Manufacturers:
  - a. John Crane, Style 2160.
  - b. Garlock, Style 3000.
  - c. Approved Equal.

### 2.3 INSULATING FLANGE KITS

A. Per Section 13110.

### 2.4 THREADED INSULATING CONNECTIONS

- A. General: Threaded insulating bushings, unions, or couplings, as appropriate, shall be used for joining threaded pipes of dissimilar metals and for piping systems where corrosion control and cathodic protection are involved.
- B. Materials: Threaded insulating connections shall be of nylon, Teflon, polycarbonate, polyethylene, or other non-conductive materials, and shall have ratings and properties to suit the service and loading conditions.

### 2.5 SLEEVE-TYPE COUPLINGS

A. Construction:

1. Sleeve-type couplings shall be provided in accordance with ANSI/AWWA C219 - Standard for Bolted Sleeve-Type Couplings for Plain-End Pipe and shall be of steel with steel bolts, without pipe stop and be of sizes to fit the pipe and fittings indicated.
2. Couplings shall be hydraulically tested per AWWA C219.
3. The middle ring shall be not less than 1/4-inch in thickness and shall be a minimum of 7 inches long for sizes up to and including 30 inches and a minimum of 10 inches long for sizes greater than 30 inches, for standard steel couplings, and 16 inches long for long-sleeve couplings.
4. The followers shall be single-piece contoured mill sections welded and cold-expanded as required for the middle rings and of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket.
5. Buried sleeve-type couplings shall be epoxy-coated at the factory as indicated.
6. Beginning of project to Station 283+80: 250 PSI rated.
7. Station 283+80 to end of Project: 150 PSI rated.

B. Pipe Preparation:

1. The ends of the pipe shall be prepared for couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to air test for porosity.
- C. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions.
1. The rubber in the gasket shall meet the following specifications:
    - a. Color: Jet Black.
    - b. Surface: Non-blooming.
    - c. Durometer Hardness: 74 ± 5.
    - d. Tensile Strength: 1,000 psi minimum.
    - e. Elongation: 175 percent minimum.
  2. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D 2000 - Classification System for Rubber Products in Automotive Applications, AA709Z, meeting Suffix B13 Grade 3, except as noted above. All gaskets shall be compatible with the piping service and fluid utilized.
- D. Insulating Couplings: Where insulating couplings are required both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.
- E. Restrained Joints: All sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means. Harnesses shall be in accordance with the appropriate reference standard or as indicated.
- F. Acceptable Manufacturers:
1. Dresser, Style 38.
  2. Ford Meter Box Co., Inc., Style FC1 or FC3.
  3. Smith-Blair, Style 411.
  4. Approved Equal.

## 2.6 FLANGED COUPLING ADAPTERS

- A. Flange Couplings Adapters: Shall conform to requirements for sleeve type couplings as applicable, shall provide for thrust restraint, shall meet ANSI/AWWA C219, and shall be hydrostatically tested.
- B. Body and End Ring: Shall be made of either ductile iron per ASTM A536 or steel per ASTM A53 or ASTM A512 to match the adjoining pipe material. Bolt circle, bolt size and spacing shall conform to the drilling pattern per ANSI B16.1 Class 125. Body shall be rated for 200 psi working pressure.
- C. Flange: AWWA Class D or E Steel Ring Flange per this Section, compatible with ANSI B16.1 Class 125 bolt circles, bolt size and spacing.
- D. Follower: Follower shall be ductile iron per ASTM A536 for sizes 3-12 inches. For sizes 14-inch and greater follower shall be heavy rolled steel per AISI C1018.
- E. Gasket: Grade 30 standard – specially compounded rubber of all new materials with ingredients to produce superior storage characteristics, permanence and resistance to set after installation.
- F. Bolts and Nuts:
1. Flanges – This Section.
  2. Couplings – Type 316, stainless steel.
- G. Coatings; Fusion bonded epoxy, NSF 61 certified.
- H. Acceptable Manufacturers:
1. Smith-Blair, Inc.
  2. Baker.

3. Approved Equal.

## **2.7 RESTRAINED FLANGED COUPLING ADAPTERS (RFCA)**

- A. Restrained Flange Couplings Adapters: Conform to requirements for Sleeve Type Couplings.
- B. Body: Construct of either ductile iron per ASTM A536 or steel per ASTM A53 or ASTM A512 to match the adjoining pipe material.
- C. Flange: AWWA Class D or E steel ring flange per this Section, compatible with ANSI Class 125 bolt circles, bolt size and spacing.
- D. Restraining Bolts: 7/8 – 9 roll thread, ductile iron, meeting or exceeding ASTM A536.
- E. Restrained Lugs: Ductile iron, meeting or exceeding ASTM A536.
- F. Bolts and Nuts:
  1. Flanges – This Section.
  2. Couplings – Type 316, stainless steel.
- G. Coatings; Fusion bonded epoxy, NSF 61 certified.
- H. Manufacturers, or Equal:
  1. Romac Industries.
  2. Robar Baker.
  3. Approved Equal.

## **2.8 BALL AND SOCKET (DOUBLE BALL JOINT):**

- A. Double Ball with Flanged Ends. Flange outlets conform to the dimensional requirements of ANSI/AWWA C110/A21.10 (Pressure Class 150 or 250 as indicated in the Drawings) with the addition of an O-ring gasket. Provide minimum of 8 inches of expansion capacity.
- B. Flange Bolt Pattern per Section 15000.
- C. Rated for a minimum 150 psi or 250 and pressure tested prior to shipment.
  1. Beginning of project to Station 283+80: 250 PSI rated.
  2. Station 283+80 to end of Project: 150 PSI rated.
- D. Expansion/Contraction travel preset at 50/50 setting.
- E. Ductile Iron per ASTM A536.
- F. Up to 15° deflection per ball.
- G. Interior coating 15 mils fusion bonded epoxy, NSF61approved. Exterior 6 mils fusion bonded epoxy.
- H. Sealing gaskets of EPDM.
- I. Tested in accordance with either AWWA C600 or ASTM D2774.
- J. EBAA IRON FLEX-TEND, double ball flexible expansion joint, or Approved Equal.

## **2.9 HARNESS COUPLING**

- A. Steel fabrications to be in accordance with Section 15061.
- B. Sleeve-Type Couplings per this Section.
- C. Pressure Rating: 250 PSI.

## **2.10 DISMANTLING JOINTS**

- A. Dismantling joints shall conform to the requirements for sleeve type couplings as applicable, shall provide for thrust restraint, shall meet ANSI/AWWA C219, and be hydrostatically tested.

- B. Body and End Ring: The end ring and body shall be made from ASTM A36 steel and shall be rated as follows:
  1. Beginning of project to Station 283+80: 250 PSI rated.
  2. Station 283+80 to end of Project: 150 PSI rated.
- C. Flanged Spool: The flanges shall conform to AWWA C207 Class D or E steel ring flanges per this Section. Bolt circle, bolt size and spacing shall conform to the drilling pattern per ANSI B16.1 Class 125. The pipe shall be ASTM A36 plate 1 percent cold expanded to size.
- D. Gasket: Grade 30 – standard – specially compounded rubber of all new ingredients to produce superior storage characteristics, permanence and resistance to set after installation.
- E. Bolts and Nuts:
  1. Flanges: Per this Section.
  2. Couplings: Type 316 stainless steel per ASTM A193.
  3. Tie Rods: Type 316 stainless steel per ASTM A193 Grade B8M.
- F. Coatings; Fusion bonded epoxy, NSF 61 certified.
- G. Acceptable Manufacturers:
  1. Romac Industries.
  2. Baker.
  3. Approved Equal.

## **2.11 SPLIT SLEEVE COUPLINGS**

- A. Shall conform to requirements for sleeve type couplings as applicable, shall provide for thrust restraint, shall be capable of 1.5 degrees of deflection, and shall meet ANSI/AWWA C227, and shall be hydrostatically tested.
- B. The split sleeve coupling shall be double-arched, rolled steel housing with steel bolts, without pipe stop, and be of sizes to fit the pipe and fittings indicated. Split sleeve couplings shall be rated for 250 PSI. Provide with restraint rings.
- C. Pipe Preparation: The ends of the pipe where indicated, shall be prepared for restrained split sleeve steel couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64-inch smaller than the nominal outside diameter of the pipe. The restraint rings shall be welded to the pipe per the manufacturer's instructions.
- D. Gaskets shall be O-ring type, meeting ASTM D2000, of an elastomer grade suitable for the intended service.
- E. Coatings; Fusion bonded epoxy, NSF 61 certified.
- F. Acceptable Manufacturers, or Equal:
  1. Victaulic Style 233.
  2. Approved Equal.

## **2.12 PIPE THREADS**

- A. All pipe threads shall be in accordance with ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (inch), made up with Teflon tape, unless otherwise indicated.

## **2.13 PIPE MARKERS**

- A. Per the Drawings.

## **2.14 TRACER WIRE**

- A. 10 AWG Wire, solid copper, blue insulation for water and orange insulation for fiber conduit.

## 2.15 WARNING TAPE

- A. Warning tape shall be magnetic tracer tape for use with non-metallic pipe. Tape shall be two inches wide and colored blue for potable water and colored orange for the fiber conduit. Tape shall be suitable for direct burial.
- B. Warning tape shall be plastic tracer tape for use with metallic pipe. Tape shall be 4 mil, three inches wide, and colored blue for potable water and colored orange for the fiber conduit. Tape shall be suitable for direct burial.
- C. A message shall be printed on the tape:
  - 1. The message shall read “CAUTION \_\_\_\_\_ PIPE BURIED BELOW” with bold letters approximately 2 inches high for tracer tape and approximately 1-1/4 inches high for magnetic tracer tape.
  - 2. The blank shall be filled with the name of the particular system fluid.
  - 3. The message shall be printed at maximum intervals of 2 feet.

## 2.16 WATER SERVICES AND CONNECTIONS

- A. General:
  - 1. Per the Drawings.
- B. Cross-linked Polyethylene (PEX):
  - 1. Pipe:
    - a. Pipe shall be manufactured in accordance with AWWA C904, ASTM F876, ASTM F877, CSA B137.5, NSF/ANSI 14, and NSF/ANSI 16.
    - b. Pipe shall be listed by PPI to standard TR-3, with applicable plumbing and mechanical code certifications
    - c. Pipe to be manufactured using a high-pressure peroxide method with a minimum degree of crosslinking of 70-89% when tested in accordance with ASTM D2765, Method B.
    - d. Pipe to be tested for resistance to hot chlorinated water in accordance with ASTM F2023. Pipe to have a minimum extrapolated time-to-failure of 50 years, calculated in accordance with section 13.3 of F2023 and listed as “3306” per the ASTM F876 standard.
    - e. Pipe to have a co-extruded UV Shield made from UV-resistant high-density polyethylene, color blue. Pipe to have minimum recommended UV exposure time of one year when tested in accordance with ASTM F2657.
    - f. Pipe shall be manufactured in a facility whose quality management system is ISO 9001 certified.
    - g. Bend Radius: The minimum bend radius for cold bending of pipe shall be not less than five (5) times the outside diameter.
  - 2. Pressure Rating: 200 psi at 73.4 degrees Fahrenheit when using a 0.63 design factor.
  - 3. Compression Joint Valves and Fittings:
    - a. Compression joint valve and fittings shall be in accordance with AWWA C800, suitable for buried applications, using stainless steel or plastic support liners inside pipe at each joint and/or cold-expansion and compression-sleeve fittings.
  - 4. Pipe Fittings
    - a. Mechanical fittings to be of compression joint or compression-sleeve style, manufactured of metal suitable for the fluid application, in a size suitable for the PEXa pipe dimensions.
    - b. Compression joint fittings shall be manufactured in accordance with AWWA C800. Fittings must meet the pressure requirements of the PEXa pipe at 73.4°F (23°C)
    - c. Compression-sleeve fittings shall be manufactured of brass and shall be supplied by the pipe manufacturer as part of a proven cataloged system.
    - d. Where fittings are encased in concrete or buried underground, fittings shall be wrapped as per manufacturer’s recommendation to protect the material.
  - 5. Acceptable Manufacturers:
    - a. REHAU MUNCIPEX.
    - b. No Approved Equal.

## **2.17 SPARE PARTS**

- A. Per Section 01750.
- B. One (1) 36-inch-diameter ductile iron dismantling joint.
- C. Two (2) manway covers with 8-inch-diameter flanged outlets.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Inspection: All pipe shall be inspected by the Contractor at the place of delivery. Notify the District of discrepancies in materials, coatings and linings.
- B. Lined Piping Systems: The lining manufacturer shall take full responsibility for the complete, final product and its application. All pipe ends and joints of lined pipes shall be lined to assure continuous protection.
- C. Coated Piping Systems: The coating manufacturer shall take full responsibility for the complete, final product and its application. All pipe ends and joints of coated pipes shall be coated to assure continuous protection.
- D. Allowable Joint Deflection: 75 percent of maximum allowable deflection from the manufacturer.

### **3.2 BURIED PIPING**

- A. Cleaning:
  - 1. Clean interior of piping systems thoroughly before installing.
  - 2. Maintain pipe in clean condition during installation.
  - 3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
- B. Laying Piping:
  - 1. Lay piping in finished trenches free from water or debris. Begin at the lowest point with bell ends up slope.
  - 2. Place piping with top or bottom markings with markings in proper position.
  - 3. Lay piping on an unyielding foundation with uniform bearing under the full length of barrels.
  - 4. Where joints require external grouting, welding, coating, banding, or pointing, provide space under the bell end of each section laid with sufficient shape and size for this work.
  - 5. At the end of each day's construction, plug open ends of piping temporarily to prevent entrance of debris, water, or animals.

### **3.3 CONNECTIONS WITH EXISTING PIPING**

- A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.
- B. Perform connections with existing piping at time and under conditions which will least interfere with Owner's operations.
- C. Undertake connections in fashion which will disturb system as little as possible.
- D. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
- E. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.
- F. Once tie-in to each existing system is initiated, continue work continuously until tie-in is made and tested.
- G. Connections to existing water distribution and service piping will be made by Skagit PUD crews.

### **3.4 INSULATING FLANGE KITS**

A. Per Section 13110.

### **3.5 CATHODIC PROTECTION**

A. Per Section 13110.

### **3.6 LOCATION OF BURIED OBSTACLES**

- A. Furnish exact location and description of buried utilities or man-made objects encountered and thrust block placement.
- B. Reference items to pipeline stationing and/or definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants, and related fixed structures.
- C. Include such information as location, elevation, coverage, supports and additional pertinent information.
- D. Incorporate information on "As-Recorded" Drawings.

### **3.7 TRACER WIRE**

A. Tracer wire shall be installed with and attached to all new water pipelines, water service pipelines, and fiber conduits.

### **3.8 WARNING TAPE**

- A. General:
  - 1. Warning tape is not required within casings.
- B. Warning Tape for Metallic Pipe:
  - 1. Install continuous plastic underground utility tracer tape above all metallic pipe during backfilling operation.
  - 2. A single line of tape shall be provided 1 foot above and parallel to each buried pipeline. For pipelines buried 8 feet or more below final grade, provide a second line of tape 12 inches below final grade, above and parallel to each buried pipeline.
  - 3. Tape shall be spread flat with message side up before backfilling.
- C. Warning Tape for Non-Metallic Pipe:
  - 1. Install continuous magnetic underground utility tracer tape above all non-metallic pipe during backfilling operation.
  - 2. A single line of tape shall be buried 6 to 12 inches below ground and above and parallel to each buried pipeline. For pipelines buried 8 feet or more below final grade, provide a second line of tape 1 foot above and parallel to each buried pipeline.

### **3.9 WATER SERVICES AND CONNECTIONS**

A. Per the Drawings and manufacturer installation recommendations.

### **3.10 FIELD QUALITY CONTROL**

- A. Pipe Testing and Disinfection: Per Section 02643.
- B. Dielectric Testing Methods and Criteria:
  - 1. Provide electrical check between metallic non-ferrous pipe or appurtenances and ferrous elements of construction to assure discontinuity has been maintained.
  - 2. Wherever electrical contact is demonstrated by such test, locate the point or points of continuity and correct the condition.

**END OF SECTION**

**SECTION 15006**  
**PIPE SUPPORTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies pipe supports, hangers, guides, and anchors.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. Drawings of pipe supports, hangers, anchors, and guides.
  - 2. Calculations for special supports and anchors.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURED SUPPORTS**

- A. Stock Parts: Where not specifically indicated, designs which are generally accepted as exemplifying good engineering practice and stock or production parts shall be utilized wherever possible. Stock parts shall be designed and rated for the intended purpose.
- B. Acceptable Manufacturers:
  - 1. Basic Engineers Inc.
  - 2. Bergen-Paterson Pipe Support Corp.
  - 3. Grinnell Corp. (Supply Sales Company).
  - 4. NPS Products, Inc.
  - 5. Power Piping Company.
  - 6. Approved Equal.

**2.2 COATING**

- A. Galvanizing: Unless otherwise indicated, all fabricated pipe supports other than stainless steel or non-ferrous supports shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM A 123 - Specifications for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

**PART 3 - EXECUTION**

**3.1 CODE COMPLIANCE**

- A. All piping systems and pipe connections to equipment shall be properly anchored and supported to prevent undue deflection, vibration, dislocation due to seismic events and line pressures, and stresses on piping, equipment, and structures. All supports and parts thereof shall conform to the requirements of ANSI/ASME B31.1 - Power Piping, except as supplemented or modified below.

**3.2 PIPE HANGERS AND SUPPORTS**

- A. Pipe hangers shall be capable of supporting the pipe in all conditions of operation, allowing free expansion and contraction of the piping, and preventing excessive stress. All hangers shall have a means of vertical adjustment after erection. Hangers shall be designed to prevent becoming disengaged by any movement of the supported pipe. All hanger rods shall be subject to tensile loading only.
- B. Hangers Subject to Horizontal Movements: At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit such movement. Where horizontal pipe movement is greater than 1/2-inch, or where the hanger rod deflection from the vertical is greater than 4

degrees from the cold to the hot position of the pipe, the hanger rod and structural attachment shall be offset in such a manner that the rod is vertical in the hot position.

- C. Thermal Expansion: Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or joints shall be provided, together with the necessary rolling or sliding supports, anchors, guides, pivots, and restraints permitting the piping to expand and contract freely in directions away from the anchored points. All components shall be structurally suitable to withstand all loads imposed.
- D. Riser Supports: Where practical, risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.
- E. Materials of Construction:
  - 1. General: All pipe support assemblies, including framing, hardware, and anchors, shall be steel construction, galvanized after fabrication, unless otherwise indicated.
  - 2. Submerged Supports: All submerged piping, piping in vaults, as well as piping, conduits, and equipment in hydraulic structures within 24 inches of the water level, shall be supported with support assemblies, including framing, hardware, and anchors, constructed of Type 316 stainless steel, unless otherwise indicated.
  - 3. Corrosive: All piping in chemical and corrosive areas shall be supported with support assemblies, including framing, hardware, and anchors, constructed of Type 316 stainless steel or FRP, unless otherwise indicated.
- F. Point Loads: Any meters, valves, heavy equipment, and other point loads on PVC and other plastic pipes shall be supported on both sides according to manufacturer's recommendations to avoid undue pipe stresses and failures. To avoid point loads, all supports on PVC and other plastic piping shall be equipped with extra wide pipe saddles or galvanized steel shields.

### 3.3 SUPPORT SPACING

- A. Supports for piping with the longitudinal axis in approximately a horizontal position shall be spaced to prevent excessive sag, bending, and shear stresses in the piping, with special consideration given where components such as flanges and valves impose concentrated loads. Pipe support spacing shall not exceed the maximum spans in the tables below. For temperatures other than ambient temperatures, or those listed, and for other piping materials or wall thicknesses, the pipe support spacing shall be modified in accordance with the pipe manufacturer's recommendations. Vertical supports shall be provided to prevent the pipe from being overstressed from the combination of all loading effects.
  - 1. Support Spacing for Schedule 40 and Schedule 80 Steel Pipe:

NOMINAL PIPE DIAMETER (INCHES)	MAXIMUM SPAN (FEET)
1/2	6
3/4 and 1	8
1-1/4 to 2	10
3	12
4	14
6	17
8 and 10	19
12 and 14	23
16 and 18	25
20 and Greater	30

- 2. Support Spacing for Ductile-Iron Pipe:

NOMINAL PIPE DIAMETER (INCHES)	MAXIMUM SPAN (FEET)
All Diameters	Two supports per pipe length or 10 feet (one of the two supports located at joint)

**3.4 INSTALLATION**

- A. Pipe supports, hangers, brackets, anchors, guides, and inserts shall be fabricated and installed in accordance with the manufacturer's instructions and ANSI/ASME B31.1 - Power Piping. All concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

**3.5 FABRICATION**

- A. Pipe hangers and supports shall be fabricated and installed by experienced welders and fitters, using the best welding procedures available. Fabricated supports shall be neat in appearance without sharp corners, burrs, and edges.

**END OF SECTION**

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**SECTION 15025**  
**STEEL PIPE (ASTM A53/A106, MODIFIED)**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies steel pipe 12 inches in diameter and smaller and appurtenances. (For pipe larger than 12 inches in diameter refer to Section 15061.)

**1.2 QUALITY ASSURANCE**

- A. The Contractor shall provide the services of a qualified materials testing laboratory (Testing Firm) to obtain inspections services for pipeline installation. The Testing Firm inspector shall be certified to inspect all welds, perform non-destructive testing, and other required inspections.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Fabrication Information:
    - a. Pipe/fitting wall construction details which indicate the type and thickness of cylinder; coating and lining holdbacks; manufacturing tolerances; maximum angular joint deflection limitations; and all other pertinent information required for the manufacture and installation.
    - b. Details of all fittings and specials such as elbows, wyes, tees, outlets, connections, end caps, test bulkheads, and other specials which indicate amount and position of all reinforcement. Properly reinforce all fittings and specials to withstand the internal pressure, both circumferential and longitudinal, and the external loading conditions as indicated in the Contract.
    - c. Welded joint details for all shop and field welded joint types, including beveled ends for alignment conformance and deep bell or butt strap joints required for control of temperature stresses.
    - d. Production schedule for manufacturing and fabricating pipe.
    - e. Manufacturer's written Quality Assurance/Control Program.
  - C. Third Party Quality Control Certification:
    1. Steel Plate Fabricator Association (SPFA) Certification or compliance with quality control procedures contained in SPFA Certification Program, or,
    2. Documentation of compliance with Lloyds Register Quality Assurance Inc., International Organization for Standardization 9000/9001.
  - D. Materials:
    1. Material lists and steel reinforcement schedules which include and describe all materials to be utilized.
    2. Metallurgical test reports for steel proposed for use on the project.
    3. Chemical and physical test reports from each heat of steel that indicate the steel conforms to the specifications.
  - E. Line Layout Information:
    1. Line layout marking diagrams compatible with the requirements of AWWA Manual 11 (M-11) and which indicate the specific number of each pipe and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the line layouts shall include:
      - a. The pipe station and centerline elevation at all changes in grade or horizontal alignment.
      - b. The station and centerline elevation to which the bell end of each pipe will be laid.
      - c. All elements of curves and bends, both in horizontal and vertical alignment.
      - d. Clearly indicate on the diagrams the location of all mitered pipe sections, beveled ends for alignment conformance, and deep bell or butt strap joints for temperature stress control.
    2. Dimensional drawings of all valves, fittings, and appurtenances as indicated in the Drawings.

3. Drawings indicating the location and details of bulkheads for hydrostatic testing of the pipeline, and details for removal of the test bulkheads and repair of the lining and coating.
  4. Details and locations of closures for length adjustment, temporary access manways, vents, and weld lead pass holes as indicated and as required for construction convenience.
- F. Welding Information:
1. Information regarding location, type, size, and extent of all welds. Indicate the Welding Procedure Specifications (WPS) numbers on the shop drawings. The shop drawings shall distinguish between shop and field welds. Shop drawings shall indicate by welding symbols or sketches the details of the welded joints, and the preparation of base metal required to make them.
  2. Written welding procedures for shop and field welds, including Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs).
  3. Written nondestructive testing (NDT) procedure specifications and NDT personnel qualifications.
  4. Current welder performance qualifications (WPQs) for each welder used prior to their performing any Work either in the shop or field.
  5. Credentials of the pipe supplier's certified welding inspectors (CWIs) and quality control specialist for review prior to starting any welding in the shop. The credentials shall include, but not be limited to, American Welding Society AWSQC1 Certification. Other NDT quality control personnel shall be certified to ASNT TC1A, Level II or higher.
  6. All NDT data for each shop-welded and field-welded joint. These data shall include all testing on each weld joint, including re-examination of repaired welds, using visual, radiographic, magnetic particle, dye penetrant examination, ultrasonic, or air test examination methods specified. Test data shall be reviewed and signed by the welding inspector(s).
  7. Welder Logs for Shop Welding: List all welders to be used for the Work, the welding process, position, welder stamp number, certification date, and status for each welder.
  8. Welding map showing the sequence of welds for all field welds.
  9. Written weld repair procedure for each type of shop weld proposed for use on the project.
  10. Written rod control procedure for shop operations demonstrating how the pipe supplier intends to maintain rods in good condition throughout the Work. The rod control procedure shall also demonstrate how the pipe supplier intends to ensure that the proper rods are used for each weld.
- G. Handling and Support Information: Detail drawings indicating the type, number, and other pertinent details of the slings, strutting and other methods proposed for pipe support and handling during manufacturing, transport, and installation.
1. Control of Temperature Stresses:
    - a. Proposed sequencing of events to control temperature stresses in the pipe wall during installation prior to starting of any field welding.
    - b. Proposed sequencing of events or special techniques to minimize distortion of the steel as may result from shop welding procedures.
    - c. Plan for monitoring pipeline temperatures.
- H. Certifications: Furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section, as specified in ANSI/AWWA C200 - Steel Water Pipe 6-inch and Larger, ANSI/AWWA C210 – Liquid-Epoxy Coating systems for the Interior and Exterior of Steel Water Pipelines, Steel Plate Fabricator Association Certification or compliance with quality control procedures contained in SPFA Certification Program, or documentation of compliance with Lloyds Register Quality Assurance Inc., International Organization for standardization 9000/9001, and the following supplemental requirements:
1. Physical and chemical properties of all steel.
  2. All materials that may come into contact with pipe interior surfaces are NSF approved for use with potable water.
  3. All welds were performed in conformance with these Contract Documents.
- I. Inspection Reports: All pipe, linings and coatings, welds, and related work shall be subject to inspection at the place of manufacture in accordance with the provisions of ANSI/AWWA C200, C205, and C210, as supplemented by the requirements herein. The pipe supplier shall notify the Contractor and the District

in writing of the manufacturing starting date not less than 14 calendar days prior to the start of each phase of the pipe manufacture, welding, lining and coating, testing, or field operations.

- J. Test Results:
1. Hydrostatic test reports.
  2. Results of production weld tests.
  3. Compliance with the additional requirements included in these Contract Documents, including all quality control check sheets used during the inspection and testing of pipe and fittings produced for this Project.
- K. Manufacturing Test Results: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of ANSI/AWWA C200, C205, and C210, as applicable and ASTM Standards B117, D3359, D3363, D4417, D4541, D4752, and G-8.
1. After the joint configuration is completed and prior to lining and coating, each length of pipe of each diameter and pressure class shall be shop-tested and certified to a pressure that will result in a hoop stress in the pipe wall of at least 75 percent of the minimum specified yield strength of the steel. Test pressure shall be maintained for a sufficient time (minimum 5 minutes) to observe the weld seams.
  2. For polyurethane coating systems, perform the following tests to assure conformance with the specifications and provide results in test reports:
    - a. Surface profile of prepared blasted surface.
    - b. Verification that the blasted surface conforms to SSPC SP10 defined as near white metal.
    - c. Steel temperature and ambient temperature and dew point.
    - d. Cure test in accordance with ASTM D4752.
    - e. Dry film thickness measurements.
    - f. Discontinuity/holiday testing.
    - g. Adhesion tests of the coatings systems in accordance with this Section and ASTM D4541.
  3. For cement mortar lining and coating systems, perform the following tests to assure conformance with the specifications and provide results in test report:
    - a. Cement-mortar compressive strength test cylinders.
    - b. Absorption testing.

## **PART 2 - PRODUCTS**

### **2.1 PIPE MATERIAL**

- A. Unless otherwise indicated, galvanized steel pipe shall conform to ASTM A53 (Type E or S) - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless and shall be Schedule 80.
- B. Pipe shall be furnished in standard outside diameters and shall be standard weight per ASTM A53, Grade B, (Type E or S.).
- a. Galvanized steel pipe shall not be cement mortar lined.

### **2.2 PIPE JOINTS**

- A. Galvanized steel pipe shall have screwed ends with NPT threads made up with pipe joint compound. Where indicated, galvanized steel pipe shall have grooved ends for shouldered couplings or plain ends for sleeve-type couplings.
- B. Threaded Joints: Pipe threads shall conform to ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (inch), and shall be full and cleanly cut with sharp dies. Not more than three threads shall remain exposed after installation.
- C. Welded Joints: Welded joints shall conform to the specifications and recommendations of ANSI/ASME B31.1.
- D. Grooved Joints: Grooves for grooved couplings and fittings shall be made with specially designed grooving tools to the manufacturer's recommendations and conform to ANSI/AWWA C606. All grooves

shall be clean and sharp without flaws, and the pipe ends shall be accurately cut at 90 degrees to the pipe axis.

### **2.3 FITTINGS**

- A. Common Use: The following fittings shall be provided for galvanized steel pipe:
  - 1. Threaded malleable iron: ANSI/ASME B16.3.
  - 2. Threaded cast iron: ANSI/ASME B16.4.
  - 3. Forged steel socket welded: ANSI/ASME B16.11.
  - 4. Butt welding: ANSI/ASME B16.9.
  - 5. Threaded cast iron drainage: ANSI/ASME 16.12.
  - 6. Flanged cast iron: ANSI/ASME B16.
  - 7. Flanged steel: ANSI/ASME B16.
  - 8. Grooved ductile iron fittings with grooving dimensions conforming to ANSI/AWWA C606.
  - 9. Compression-type steel fittings with armored Buna S gaskets for plain end pipe.
- B. Flange Bolt Patterns: Per Section 15000.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Per Section 15000.

### **3.2 SURVEYING**

- A. Per Section 02212.

### **3.3 TRENCHING, EXCAVATION, BEDDING, AND BACKFILL**

- A. Per Sections 02200, 02221, and 15000, and as indicated in the Drawings.

### **3.4 CONNECTION TO PRECAST CONCRETE VAULT STRUCTURES**

- A. Per Section 02540 and as indicated in the Drawings.

### **3.5 SHIPPING OF PIPE**

- A. Cut pipe supports to fit the diameter of the pipe and place at the ends of pipe lengths in such a manner as to prevent injury to the coating. All binding and lifting straps shall be in the form of flat belting or approved equal and shall not be so tight as to distort the pipe.
- B. Cover ends of the pipe to prevent exhaust from entering the pipe during shipping. Install pipe end covering shortly after lining and coating is completed; covering to be 6 mil polyethylene sheeting tightly attached to each pipe end with plastic banding.
- C. Provide adequate strutting on all straight pipe and fittings so as to avoid damage to the pipe during handling, storage, hauling, and installation. For all lined steel pipe, the following requirements shall apply:
  - 1. Place the strutting as soon as practicable after the lining has been applied; strutting to remain in place while the pipe is loaded, transported, unloaded, and installed at the jobsite.
  - 2. The strutting materials, size, and spacing shall be adequate to protect the pipe and lining/coating from damage during handling, transporting, and installation.
  - 3. Repair or replace any pipe damaged during handling, hauling, storage, or installation due to improper strutting.
  - 4. Place strutting a minimum of 48 inches from the ends of the pipe.

### **3.6 HANDLING AND STORAGE**

- A. Carefully handle and protect all pipe and fittings against damage to exterior coatings and interior linings. Do not place pipe directly on rough ground but support in a manner which will protect the pipe against damage. Do not install pipe where the linings or coatings show cracks, abrasions, or other damage. Repair damaged linings and coating or provide a new undamaged pipe.
- B. All pipe handling equipment shall be acceptable to the District. Handle pipe as a minimum at the 1/3 points by use of wide slings, padded cradles, or other devices designed and constructed to prevent damage to the pipe coating. The use of chains, hooks, or other equipment which might injure the pipe coating shall not be permitted. Be responsible for selecting lifting points that do not result in damage to the pipe.
- C. Suitably support and secure stockpiled pipe to prevent accidental rolling.
- D. Support stockpiled pipe on sand or earth berms free of rock exceeding 1 inch in diameter.
- E. Do not roll or drag pipe.
- F. Secure pipe to prevent accidental rolling.

### **3.7 PIPE PREPARATION**

- A. Prior to installation, each pipe length shall be carefully inspected, be flushed clean of any debris or dust, and be straightened if not true. Ends of threaded pipes shall be reamed and filed smooth. All pipe fittings shall be equally cleaned before assemblage.

### **3.8 INSTALLATION**

- A. General: All steel pipes shall be installed in a neat and workmanlike manner, properly aligned, and cut from measurements taken at the site, to avoid interferences with structural members, architectural features, openings, and equipment. Exposed pipes shall afford maximum headroom and access to equipment, and where necessary, all piping shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low points. All installations shall be acceptable to the District.
- B. Supports and Anchors: All piping shall be firmly supported with fabricated or commercial hangers or supports in accordance with Section 15006. Where necessary to avoid stress on equipment or structural members, the pipes shall be anchored or harnessed. Expansion joints and guides shall compensate for pipe expansion due to temperature differences.
- C. Valves and Unions: Water and air supply piping to fixtures, groups of fixtures, and equipment shall be provided with a shutoff valve and union, unless the valve has flanged ends. Low points in water systems and driplegs in steam, gas, and air systems shall have drainage valves. Unions shall be provided at threaded valves, equipment, and other devices requiring occasional removal or disconnection.
- D. Pipe Joints:
  - 1. Threaded Joints: Pipe threads shall conform to ANSI/ASME B1.20.1 - Pipe Threads, General Purpose (inch), and shall be full and cleanly cut with sharp dies. Not more than three threads shall remain exposed after installation.
  - 2. Welded Joints: Welded joints shall conform to the specifications and recommendations of ANSI/ASME B31.1 - Power Piping. All welding shall be done by skilled and qualified welders per Section 15000.
  - 3. Grooved Joints: Grooves for grooved couplings and fittings shall be made with specially designed grooving tools to the Manufacturer's recommendations and conform to ANSI/AWWA C606. All grooves shall be clean and sharp without flaws, and the pipe ends shall be accurately cut at 90 degrees to the pipe axis.

### **3.9 PIPELINE FIELD INSPECTIONS**

- A. Allow the District's inspector access to the pipeline at any time during construction. Provide all necessary environmental and safety features required by law for safe access and occupation of the pipeline for the Testing Firm and the District's inspectors.

- B. All pipe will be inspected by the District prior to backfilling and filling with water. Specific inspection hold points are as follows:
  - 1. Interior and exterior welds. Deficient welds will be re-examined and retested as necessary until acceptance has been achieved.
  - 2. Air test of lap welds and buttstrap closures.
  - 3. Mortar lining.
  - 4. Epoxy coating.
  - 5. Final clean-up of interior of pipe.
- C. Provide a minimum of 24 hours of notice prior to any required inspections.
- D. Allow a minimum of 2 hours for inspection of each section.

### **3.10 INSPECTION AND FIELD TESTING**

- A. Inspection: All finished installations shall be carefully inspected for proper supports, anchoring, interferences, and damage to pipe, fittings, and coating. Any damage shall be repaired to the satisfaction of the District.
- B. Field Testing:
  - 1. Prior to enclosure or burying, all piping systems shall be pressure tested, for a period of not less than two hours.
  - 2. Where no pressures are indicated, the pipes shall be subject to 1-1/2 times the maximum working pressure.
  - 3. The Contractor shall furnish all test equipment, labor, materials, and devices at no extra cost to the District. For additional testing requirements, refer to Section 02643.
  - 4. Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method. All fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the testing procedures.
  - 5. Leaks shall be repaired to the satisfaction of the District, and the system shall be retested until no leaks are found.

**END OF SECTION**

## SECTION 15061

### STEEL PIPE LINED AND COATED (AWWA C200 MODIFIED)

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section specifies lined and coated steel pipe larger than 12 inches diameter and tangential outlets for appurtenances. (For pipe 12 inches in diameter and smaller refer to Section 15025.)
  - 1. Lined and coated steel pipe types include:
    - a. Steel Pipe Cement Mortar Lined and Polyurethane Coated (CML/PUL)
    - b. Steel Pipe Polyurethane lined and Coated (PUL/PUC)
    - c. Field-applied joint lining and coating materials for steel pipe.

##### 1.2 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Pipe Welding Contractor:
    - a. On all shifts, use the firm(s) determined acceptable as part of the Required Supplementary Bidder Responsibility Criteria in the bid evaluation.
- B. Welding Inspection:
  - 1. Inspection of Field Welded Joints: An independent testing laboratory (Testing Firm) paid for by the District shall inspect the joints. Inspection shall be coordinated by Contractor and shall be performed as soon as practicable after the welds are completed.
    - a. All double fillet welds on double lap joint joints and on butt strap joints shall be tested by the soap solution method using approximately 40 psi air pressure introduced between the plates through a threaded hole. Test holes shall be plug welded following successful testing.
    - b. Fillet welds shall be visually inspected and may be tested by the Magnetic Particle Inspection Method in accordance with ASME Section VIII, Division 1, Appendix 6.
    - c. Butt strap joints shall be visually inspected and may be inspected by radiographic methods in accordance with API Standard 1104.
    - d. Field butt welds shall be radiographed in accordance with API 1104. Regardless of testing frequency in API 1104, 100% of field butt welds shall be radiographed.
  - 2. Following tests of the joint, coat the exterior joint.

##### 1.3 SUBMITTALS

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. Fabrication Information:
    - a. Pipe/fitting wall construction details which indicate the type and thickness of cylinder; coating and lining holdbacks; manufacturing tolerances; maximum angular joint deflection limitations; and all other pertinent information required for the manufacture and installation.
    - b. Details of all fittings and specials such as elbows, wyes, tees, outlets, connections, end caps, test bulkheads, and other specials which indicate amount and position of all reinforcement. Properly reinforce all fittings and specials to withstand the internal pressure, both circumferential and longitudinal, and the external loading conditions as indicated in the Contract.
    - c. Welded joint details for all shop and field welded joint types, including beveled ends for alignment conformance and deep bell or butt strap joints required for control of temperature stresses.
    - d. Production schedule for manufacturing and fabricating pipe.
    - e. Manufacturer's written Quality Assurance/Control Program.

- C. Third Party Quality Control Certification:
1. Steel Plate Fabricator Association (SPFA) Certification or compliance with quality control procedures contained in SPFA Certification Program, or,
  2. Documentation of compliance with Lloyds Register Quality Assurance Inc., International Organization for Standardization 9000/9001.
- D. Materials:
1. Material lists and steel reinforcement schedules which include and describe all materials to be utilized.
  2. Metallurgical test reports for steel proposed for use on the project.
  3. Chemical and physical test reports from each heat of steel that indicate the steel conforms to the specifications.
- E. Line Layout Information:
1. Line layout marking diagrams compatible with the requirements of AWWA Manual 11 (M-11) and which indicate the specific number of each pipe and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the line layouts shall include:
    - a. The pipe station and centerline elevation at all changes in grade or horizontal alignment.
    - b. The station and centerline elevation to which the bell end of each pipe will be laid.
    - c. All elements of curves and bends, both in horizontal and vertical alignment.
    - d. Clearly indicate on the diagrams the location of all mitered pipe sections, beveled ends for alignment conformance, and deep bell or butt strap joints for temperature stress control.
  2. Dimensional drawings of all valves, fittings, and appurtenances as indicated in the Drawings.
  3. Drawings indicating the location and details of bulkheads for hydrostatic testing of the pipeline, and details for removal of the test bulkheads and repair of the lining and coating.
  4. Details and locations of closures for length adjustment, temporary access manways, vents, and weld lead pass holes as indicated and as required for construction convenience.
- F. Welding Information:
1. Information regarding location, type, size, and extent of all welds. Indicate the Welding Procedure Specifications (WPS) numbers on the shop drawings. The shop drawings shall distinguish between shop and field welds. Shop drawings shall indicate by welding symbols or sketches the details of the welded joints, and the preparation of base metal required to make them.
  2. Written welding procedures for shop and field welds, including Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs).
  3. Written nondestructive testing (NDT) procedure specifications and NDT personnel qualifications.
  4. Current welder performance qualifications (WPQs) for each welder used prior to their performing any Work either in the shop or field.
  5. Credentials of the pipe supplier's certified welding inspectors (CWIs) and quality control specialist for review prior to starting any welding in the shop. The credentials shall include, but not be limited to, American Welding Society AWSQC1 Certification. Other NDT quality control personnel shall be certified to ASNT TC1A, Level II or higher.
  6. All NDT data for each shop-welded and field-welded joint. These data shall include all testing on each weld joint, including re-examination of repaired welds, using visual, radiographic, magnetic particle, dye penetrant examination, ultrasonic, or air test examination methods specified. Test data shall be reviewed and signed by the welding inspector(s).
  7. Welder Logs for Shop Welding: List all welders to be used for the Work, the welding process, position, welder stamp number, certification date, and status for each welder.
  8. Welding map showing the sequence of welds for all field welds.
  9. Written weld repair procedure for each type of shop weld proposed for use on the project.
  10. Written rod control procedure for shop operations demonstrating how the pipe supplier intends to maintain rods in good condition throughout the Work. The rod control procedure shall also demonstrate how the pipe supplier intends to ensure that the proper rods are used for each weld.
- G. Handling and Support Information: Detail drawings indicating the type, number, and other pertinent details of the slings, strutting and other methods proposed for pipe support and handling during manufacturing, transport, and installation.

1. Control of Temperature Stresses:
  - a. Proposed sequencing of events to control temperature stresses in the pipe wall during installation prior to starting of any field welding.
  - b. Proposed sequencing of events or special techniques to minimize distortion of the steel as may result from shop welding procedures.
  - c. Plan for monitoring pipeline temperatures.
  
- H. Certifications: Furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section, as specified in ANSI/AWWA C200 - Steel Water Pipe 6-inch and Larger, ANSI/AWWA C222 – Polyurethane Coating systems for the Interior and Exterior of Steel Water Pipelines, Steel Plate Fabricator Association Certification or compliance with quality control procedures contained in SPFA Certification Program, or documentation of compliance with Lloyds Register Quality Assurance Inc., International Organization for standardization 9000/9001, and the following supplemental requirements:
  1. Physical and chemical properties of all steel.
  2. All materials that may come into contact with pipe interior surfaces are NSF approved for use with potable water.
  3. All welds were performed in conformance with these Contract Documents.
  
- I. Inspection Reports: All pipe, linings and coatings, welds, and related work shall be subject to inspection at the place of manufacture in accordance with the provisions of ANSI/AWWA C200, C205, and C222, as supplemented by the requirements herein. The pipe supplier shall notify the Contractor and District in writing of the manufacturing starting date not less than 14 calendar days prior to the start of each phase of the pipe manufacture, welding, lining and coating, testing, or field operations.
  
- J. Test Results:
  1. Results of production weld tests.
  2. Compliance with the additional requirements included in these Contract Documents, including all quality control check sheets used during the inspection and testing of pipe and fittings produced for this Project.
  3. Joint test results.
  
- K. Manufacturer Test Results: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of ANSI/AWWA C200, C205, and C222, as applicable and ASTM Standards B117, D3359, D3363, D4417, D4541, D4752, and G-8.
  1. After the joint configuration is completed and prior to lining and coating, each length of pipe of each diameter and pressure class shall be shop-tested and certified to a pressure that will result in a hoop stress in the pipe wall of at least 75 percent of the minimum specified yield strength of the steel. Test pressure shall be maintained for a sufficient time (minimum 5 minutes) to observe the weld seams.
  2. For polyurethane coating systems, perform the following tests to assure conformance with the specifications and provide results in test reports:
    - a. Surface profile of prepared blasted surface.
    - b. Verification that the blasted surface conforms to SSPC SP10 defined as near white metal.
    - c. Steel temperature and ambient temperature and dew point.
    - d. Cure test in accordance with ASTM D4752.
    - e. Dry film thickness measurements.
    - f. Discontinuity/holiday testing.
    - g. Adhesion tests of the coatings systems in accordance with this Section and ASTM D4541.
  3. For cement mortar lining and coating systems, perform the following tests to assure conformance with the specifications and provide results in test report:
    - a. Cement-mortar compressive strength test cylinders.
    - b. Absorption testing.
  
- L. Welding Procedure Specifications (WPS): All WPS used to fabricate and install pipe shall be qualified by testing in accordance with the ASME Boiler and Pressure Vessel Code (BPVC) for shop welds. Written WPS shall be required for all welds. WPS qualified per the ASME BPVC shall include Supplementary Essential Variables for notch-tough welding.

1. Prequalified welding procedures permitted by ANSI/AWS D1.1 are not allowed.
- M. Welder Performance Qualifications: Done by skilled welders, welding operators, and tackers who have had adequate experience in the methods and materials to be used. Welders shall be qualified by the pipe supplier under the provisions of ASME BPVC for shop welds.
- N. Shop Nondestructive Testing: Performed for various weld categories as specified below. Testing shall include submitting written documentation of procedures per Section V, and acceptance criteria shall be in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code.
1. Butt Strap Joint Welds: 100% Radiographic or Radioscopic Examination in accordance with Paragraph UW-51 of the ASME Boiler and Pressure Vessel Code Section VIII, Division 1. If, in the opinion of the District, the welds cannot readily be radiographed, they shall be 100 percent ultrasonically examined per UW-53.
  2. Fillet Welds: Examine 10 percent of all fillet welds using the magnetic particle inspection method, and 100% of all fillet welds using visual inspection (VT), per ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Appendix 6.
  3. Groove Welds: 100 percent ultrasonically examine all groove welds that cannot be readily radiographically examined per ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Appendix 12.
  4. In addition to weld tests hereinbefore specified, air test reinforcing pads and double welded lap joints as stated in AWWA C206.
- O. Shop Destructive Testing as required by ASME BPVC (Boiler and Pressure Vessel Code) and below:
1. Prior to acceptance of production welds for a new lot of steel, heat of steel, or distinct wall thickness, a successful Charpy test (ASTM A370) shall demonstrate effective welding procedures. Perform Charpy test set on both the weld metal and heat affected zone for each type of production weld oriented transverse to the weld axis. If a Charpy test fails according to A370, as adjusted for metal thickness if less than a full size specimen is utilized, all prior welding for that weld type for that heat or lot of steel shall be rejected without remedy.
- P. Certified Welding Inspector:
1. Provide a certified welding inspector (CWI) for all shop welding as specified in AWWA C200.
  2. Visually inspect welds, verify proper procedures are being followed using qualified welders, supervise pipe supplier's NDT and witness non-destructive testing.
  3. Submit written certification that all welds were performed in conformance with these documents. All shop weld tests shall be reviewed and signed by the CWI.
- Q. Coating Quality Control:
1. Submit Applicator's Quality Control Plan for each type of coating to be applied with letter of approval from each specific coating or lining manufacturer including inspection and sampling procedures and frequencies.
  2. Shop Applicator: Maintain an in-house quality assurance program that monitors surface preparation, coating application, and quality control testing for coating operations.
  3. Level of experience, quality assurance program, and quality control testing by Applicator shall meet minimum requirements of these specifications, written product manufacturer instructions, referenced standards, and related government regulations.
  4. All coating quality control inspections for Polyurethane Coatings shall be performed by or under the direction of a NACE International (formerly National Association of Corrosion Engineers, or NACE) Level III Certified Coating Inspector.
    - a. The NACE Certified Coating Inspector shall be employed full time by the pipe supplier or secondary coating and lining applicator and shall either conduct the testing or have a supervisory position over the quality control inspectors performing the work.
    - b. If a NACE Certified Coating Inspector is not employed by the pipe supplier or the secondary coating and lining applicator, then an independent third (3rd) party NACE Certified Coating Inspector shall be employed/contracted by the pipe supplier/applicator to serve in this capacity for the duration of the coating application.

- c. The NACE Certified Coating inspector shall certify that all quality control coating and lining inspection results were performed in accordance with the referenced standards, and meet or exceed the requirements of these specifications.
  - d. The NACE Certified Coating Inspector shall review in-house quality control test documentation and provide a signed certification in letter format, as such, on a monthly basis for all invoiced pipe and fabricated pieces.
5. There shall be a coating supervisor present during all shifts, when surface preparation or coating application is being performed.
  6. Assign a coating sequence number to each joint based on when coated. Mark this coating sequence number on each pipe and summarize on a data sheet by coating sequence number, date, time, and shift completed. Use this coating sequence number to summarize all tests and values completed during production, as part of the quality control program testing, or during any troubleshooting testing.
  7. Monitor environmental conditions; conduct surface preparation, and coating application quality control checks in accordance with product manufacturer's recommendations, Applicator Quality Control Program, and as required by these Specifications.
  8. Complete dry film measurements, holiday inspection, and adhesion testing on cured coatings. Record date, time, adhesion value, and pipe surface temperature at time of test on pipe next to location tested.
  9. Test the holiday detector to confirm proper calibration and to demonstrate that the voltage is sufficient to detect holidays at start and end of each shift, after lunch, and after any change in detector equipment or operators. Record results daily; have pipe manufacturer certify results daily.
  10. Record daily and file all measurements on Contractor Quality Control forms for each phase of the work by coating sequence and pipe joint number. Use individual forms for each pipe section.
  11. Provide completed Applicator Quality Control forms for each phase of work.
  12. Provide completed copies to the District when requested and at end of project as part of project completion.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Manufacture of lined and coated steel pipe and steel pipe fabricated specials (see Section 15065) required to complete the Work, shall be under the direction of one steel pipe supplier only. This does not prevent a separate supplier from manufacturing portions of the material such as specials or fittings; however, all Work shall be the responsibility of the contracted pipe supplier:
  1. Ensure all pipe, fittings, and specials are manufactured in full accordance with the Contract Documents including use of the appropriate materials, and performing the appropriate manufacturing, shop testing, and shipping procedures.
  2. Prepare all submittal information and shop drawings.
  3. Make any corrections that may be required to the submittal information and shop drawings.
  4. Certify that the pipe and specials have been manufactured in accordance with the Contract Documents.
- B. Steel Pipe:
  1. Conform to ANSI/AWWA C200, C205, C222, and ASTM D16 subject to the following supplemental requirements.
  2. Steel shall be in accordance with ASTM A36, ASTM A1011 or ASTM A1018 – both Grade 36 Type 2 Structural Steel or approved equal.
  3. Diameter, grade, and wall thickness indicated in the Drawings. Diameter indicated in the Drawings is outside diameter.
  4. Complete with welded joints as indicated in the Contract Documents.
  5. Standard Weight Pipe: ASTM A53, Grade B, Type E or S, or ASTM A106, Grade B.
- C. Markings: Legibly mark all pipes and specials in accordance with the line layout marking diagram. Number each pipe in sequence; said number shall appear on the line layout marking diagram in its proper

location for installation. Mark all pipe sections and fittings at each end with top field centerline. Paint or mark the word “top” on the outside top spigot of each pipe section.

- D. Maximum Laying Lengths:
  - 1. 50 feet; shorter lengths provided where indicated or as required.
  - 2. Select lengths to accommodate the geometry of the alignment as indicated in the Drawings.
- E. Closures and Correction Pieces (Manufactured Pipe):
  - 1. Provide closures and correction pieces as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing indicated in the Drawings.
  - 2. Show the locations of correction pieces and closure assemblies on the line layout marking diagrams, subject to the District’s review. Any change in location or number of said items shall be acceptable to the District.
- F. Closures and Correction Pieces (Previously Installed Pipe):
  - 1. No closures or correction pieces will be supplied by the District for previously installed pipe.
  - 2. Provide closures or correction pieces so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing indicated in the Drawings.
  - 3. Coordinate all connections between Contractor-supplied pipe and previously installed pipe.

## 2.2 DESIGN OF PIPE

- A. General: Steel pipe, shop lined and coated, with standard welded lap joints unless otherwise indicated in the Drawings.
- B. Designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated, and, except as hereinafter modified ANSI/AWWA C200. Contractor’s design scope shall not include those items that are explicitly controlled by the Contract Documents.
- C. Standard Field Joint Design for Buried Steel Pipe: Double Lap Joint weld inside and out.
- D. Standard Field Joint Design for Pipe on Bridge: Split ring couplings.
- E. Standard Field Joint Design for Horizontal Directional Drill: Full Penetration Butt Weld:
- F. Double full-fillet welded lap joint. Butt welded, mechanically coupled, or flanged joints shall be required where indicated in the Drawings. Use butt-strap joints only where required for closures or where indicated in the Drawings. The joints shall have the same or higher pressure rating as the adjoining pipe. Provide air test connections for field welded joints where indicated. Include in layout and provide temperature control joints as indicated in the Drawings and as directed by the District during shop drawing review.
- G. Joints prepared for field welding shall be in accordance with ANSI/AWWA C200. The method used to form, shape, and size bell ends shall be such that the physical properties of the steel are not substantially altered. Unless otherwise acceptable to the District, bell ends shall be formed by an expanding press or by being moved axially over a die in such a manner as to stretch the steel plate beyond its elastic limit to form a truly round bell of suitable diameter and shape. Do not roll the ends. Faying surfaces of the bell and spigot shall be essentially parallel, but in no case shall the bell slope vary more than 2 degrees from the longitudinal axis of the pipe.
- H. Shop-applied interior linings and exterior coatings shall be held back from the ends of the pipe as indicated in the Drawings or as otherwise acceptable to the District. Coat holdback areas as hereinafter specified.
- I. Joint Stops: Mark the standard lap and the maximum lap around the outside circumference of the spigot ends of all lap welded pipe to indicate the location at which the spigot end has reached standard penetration and maximum penetration into the bell. Mark joints to enable convenient measurement of maximum joint pull.
- J. Joint Testing:

1. To ensure that lap and bell and spigot joints may be fully assembled and that excessive annular space between spigots and bells does not exist, and that the pipe meets the requirements of AWWA C200, the pipe fabricator shall test a minimum of five joints of each pipe size used. The joints to be tested shall be selected by the District based on pipe measurements.
2. The shop fit test shall join the pipe ends in the shop with the proposed adjacent pipe end.
3. Record the annular space, with the data to include as a minimum:
  - a. Maximum space at any point.
  - b. Minimum space at any point.
  - c. Space at 90-degree intervals-top, bottom, and spring line on both sides.
4. Match mark the pipe ends after shop assembly.

### **2.3 STEEL MATERIALS**

- A. Steel for Cylinder and Fittings: Steel for pipe manufactured under the requirements of these Contract Documents shall satisfy the following requirements:
  1. Minimum yield strength of 42,000 psi.
  2. Minimum tensile strength of 60,000 psi.
  3. Manufactured by a continuous casting process.
  4. Fully killed.
  5. Fine grain practice.
  6. Minimum elongation of 21 percent in a 2-inch gauge length.
  7. Steel shall be in accordance with ASTM A36 with minimum 42,000 psi tensile strength, ASTM A1011 or ASTM A1018 – Grade 36 Type 2, or Grade 40, Structural Steel or approved equal.
  8. The thickness tolerance specification referenced within each ASTM steel material specification listed above shall be enforced.
  9. Pipe used for HDD installations shall have a minimum wall thickness of 3/4" and have longitudinally welded seams (non-spiral weld).

### **2.4 SPECIALS AND FITTINGS**

- A. Specials and Fittings: Per Section 15065.
- B. Flange Bolt Patterns: per Section 15000.

### **2.5 CEMENT MORTAR LINING (SHOP-APPLIED)**

- A. Cement mortar lining shall conform to AWWA C205 (Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 inch and Larger) with a minimum thickness of 3/8 inch with other dimensional tolerances as allowed per AWWA C205. Minimum compressive strength of shall be 4,500 psi.
- B. Cement mortar lining shall either be Type II or Type V cement. Cement mortar lining shall be one type of cement; i.e., Type II & V shall not be mixed together.
- C. Omit coating at each end for a sufficient distance to permit the making of field joints as indicated in the Drawings.
- D. Repair per manufacturer's instructions.

### **2.6 POLYURETHANE COATING (SHOP-APPLIED)**

- A. Acceptable Products for Shop-Applied Lining Systems:
  1. Corropipe II PW Off-white, by Madison Chemical Industries, Inc.
  2. DuraShield 210-61, by LifeLast, Inc.
  3. Or approved equal.
- B. The coating materials shall have a documented history of successful application and performance in potable water piping greater than 100,000 square feet.
- C. Polyurethane Coating for Shop Application: Polyurethane coating shall conform to the requirements of AWWA C222 and as specified in these specifications. Unless indicated otherwise, exterior and interior surfaces of all pipe shall be cleaned and lined and coated in the shop in accordance with the manufacturer's instructions and as specified below:

1. Minimum Surface Preparation:
  - a. Prior to abrasive blasting, the entire area to receive the coating shall be inspected for oil, grease, rust, dust, or any other deleterious substances. Any areas where such deleterious substances are present shall be cleaned.
  - b. After cleaning, all areas to receive the coating shall be abrasive blasted to a near white metal finish as described in SSPC-SP10 with an angular profile of greater than 3 mils. The cleaning abrasive can be either sand, steel grit, or other angular medium and shall be selected according to SSPC-SP10 to achieve a surface anchor pattern.
  - c. Use clean, dry, oil-free air to blow the dust, grit, or other foreign matter from the substrate in a manner that does not affect the cleaned surface, other cleaned pipe or fittings, or pipe that is to be coated. Vacuum cleaning or other methods may be used in place of compressed air. The metal shall be dust free.
  - d. All blasted steel is to be coated within 8 hours of blasting. Any blasted steel that is not lined or coated during that time period shall be reblasted. If the steel suffers from flash rusting or any other contamination before coating, it must be decontaminated and reblasted.
  - e. The cleaned exterior surfaces of the pipe and fittings shall be inspected for adequate surface preparation. Surface imperfections such as burrs and weld splatter shall be removed by hand filing or grinding to prevent holidays in the applied coating.
2. Application of Coating Materials:
  - a. The material shall be applied according to the manufacturer's application instructions. The coating shall be applied by a two component, heated airless spray unit approved for such use by the coating manufacturer. Pipe and fittings to be sprayed manually shall use a one-coat with multiple-pass spray technique. Pipe to be lined or coated using automatic spray equipment may use a single- or multiple-pass coat to achieve the desired lining or coating thickness. The coating thickness shall be applied to an absolute minimum dry film thickness of 40 mils. The number of film thickness measurements and testing procedure shall be in accordance with SSPC PA2, with the exception that the absolute minimum dry film thickness of the coating shall be 40 mils.
  - b. The coating applicator shall have all the necessary equipment available to convey, lift, and move pipe safely and efficiently.
  - c. The applicator shall be approved by the material manufacturer for the application of the specific coating being applied. The applicator shall have personnel that have been trained by the coating manufacturer within the past 12 months of starting the project. At least one of these trained personnel shall be on site at all times during the application.
  - d. In order to avoid moisture contamination of the steel, the temperature of the substrate surface must be at least 5 degrees F above the dew point temperature after blasting and before the application of the lining or coating material. High humidity may cause surface condensation in the form of dew or frost which will affect bonding of the lining. Therefore, the applicator shall exercise caution if the relative humidity exceeds 85 percent. Heating of pipe surfaces may be required to meet the requirements of the above dew point temperature.
  - e. The material shall be applied to the steel between 50 degrees F and 120 degrees F with the minimum ambient air temperature steady at 45 degrees F and rising.
3. Recoating:
  - a. Recoating over new coating of the same formulation shall be permitted provided the coating has cured less than the recoat window time specified by the coating manufacturer.
  - b. Recoating over new coating of the same formulation that has cured for more than the recoat time specified by the coating manufacturer shall be permitted only with proper preparation as allowed by the coating manufacturer. The existing coating shall be brush-blasted or thoroughly abraded with a grinder, followed by blow-off cleaning using clean, dry, high pressure compressed air. All surfaces to be recoated must show a surface profile of greater than 2.0 mils to provide adequate mechanical bonding.
  - c. Recoating over existing coatings of a different type or formulation such as a primer or epoxy shall not be permitted without the acceptance of the Engineer and both coating manufacturers.
4. Holdbacks for Field Joints:

- a. Where the pipe sections are to be joined together by field welding, hold back the coating as shown on the Drawings. Steel surfaces at the hold backs are to receive the same surface preparation as the rest of the pipe.
  - b. When gasketed or mechanical couplings are used to connect the pipe sections together, the pipe is to be coated to its end with no holdback.
5. Inspection:
- a. Coating work is to be inspected to verify that the surface preparation application has been completed as specified.
  - b. The coating applicator shall utilize a quality assurance program to ensure that the quality controls herein specified are followed. Complete records of all inspection work must be kept and made available to the Engineer at any time.
  - c. At the discretion of the Engineer, the entire coating procedure may be inspected by the Engineer from the time of surface preparation to the completion of the coating. Such inspection shall not relieve the coating applicator of its quality assurance requirements.
  - d. If it is found that the procedures for applying the coating are not in accordance with this specification, any pipe or fittings that were coated during that time period may be rejected.
    - 1) Surface Preparation:
      - a) Profile and Appearance: The depth of profile shall be determined by using replica tape. Color of blast shall be determined with the visual comparative standards SSPC VIS 1. The profile shall be greater than 3 mils and the color shall be SSPC SP10 (near white).
      - b) Dust: Amount of dust on the pipe or fittings after blasting is to be determined by placing a one-inch by six-inch piece of scotch tape on the pipe or fitting (sticky side toward the steel). The tape is removed and a visual estimate of the amount of dust on the tape is made. The amount of dust shall be less than 5 percent.
      - c) Environmental Conditions: Humidity and dew point shall be measured using a standard sling psychrometer. Surface temperature shall be measured with a thermometer. The steel temperature shall be greater than 5 degrees F above the dew point.
      - d) Frequency of Measurements: The profile, color and percent dust measurements shall be made on the first and last pipe or fitting of each shift. The humidity and dew point shall be calculated at the same time the first and last pipe or fitting of each shift is blasted. Coating applicator may make more frequent measurements during the shift if desired.
      - e) Rejection: If the last measurement of the shift shows inadequate profile or blast color all of the pipe or fittings blasted and coated after the last acceptable tests for that day shall be rejected.
    - 2) Primary Coating:
      - a) Test Spray: The coating applicator shall apply a small section of coating on cardboard (or other surface) approximately 5 square feet at the beginning of each shift to determine that the spray equipment is working properly. The applicator shall confirm that the spray pressures, material temperatures, coating setting time and coating appearance meet the manufacturer's requirements. The applicator shall not spray any steel until these requirements are met. The results of this test spray are to be recorded for inspection purposes.
      - b) Coating Appearance: The finished lining and coating shall be generally smooth and free of sharp protrusions. A minor amount of sags, dimpling, and curtaining which does not exceed 5 percent of the surface shall not be considered cause for rejection. The coating shall not have any blisters or bubbles. There shall be no gooey or sticky areas in the coating. All coated pipe and fittings are to be visually inspected.
      - c) Dry Film Thickness: Dry film thickness is to be measured with a magnetic thickness gauge. The lining and coating thickness of every tenth pipe or fitting coated shall be measured, as well as the first and last pipe or fitting coated on each shift. Coating applicator may make more frequent measurements during the shift if desired. If the thickness is found to be less than specified, all the pipe and fittings coated since the last thickness test shall be checked and recoated if necessary.
        - (1) Coating Thickness:

- (a) Buried in open trench: 40 mils.
  - (b) Above grade at East Fork Nookachamps Bridge between Stations 169+90 and 172+30: 60 mils.
  - (c) HDD segment between Stations 92+03.65 and 110+76.81: 60 mils.
  - (d) At gas pipeline crossings between Stations 115+00 to 115+60 and 313+60 and 314+60: 80 mils.
- (2) Lining Thickness:
- (a) Above grade at East Fork Nookachamps Bridge: 40 mils.
  - (b) HDD segment between Stations 92+03.65 and 110+76.81: 40 mils.
- d) Adhesion. Select two pipe or fittings each day at random that have cured for at least one hour and perform an "X" cut adhesion test. Make a small "X" cut through the coating down to the steel with a sharp knife. Each of the two arms of the "X" should be approximately one-inch long. With the point of the knife, attempt to remove the coating at the center of the "X" by sliding the knife point under the coating. If coating is removed easily in large sections greater than two square inches, the pipe or fitting shall be rejected and the coating application stopped. Begin a systematic check on all pipe and fittings coated that day and reject all pipe and fittings that do not pass this test. Continue to check every pipe and fitting until 10 consecutive acceptable tests are made. Then return to checking two pipe or fittings at random each day. Complete only one test per pipe or fitting. Note that some qualitative judgment is necessary and that the longer the coating has cured, the greater the adhesion. Repair damaged areas of pipe passing test.
- e) Holiday Testing. Holiday inspection shall be conducted on all pipe and fittings in accordance with NACE RP-0188 using a minimum 100 volts per mil any time after the coating has reached sufficient cure according to the coating manufacturer. Each holiday found shall be marked and repaired as specified. If more than 4 holidays per 100 square feet are found, the pipe is to be rejected and recoated.
6. Repair and Touchup:
- a. Areas requiring repair shall be determined by the inspection and testing procedures.
  - b. Removal of Old Coating: Completely remove damaged or improperly applied coating by scraping or abrasive blasting. Uncured coating that is sticky or gooey may have to be removed by solvent washing. Ensure that the area around section to be repaired is well adhered. Remove additional surrounding coating if necessary until good, sound well-adhered coating is reached. Note it is not necessary to remove coating that is well adhered.
  - c. Repair of Thin Coating: To increase the coating thickness for areas that do not meet the minimum thickness requirements, recoat as specified.
  - d. Surface Preparation: Ensure that the substrate is clean, dry, and uncontaminated. Solvent wash using clean rags and solvent if necessary. For small areas under one square foot that have been previously abrasive blasted, use coarse sandpaper, wire wheel, or grinder to return surface to SSPC-SP10 condition. For larger areas, use abrasive blasting to return surface to SSPC-SP10 condition.
  - e. Roughen approximately two inches of the existing coating surrounding the repair area using the same surface preparation tools so that it has a greater than 2 mil profile as well.
  - f. Repair Material Selection: Use only repair materials recommended by the coating manufacturers. For small areas under one square feet, use either the originally applied coating or a manually applied repair material specifically made for that purpose. For larger areas, use only the originally applied material.
  - g. Repair Material Application: Apply the repair coating as per the coating manufacturer's instructions. Coat entire metal surface and 3 inches into the existing coating that has been previously prepared. Note that approximately 1 inch of the existing (but roughened) coating is to be left uncoated to provide evidence of surface preparation.
  - h. Repair Material Thickness: Apply repair materials to the same thickness or greater as originally specified for the coating being repaired.

7. Coating and Lining Manufacturer's Services: The lining and coating manufacturers shall provide a factory-trained, qualified representative onsite at the start of lining and coating procedures for 2 days minimum, to inspect surface preparation, lining application procedures, repair procedures, and quality control testing.

## **2.7 POLYURETHANE COATING (COATING FOR ABOVE GROUND EXPOSURE)**

- A. In addition to the coating requirements per 15061 Section 2.6, the above ground exposed pipe supported by the E. Fork Nookachamps Weathered Steel Bridge shall be coated between Stations: 169+90 and 172+30 with a compatible coating that is UV resistant closely matching the weathered steel of the bridge. Contractor to submit samples for owner approval.

## **2.8 TANGENTIAL OUTLETS FOR PIPE APPURTENANCES**

- A. Tangential outlets for pipe appurtenances shall be as indicated in the Drawings. Coating and lining shall match that required for connected steel pipe.

## **2.9 WARNING TAPE**

- A. Per Section 15000.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Per Section 15000.
- B. The District and Engineer shall have the right to witness all testing conducted.
- C. In addition to those tests specifically required, the Engineer may request additional samples of any material including lining and coating for testing by the District.

### **3.2 SURVEYING**

- A. Per Section 02212.

### **3.3 TRENCHING, EXCAVATION, BEDDING, AND BACKFILL**

- A. Per Sections 02200, 02221, and 15000, and as indicated in the Drawings.

### **3.4 CONNECTION TO PRECAST CONCRETE VAULT STRUCTURES**

- A. Per Section 02540 and as indicated in the Drawings.

### **3.5 CARRIER PIPE INSTALLATION IN CASING**

- A. Per Section 02150.

### **3.6 SHIPPING OF PIPE**

- A. Cut pipe supports to fit the diameter of the pipe and place at the ends of pipe lengths in such a manner as to prevent injury to the coating. All binding and lifting straps shall be in the form of flat belting or approved equal and shall not be so tight as to distort the pipe.
- B. Cover ends of the pipe to prevent exhaust from entering the pipe during shipping. Install pipe end covering shortly after lining and coating is completed; covering to be 6 mil polyethylene sheeting tightly attached to each pipe end with plastic banding.
- C. Provide adequate strutting on all straight pipe and fittings so as to avoid damage to the pipe during handling, storage, hauling, and installation. For all lined steel pipe, the following requirements shall apply:
  1. Place the strutting as soon as practicable after the lining has been applied; strutting to remain in place while the pipe is loaded, transported, unloaded, and installed at the jobsite.

2. The strutting materials, size, and spacing shall be adequate to protect the pipe and lining/coating from damage during handling, transporting, and installation.
3. Repair or replace any pipe damaged during handling, hauling, storage, or installation due to improper strutting.
4. Place strutting a minimum of 48 inches from the ends of the pipe.

### **3.7 HANDLING AND STORAGE**

- A. Carefully handle and protect all pipe and fittings against damage to exterior coatings and interior linings. Do not place pipe directly on rough ground but support in a manner which will protect the pipe against damage. Do not install pipe where the linings or coatings show cracks, abrasions, or other damage. Repair damaged linings and coating or provide a new undamaged pipe.
- B. All pipe handling equipment shall be acceptable to the District. Handle pipe as a minimum at the 1/3 points by use of wide slings, padded cradles, or other devices designed and constructed to prevent damage to the pipe coating. The use of chains, hooks, or other equipment which might injure the pipe coating shall not be permitted. Be responsible for selecting lifting points that do not result in damage to the pipe.
- C. Suitably support and secure stockpiled pipe to prevent accidental rolling.
- D. Support stockpiled pipe on sand or earth berms free of rock exceeding 1 inch in diameter.
- E. Do not roll or drag pipe.
- F. Secure pipe to prevent accidental rolling.

### **3.8 PIPE PREPARATION**

- A. Prior to installation, each pipe length shall be carefully inspected, be flushed clean of any debris or dust, and be straightened if not true. Ends of threaded pipes shall be reamed and filed smooth. All pipe fittings shall be cleaned before assembly.

### **3.9 INSTALLATION OF PIPE**

- A. Limitations on joint deflection for standard lap joints and all specials are per Section 15065. Inspect each pipe and fitting to ensure there is no damage to the pipe.
- B. Before placement of pipe, thoroughly clean each pipe or fitting of any foreign substance. Keep pipe clean at all times. The openings of all pipes and fittings in the trench shall be closed during any interruption to the Work.
- C. Lay pipe directly on the saddles and slide guides. Shim and shift slide guides using slotted holes in supports to align the pipe within tolerances specified and assure uniform bearing of pipe on elastomeric slide bearing. Adjust slide guides on anchor blocks at each end to align with pipe secured through anchor block. Check alignment of entire run across bridge before completing welds at each intermediate joint.
- D. Installation Tolerances: Lay each section of pipe in the order and position shown on the line layout marking diagram and in accordance with the following:
  1. Lay each section of pipe to line and grade, within plus or minus 0.1 inch horizontal deviation and plus or minus 0.1-inch vertical deviation.
- E. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the District may change the alignment and grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 75 percent of the maximum deflection recommended by the pipe manufacturer or the amount that results in more than 1/8-inch gap at the weld location, whichever is less, unless noted otherwise on the Drawings.
- F. Cold Weather Protection: Do not install pipe upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. Do not lay pipe unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.

- G. Pipe and Specials Protection: Protect the openings of all pipe and specials (including pass holes) where the pipe and specials have been lined in the shop with suitable bulkheads to prevent unauthorized access by persons, animals, water, or any undesirable substance. Temporary shoring to provide access to pass holes shall be ADS or PVC pipe or other such plastic material and shall not be placed directly against the coating on the pipe.
- H. Pipe Cleanup: As pipe laying progresses, keep the pipe interior free of all debris. Completely clean the interior of the pipe of all sand, dirt, used welding materials, and any other debris following completion of pipe laying, coating of joints, and any necessary interior repairs prior to testing the completed pipeline.

### **3.10 WELDED JOINTS**

- A. General: Field welded joints shall be in accordance with ANSI/AWWA C206 - Field Welding of Steel Water Pipe and AWS D1.1 Structural Welding Code-Steel. In the event of conflict, AWS D1.1 shall govern, except as modified herein.
- B. Where exterior welds are performed, provide adequate space for welding and inspection of the joints.
- C. When fitting up the ends of pipe to be welded or fitting butt-strap pieces, minor jacking or clamping will be allowed. Cold working the metal with sledges or localized application of heat and working the metal with sledges will not be allowed. If field displacement of joints, where butt strap joints are indicated, does not allow proper fit up with the tolerances indicated, special closure butt straps or mitered pieces shall be shop fabricated and installed.
- D. Lap Welded Joints: During installation of welded steel pipe in either straight alignment or on curves, lay the pipe so that at any point around the circumference of the joint there is at least a minimum lap as indicated in the Drawings. The toe of the weld shall also be held back from the nearest point of tangency of the bell radius as indicated in the Drawings. Prior to welding, the pipe shall be shimmed at the joints to equalize the gap between the bell and the spigot around the joint circumference. Perform the welding in a manner that will maintain the equalized fit-up. Remove shims.
- E. Butt Weld Joints: Prior to butt welding, properly position the pipe and pipe joint using line up clamps so that, in the finished joint, the abutting pipe sections shall not be misaligned by more than 1/16-inch.
- F. A heat-resistant shield shall be draped over at least 24 inches of lining and coating beyond the holdback on both sides of the weld or cut during welding and cutting operations to avoid damage to the lining and coating by hot weld splatter. On steep grades, use greater shielding or other measures acceptable to the District. Do not attach welding grounds to the coated part of the pipe. Repair all damage to lining and coating.
- G. Prior to the beginning of the welding procedure, remove any tack welds or joint stops used to position the pipe during laying. Equally distribute annular space between the surfaces of the bell and spigot around the circumference of the joint by shimming, jacking, or other suitable means. Make the weld in accordance with ANSI/AWWA C206. Where more than one pass is required, peen each pass except the first and final one to relieve shrinkage stresses; remove all dirt, slag, and flux before the succeeding bead is applied.
- H. Unless otherwise indicated in the Drawings, field welded joints shall be double lap joint weld joints.
- I. Repair of Welds:
  - 1. Repair all welds that are defective. The weld repairs shall conform to the Contractor's written weld repair procedure that receives a Review Action of 1 or 2 per Section 01300.
  - 2. Remove defects in welds or defective welds and reweld that section of the joint. After the repair is made, check the joint by repeating the original test procedure. Repair welds deficient in size by adding weld metal.

### **3.11 FIELD JOINT CEMENT MORTAR LINING**

- A. General:

1. After welding has been completed, thoroughly wipe clean the interior and exterior joint recesses and remove all water, loose scale, dirt, weld splatter, and other foreign material from the surface of the pipe.
- B. Joint Lining:
  1. Joint lining shall consist of cement mortar lining hand applied (3/8-inch minimum thickness).
  2. Wet adjoining mortar lining prior to beginning placement of mortar.
  3. Cement mortar shall completely fill any voids between the pipe segments. Mortar shall be worked by hand.
  4. Surface shall be troweled smooth, matching the liner profile of the adjacent pipes

### **3.12 FIELD JOINT – EXTERIOR COATING (HEAT SHRINK SLEEVE)**

- A. Exterior Coating of Buried Piping for Field Joints: Coat all field joints of pipe with heat shrink sleeves. Store, handle, and apply heat shrink sleeves in accordance with AWWA C216 and the sleeve manufacturer’s written instructions.
  1. Clean and prepare pipe surface in accordance with AWWA C216. Clean 4 to 6 inches onto shop-applied coating as recommended by the sleeve manufacturer. Preheat pipe and apply sleeve in accordance with the manufacturer’s recommended heating equipment.
  2. Holiday test the completed sleeve installation and repair defects in accordance with AWWA C216 and the manufacturer’s directions.
  3. Manufacturer’s Services: The sleeve manufacturer shall provide a factory-trained, qualified representative onsite at the start of pipe installation for 3 days, minimum, to inspect surface preparation and sleeve application procedures. The coating manufacturer shall also provide a factory-trained, qualified representative onsite in the field as many be required during surface preparation and application of sleeve to resolve any problems that may arise in association with sleeve products

### **3.13 FIELD JOINT – POLYURETHANE COATING AND LINING AT HDD CROSSING & ABOVE GROUND EXPOSURE (OVERHEAD BRIDGE CROSSING)**

- A. Apply polyurethane as lining and coating at field joint in accordance with Part 2.6 and 2.7 and details on the drawings.
- B. Holiday test the completed field joint coating and lining per AWWA C216 and the manufacturer’s directions.

### **3.14 PIPE APPURTENANCES\_**

- A. Installation of Flanged Joints: Before the joint is assembled, thoroughly clean the flange faces of all foreign material with a power wire brush. Center the gasket and the connecting flanges drawn up watertight without unnecessarily stressing the flanges.
- B. Tighten bolts in a progressive diametrically opposite sequence progressively and evenly. Torque with a suitable, approved, and calibrated torque wrench. Tighten bolts so as to secure a uniform annular space between the follower rings and the body of the pipe with all bolts tightened approximately the same amount. Apply all clamping torque to the nuts only.
- C. Insulated Joints (with Insulated Flange Kits): Make insulated joints (with Insulated Flange Kits) and appurtenant features as indicated in the Drawings. Install Insulated Flange Kits per Section 13110.
- D. Wrenches used in bolting couplings shall be of a type and size recommended by the coupling manufacturer.

### **3.15 PIPELINE FIELD INSPECTIONS**

- A. The Contractor shall provide the services of a qualified materials testing laboratory (Testing Firm) to obtain inspections services for pipeline installation. The Testing Firm inspector will be certified to inspect all welds, perform non-destructive testing and other required inspections.
- B. Allow the District’s inspector access to the pipeline at any time during construction. Provide all necessary environmental and safety features required by law for safe access and occupation of the pipeline for the Testing Firm and District’s inspectors.

- C. All pipe will be inspected by the District prior to backfilling and filling with water. Specific inspection hold points are as follows:
  - 1. Interior and exterior welds. Welding inspection to be in accordance with this Section. Deficient welds will be re-examined and retested as necessary until acceptance has been achieved.
  - 2. Air test of lap welds and buttstrap closures.
  - 3. Cement mortar lining.
  - 4. Polyurethane coating.
  - 5. Final clean-up of interior of pipe.
- D. Provide a minimum of 24 hours of notice prior to any required inspections.
- E. Allow a minimum of 2 hours for inspection of each section.

**3.16 INSPECTION AND FIELD TESTING**

- A. All finished installations shall be carefully inspected for proper supports, anchoring, interferences, and damage to pipe, fittings, and coating. Any damage shall be repaired to the satisfaction of the District.
- B. Pipe Testing and Disinfection: Per Section 02643.

**END OF SECTION**

**SECTION 15062**  
**DUCTILE IRON PIPE**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies ductile iron piping, fittings, and appurtenances.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Certification of factory hydrostatic testing.
  2. If a restrained mechanical coupling system is used and where approved for use by the District, submit piping, fittings, and appurtenant items which will be utilized to meet system requirements.
  3. Restrained joint pipe: line layout and marking diagrams which indicate the specific number of each fitting and the location and the direction of each fitting in the completed line. In addition, include the following in the line layouts:
    - a. Pipe station and invert elevation at all changes in grade or horizontal alignment.
    - b. All elements of curves and bends, both in the horizontal and vertical alignment.
    - c. Limits of each reach of restrained joints.
  4. Acknowledgement that Contractor has coordinated and accounted for fabrication of special order fittings.

**PART 2 - PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the Contract Documents the following manufacturers are acceptable:
1. Ductile Iron Pipe (Restrained Joint):
    - a. Pipe:
      - 1) American Ductile Iron Pipe:
        - a) Flex-Ring (4IN to 36IN)
        - b) Lok-Ring (42IN to 64IN)
      - 2) US Pipe:
        - a) TR-Flex (4IN to 36IN)
      - 3) Approved Equal.
    - b. Fittings:
      - 1) American Ductile Iron Pipe:
        - a) Flex-Ring (16IN to 48IN)
        - b) Lok-Ring (54IN to 64IN)
      - 2) US Pipe:
        - a) TR-Flex (4IN to 36IN)
      - 3) Approved Equal.

**2.2 GENERAL**

- A. Mortar-lined and asphaltic-coated Ductile Iron Pipe: ANSI/AWWA C151, C104, and C105, subject to the following requirements. Diameter and class indicated in the Contract Documents, furnished complete with rubber gaskets, and all specials and fittings provided as indicated.
- B. Maximum Pipe Laying Lengths: 20 feet with shorter lengths provided as required by the Drawings.
- C. Finish: Smooth dense interior surfaces free from fractures, excessive interior surface crazing, and roughness.

- D. Closures and Correction Pieces: Provide closures and correction pieces as allowed by Contract Documents that are required due to different headings in the pipe laying operation and to adjust pipe layout to conform to field conditions.

### **2.3 PIPE DESIGN CRITERIA**

- A. General: ANSI/AWWA C150 as applicable and as modified in this Section.
- B. Furnish the following pipe size and class:
  - 1. 24-inch and Smaller Connection and Appurtenance Piping: Thickness Class 50, with restrained joints as indicated in the Drawings, unless otherwise indicated.
- C. Minimum Pipe Wall Thickness: In addition to the requirements of this Section, provide thicker wall pipe where required for threaded flanged ends and grooved ends, or provide shoulder grooved ends.
- D. Designed, manufactured, tested, inspected, and marked according to applicable requirements and, except as hereinafter modified, conforming to ANSI/AWWA C151.
- E. Pipe and Fitting Dimensions: Diameter and class as indicated in the Drawings. For where class is not indicated in the Drawings, class shall be Thickness Class 50.

### **2.4 MATERIALS**

- A. Ductile iron pipe, cement mortar-lined and asphaltic-coated, with nitrile butadiene rubber (NBR)-gasketed joints per ANSI/AWWA C151.
- B. Cement Mortar Lining: ANSI/AWWA C104; Double thickness. Ensure cement does not originate from kilns that burn metal-rich hazardous waste fuel, nor use a fly ash or pozzolan as a cement replacement.
- C. NBR gaskets: Color coded and marked in color so as to be easily identifiable as nitrile conforming to ANSI/AWWA C111.
- D. Nuts and Bolts:
  - 1. Buried: All bolts used in buried flanges shall be ASTM A307 Grade B unfinished with nuts to ASTM A563 Grade A and washers to ASTM F844, or ASTM A325 Type 3 (corten steel) unfinished, with nuts to ASTM A563 Grade C3 or A563 Grade DH3 and washers to ASTM F436, Type 1.
  - 1. Exposed: All bolts, nuts and washers used in exposed or above ground locations shall be ASTM A307 Grade B unfinished or hot-dip galvanized.
  - 2. Heads and dimensions per ASME B1.1.
  - 3. Threaded per ASME B1.1.
  - 4. Project ends 1/4 to 1/2 IN beyond nuts.
- E. Polyethylene Encasement:
  - 1. Per AWWA/ANSI C105/A21.5.

### **2.5 SPECIALS AND FITTINGS**

- A. Fittings: ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10 for diameters 3-inch through 48-inch; minimum working pressure rating of 150 or 250 psi.
  - 1. Beginning of project to Station 283+80: 250 PSI rated.
  - 2. Station 283+80 to end of Project: 150 PSI rated.
- B. Welded outlets and tangential welded outlets for ductile iron pipe may be used for branch connections, air valve and drain connections. The welded outlets and tangential welded outlets for ductile iron pipe shall have restrained joint connections with adapters to flanged connections. Welded outlets must be installed by the original pipe manufacturer only, or by an iron fabricator authorized and contracted by the original pipe manufacturer. Pipe manufacturer's warranties will apply to fabricated outlets.
- C. Flange Bolt Pattern: per Section 15000.

## **2.6 JOINTS**

- A. Furnish ductile iron pipe and fittings with 100-percent restrained and flanged joints.
  - 1. Flanged Joints: ANSI/AWWA C115/A21.15.
  - 2. Flange Drilling Patterns: per Section 15000.
  - 3. Restrained joints:
    - a. "Flex-Ring" restrained joint by American Ductile Iron Pipe,
    - b. "TR FLEX" restrained joint by U.S. Pipe,
    - c. Approved Equal.
  - 4. Restrained joints using set screws, anchor lugs, wedges, exposed bolts in the thrust restraint assembly, or other friction devices or teeth such as "Field Flex-Ring" or "Fast Grip" by American Ductile Iron Pipe or the "TR Flex-Gripper Ring" or "Field Lok Gasket" by U.S. Pipe are unacceptable unless written approval is provided by the District for use.
  - 5. Bond all joints per Section 13110 and where indicated in the Drawings.

## **2.7 CEMENT-MORTAR LINING (SHOP-APPLIED)**

- A. Cement-Mortar Lining for Shop Application: Except as otherwise provided herein, the interior surfaces of all ductile iron pipe, fittings, and specials to be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C104. During the lining operation and thereafter, require the pipe to be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Take every precaution to prevent damage to the lining. If lining is damaged or found faulty at delivery site, replace the damaged or unsatisfactory portions with lining conforming to these Specifications.
- B. Cement-mortar lining for all ductile iron pipe and fittings: Double thickness in conformity with ANSI/AWWA C104.

## **2.8 EXTERIOR COATING OF PIPE**

- A. Exterior Coating of Buried Piping:
  - 1. Asphaltic coating minimum 1 mil thick.
- B. Polyethylene Encasement:
  - 1. Meets or exceeds requirements of AWWA/ANSI C105/A21.5.

## **2.9 WARNING TAPE**

- A. Per Section 15000.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Per Section 15000.

### **3.2 SURVEYING**

- A. Per Section 02212.

### **3.3 TRENCHING, EXCAVATION, BEDDING, AND BACKFILL**

- A. Per Sections 02200, 02221, and 15000, and as indicated in the Drawings.

### **3.4 CONNECTION TO PRECAST CONCRETE VAULT STRUCTURES**

- A. Per Section 02540 and as indicated in the Drawings.

### **3.5 CARRIER PIPE INSTALLATION IN CASING**

- A. Per Section 02150.

### **3.6 INSTALLATION OF PIPE**

- A. Inspect each pipe and fitting prior to installation to insure that there is no damage.
- B. Pipe Laying: Install the pipe in accordance with ANSI/AWWA C600.
- C. Lay pipe directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavate as needed to facilitate removal of handling devices after the pipe is laid. Form bell holes at the ends of the pipe to prevent point loading at the bells, fittings, and couplings. Excavate as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.
- D. Lay each section of restrained joint pipe in the order and position indicated on the line layout and marking diagrams. In laying pipe, lay to the set line and grade, within one inch plus or minus.
- E. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the District may change the alignment and grades. Make such change by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 75% of the maximum deflection recommended by the pipe manufacturer.
- F. Except for short runs which may be permitted by the District, lay pipes uphill on grades exceeding 10 percent. For pipe which is laid on a downhill grade, block and hold in place until sufficient support is furnished by the following pipe to prevent movement.
- G. Cold Weather Protection: Do not install pipe upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. Do not lay pipe unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.
- H. Protect the openings of all pipe and specials with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance.
- I. Provide means to prevent the pipe from floating.
- J. As pipe laying progresses, keep the pipe interior free of all debris. Completely clean the interior of the pipe of all sand, dirt, mortar splatter, and any other debris following completion of pipe laying and interior repairs prior to testing.

### **3.7 RUBBER GASKETED JOINTS**

- A. Immediately before jointing pipe, thoroughly clean the bell end of the pipe and place a clean gasket lubricated with an NSF approved vegetable-based lubricant in the bell groove. Carefully clean the spigot end of the pipe and lubricate with a vegetable-based lubricant. Insert the spigot end of the pipe section into the bell of the previously laid joint and telescope into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

### **3.8 JOINING METHOD**

- A. Joining Method – Push-On Restrained Joints:
  - 1. Install in accordance with AWWA/ANSI C151/A21.51.
  - 2. Assemble joints in accordance with manufacturer's directions.
    - a. Extend restrained joints after assembly to take up any slack.
  - 3. Bevel and lubricate spigot end of pipe to facilitate assembly without damage to gasket.
    - a. Use lubricant that is non-toxic, does not support the growth of bacteria, has no deteriorating effects on the gasket material, and imparts no taste or odor to water in pipe.
  - 4. Assure the gasket groove is thoroughly clean.
  - 5. For cold weather installation, warm gasket prior to placement in bell.
  - 6. Taper of bevel shall be approximately 30 degrees with centerline of pipe and approximately 1/4 IN back.
  - 7. Do not exceed 75% of manufacturer's recommendation for joint deflection.

- B. Joining Method - Flanged Joints:
  - 1. Install in accordance with AWWA C115.
  - 2. Extend pipe completely through screwed-on flanged and machine flange face and pipe in single operation.
  - 3. Make flange faces flat and perpendicular to pipe centerline.
  - 4. When bolting flange joints, exercise care to ensure that there is no restraint on opposite end of pipe or fitting which would prevent uniform gasket compression or would cause unnecessary stress, bending or torsional strains to be applied to cast flanges or flanged fittings.
  - 5. Allow one flange free movement in any direction while bolts are being tightened.
  - 6. Do not assemble adjoining flexible joints until flanged joints in piping system have been tightened.
  - 7. Gradually tighten flange bolts uniformly to permit even gasket compression.
- C. Joining Method - Mechanical Coupling Joint (where approved for use by the District):
  - 1. Arrange piping so that pipe ends are in full contact.
  - 2. Groove and shoulder ends of piping in accordance with manufacturer's recommendations.
  - 3. Provide coupling and grooving technique assuring a connection which passes pressure testing requirements.
  - 4. Do not exceed 75% of manufacturer's recommendation for joint deflection.
- D. Restrained Flanged Coupling Adapters:
  - 1. See Section 15000.
- E. Cutting:
  - 1. Do not damage interior lining material during cutting.
  - 2. Use abrasive wheel cutters or saws.
  - 3. Make square cuts.
  - 4. Bevel and free cut ends of sharp edges after cutting.
  - 5. Field cutting of restrained joint pipe utilizing a welded bead (such as TR Flex and Flex-Ring) is not allowed.
- F. Support exposed pipe in accordance with Section 15006.
- G. Install buried piping in accordance with Section 15000.
- H. Field welding: Follow manufacturer's recommended procedures instructions for field welding restrained joint rings or other ductile iron components.
- I. Polyethylene Encasement:
  - 1. Install with two layers of polyethylene encasement, minimum thickness of 8 mils, on all ductile iron pipe and fittings.
- J. Corrosion Protection: Bolted joints to be protected with wax tape per Section 13110.

### **3.9 ACCEPTANCE TESTING**

- A. Pipe Testing and Disinfection: Per Section 02643.

### **3.10 CONNECTIONS TO EXISTING PIPELINE**

- A. Test in accordance with Section 02643. Following testing and flushing of pipe, make connections to existing pipelines as indicated in the Drawings.

**END OF SECTION**

**SECTION 15064**  
**SOLID WALL PVC PIPING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies solid wall polyvinyl chloride (PVC) pipe, fittings, gaskets, and accessories for buried water pressure system and pumped storm drainage system.

**1.2 QUALITY ASSURANCE**

- A. Solid Wall PVC Pipe Qualifications for Buried Water Pressure Systems:
1. Solid Wall PVC Pipe Manufacturer: A minimum of five projects within last five years manufacturing solid wall PVC pipe of size similar to those required by the Contract.
  2. Contractor's personnel installing solid wall PVC pipe and fittings shall have experience meeting the following criteria:
    - a. Five years experience with installing solid wall PVC pipe and fittings with restrained joint system of size similar to those required by the Contract, with a minimum of two projects completed within the last five years.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Qualifications:
1. Solid Wall PVC Pipe Manufacturer.
- C. Pipe Manufacturer's Product Data:
1. Product information for materials of all pipe and fittings.
  2. Product information for restrained joint system for buried water pressure system.
  3. Handling, storage, and installation requirements, including procedures for compaction of bedding around pipe.
  4. Maximum allowable joint deflection from manufacturer.
  5. Minimum allowable pipe bending radius from manufacturer.
- D. Manufacturer's certificates of compliance with the specified standards.
- E. Test results for buried water pressure systems as listed in AWWA C909.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Use a single pipe manufacturer for furnishing pipe for buried water pressure systems.

**2.2 BURIED WATER PRESSURE SYSTEMS: SOLID WALL PVC PIPE AND FITTINGS**

- A. Pipe:
1. Shall be made of solid wall PVC, tested and manufactured per AWWA C909. Polyvinyl chloride compounds with a minimum cell classification of 12454 as defined by ASTM D1784.
  2. All accessories shall be as manufactured and furnished by the pipe supplier and have configurations compatible with the pipe joints.
  3. Nominal Diameter: As indicated in the Drawings.
  4. Minimum Pressure Class: 235 PSI.
- B. Fittings:
1. Unless otherwise indicated, fittings shall be properly protected ductile iron fittings per AWWA C110 or AWWA C153 that are compatible with the pipe size and suitable for the pipe pressures.

- a. Non-cathodically protected metallic fittings and appurtenances shall be protected with wax tape per Section 13110.
  - b. Lining: Unless indicated otherwise, ductile iron fittings shall be cement mortar lined (double thickness) per AWWA C104.
  - 2. All accessories shall be as manufactured and furnished by the fitting supplier and have configurations compatible with the pipe joints.
- C. Joints:
- 1. All joints shall be restrained joints.
    - a. Solvent cement welded joints are not acceptable.
    - b. The restraining of pipe, fittings, and valves shall be accomplished by the use of either a bolted or boltless system. Any device utilizing round point set screws will not be permitted.
    - c. Non-cathodically protected metallic joint restraint system components shall be corrosion resistant materials and protected with wax tape per Section 13110.
    - d. Restrained joints shall be designed for and be compatible with AWWA C909 pipe material, size, and working and test pressures indicated for the pipe to which the restraints are being used.
    - e. The restraint system shall comply with requirements of ASTM F1674.
    - f. Restraint System for Fittings:
      - 1) The Ford Uni-Ring.
      - 2) Approved Equal.
  - 2. Unless otherwise indicated, joints shall be gasket, push-on type and meet the performance requirements of ASTM D3139.
  - 3. Joints shall be in accordance with the manufacturer's recommendations and meet the applicable requirements of AWWA C909.
- D. Gaskets shall meet ASTM F477 and be supplied by a qualified gasket manufacturer and be suitable for the service intended.
- E. Pipe and fittings shall bear identification markings with the information required in AWWA C909.
- F. Design pipes and fittings for loads and conditions anticipated and for installation inside of a casing including heat of hydration and grouting pressures.

### 2.3 PUMPED STORM DRAINAGE SYSTEM

- A. General:
- 1. Provide Schedule 80 pipe with Schedule 80 fittings and appurtenances at locations indicated in the Drawings.
  - 2. Furnish materials in full compliance to following material specifications:
    - a. Manufacture pipe, fittings and appurtenances from polyvinyl chloride (PVC) compound which meets the requirements of Type 1, Grade 1 (12454-B) Polyvinyl Chloride as outlined in ASTM D1784.
- B. Pipe:
- 1. Furnish pipe meeting requirements of ASTM D1785.
  - 2. Pipe 2 inches in diameter or less shall be solvent welded.
  - 3. Pipe larger than 2 inches in diameter may be either flanged or solvent welded unless indicated otherwise in Drawings.
- C. Fittings: Provide ASTM D2467 PVC socket type fittings having the same pressure and temperature rating as the pipe.
- D. Flanges/Unions:
- 1. Provide either flanges or unions at valves, penetrations through structures and equipment connections.
  - 2. For pipe 2 inches in diameter or less, provide socket type PVC union with Buna O-rings.
  - 3. For pipe larger than 2 inches in diameter, provide 150 LB socket type PVC flange.
  - 4. Use flat, full faced natural rubber gaskets at flanged connections.

- a. Furnish heavy hex head bolts, each with one (1) heavy hex nut, ASTM F593 Type 316 stainless steel.
  - 5. Use spacers supplied by pipe manufacturer when mating raised-faced flanges to other flanges.
- E. Solvent Weld:
  - 1. Solvent: ASTM D2564 formulated and labeled for PVC; formulated and labeled for use in the size and pressure rating of the pipe and labeled as resistant to caustic chemicals and hypochlorite solutions. Universal plastic pipe solvents are not acceptable.
  - 2. Primer: same manufacturer as the solvent; purple stain.
  - 3. Prior to solvent welding, clean joints of all loose debris and prime; primer shall stain pipe purple.
  - 4. Manufacturers:
    - a. Solvent: IPC Weld-On.
    - b. Primer: IPC Weld-On.

## **2.4 WARNING TAPE**

- A. Per Section 15000.

## **PART 3 - EXECUTION**

### **3.1 GENERAL**

- A. Per Section 15000.

### **3.2 SURVEYING**

- A. Per Section 02212.

### **3.3 TRENCHING, EXCAVATION, BEDDING, AND BACKFILL**

- A. Per Sections 02200, 02221, and 15000, and as indicated in the Drawings.

### **3.4 CONNECTION TO PRECAST CONCRETE VAULT STRUCTURES**

- A. Per Section 02540 and as indicated in the Drawings.

### **3.5 BURIED WATER PRESSURE SYSTEM**

- A. Unless otherwise indicated, install the piping system in accordance with the manufacturer's recommendations and AWWA C605.
- B. Coat all buried non-cathodically protected metallic fittings and appurtenances and joint restraint system components with a wax tape coating system per Section 13110.
- C. Joint deflection of pipe and fittings shall not exceed 75 percent of the maximum allowable joint deflection from the manufacturer.
- D. Pipe bending radius of pipe shall not exceed 75 percent of minimum pipe bending radius allowed from the pipe manufacturer.

### **3.6 PUMPED STORM DRAINAGE SYSTEM**

- A. PVC pipe 3 inches in diameter and smaller:
  - 1. Join by means of socket fittings and solvent welding in conformance with ASTM F402.
  - 2. Make solvent-cemented joints in strict compliance with the manufacturer's/supplier's instructions and recommended procedures.
- B. Installation:
  - 1. Field threading PVC will not be permitted.
    - a. Perform required threaded connections or attachments by the use of factory molded socket by threaded adapters.
    - b. Female adapters are not acceptable.

2. Employ installation and pipe support practices and solvent welding all in compliance to the manufacturer's printed recommendation.
  - a. Continuously support PVC piping at liquid operating temperatures in excess of 100 DegF.
  - b. For vertical piping, band the pipe at intervals to rigidly support load of twice vertical load.
  - c. Support riser clamps on spring hangers.
  - d. Do not clamp PVC tightly or restrict movement for expansion and contraction.
3. Perform installation procedures, handling, thrust blocking, connections, and other appurtenant operations in full compliance to the manufacturer's printed recommendations and in full observance to plan details when more stringent.

### **3.7 FIELD INSPECTION AND TESTING**

- A. Pipe Testing and Disinfection for Buried Water Pressure System:
  1. Per Section 02643.
- B. Pipe Testing for Pumped Storm Drainage System:
  1. Test with water at 100 psi for 120 minutes.

**END OF SECTION**

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## SECTION 15065

### STEEL PIPE FABRICATED SPECIALS (AWWA C200, MODIFIED)

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section specifies lined and coated steel pipe specials for pipe larger than 12 inches diameter.
- B. Specials are defined as fittings, closure pieces, bends, elbows, reducers, wyes, tees, crosses, outlets, manifolds, bolts, nuts, gaskets, etc. wherever located, and all piping above ground or in structures.

##### 1.2 QUALITY ASSURANCE

- A. Inspection: See Inspection under Section 15061.
- B. Shop Testing of Steel Pipe Fabricated Specials:
  - 1. If any special has been fabricated from straight pipe not previously tested and is of the type listed below, hydrostatically test the special with a pressure equal to 1-1/2 times the design working pressure:
    - a. All bends, wyes, crosses, tees with side outlet diameter greater than 30 percent of the main pipe diameter and manifolds.
    - b. In no case shall shop test pressure be less than 150 psi.
  - 2. Welds: Non-destructively tested at the fabricator's facility as specified below for various weld categories. Testing: Include submitting written documentation of procedures per Section V, and acceptance criteria shall be in accordance with Section VIII, Div. I of the ASME Boiler and Pressure Vessel Code.
    - a. Butt Joint Welds: Spot radiographically examine pipe in accordance with paragraph UW-52 of the ASME Boiler and Pressure Vessel Code Section VIII, Division 1. If, in the opinion of the District, the welds cannot readily be radiographed, they shall be 100 percent ultrasonically examined.
    - b. Fillet Welds: Examine 10 percent of all fillet welds using the magnetic particle inspection method. Examine 100 percent with visual inspection (VT) method.
    - c. Groove Welds: 100 percent ultrasonically examine all groove welds that cannot be readily radiographically spot examined.
    - d. In addition to weld tests herein specified, air test the reinforcing pads as stated in AWWA C206.
  - 3. Correct any weld defects, cracks, leaks, distortion, or signs of distress during testing. Grind out and re-weld defects. After corrections, retest the special.
  - 4. Where welded test heads or bulkheads are used, provide extra length to each opening of the special. After removal of each test head, trim the special back to the design points with all finished plate edges ground smooth, straight, and prepared for the field joint.
  - 5. Perform testing before joints have been coated or lined.
  - 6. The District shall have the right to witness all testing conducted.
  - 7. In addition to those tests specifically required, the Engineer may request additional samples of any material including lining and coating samples for testing by the District.
- C. Ultrasonic Examination:
  - 1. Ultrasonically examine steel plate that will be in welded joints or welded stiffener elements for laminar discontinuities where both of the following conditions exist:
    - a. Any plate in the welded joint has a thickness exceeding 1/2 inch.
    - b. Any plate in the welded joint is subject to transverse tensile stress through its thickness during the welding or service.
  - 2. In accordance with ASTM A578 - Straight Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications with a Level I acceptance standard.

3. Plates that are not in conformance with the acceptance criteria in ASTM A578 may be used in the work if the areas that contain the discontinuities are a distance at least four times the greatest dimension of the discontinuity away from the weld joint as accepted by the District.
- D. Welding Procedure Specifications: In accordance with Section 15061.
- E. Welder Performance Qualifications: In accordance with Section 15061.
- F. Certified Welding Inspector: Provide a certified welding inspector for shop fabrication work with responsibilities as indicated in Section 15061.
- G. Coating Quality Control: In accordance with Section 15061.

### **1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Submittals shall be the same as for pipe per Section 15061 – to be submitted under Section 15061.
- C. Certified affidavit of compliance shall be the same as for pipe per Section 15061 – to be submitted under Section 15061.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Per Section 15061.

### **2.2 STEEL MATERIALS**

- A. Per Section 15061.

### **2.3 FABRICATION AND MATERIALS**

- A. General:
  1. Fabricate all pipe specials in the shop.
  2. All Specials and Fittings: In accordance with AWWA C200; conform to the dimensions of AWWA C208. Unless otherwise indicated, the minimum radius of elbows shall be 2.5 times the pipe diameter and the maximum miter angle on each section of the elbow shall not exceed 11-1/4 degrees.
  3. Shop Welding: Conform to the applicable provisions of the ASME Boiler and Pressure Vessel Code.
  4. Reinforcement and design for wyes, tees, outlets, and nozzles in accordance with AWWA C208 and as indicated in the Drawings.
- B. Specials and fittings that cannot be mechanically lined and coated shall be lined and coated by hand-application using the same materials as used for the pipe and in accordance with the applicable AWWA or ASTM Standards. Coating and lining applied in this manner shall provide protection equal to that for the pipe.
- C. Forge steel all threaded outlets suitable for 3,000 psi service, and shall be as manufactured by Vogt, or approved equal.
- D. Moderate deflections and long radius curves may be made by means of beveled bells, by pulling standard joints, by using short lengths of pipe, or a combination of these methods:
  1. The maximum total allowable angle for beveled joints, and total installed alignment deflection, shall be 5 degrees per pipe joint. Bevels shall be provided on the bell ends. Mitering of the spigot ends will not be permitted.
  2. All horizontal deflections or fabricated angles shall fall on the alignment as indicated in the Drawings.

- E. The maximum allowable pulled joint shall be a 3/4-inch pull out from normal joint closure. In no case shall pulled joints result in a gap between the bell and spigot at the weld location that exceeds 1/8 inch, unless indicated otherwise in the Drawings. In no case shall the angular deflections for pulled joints exceed 1.5 degrees.
- F. Fabricate tees, wyes, crosses, elbows, and manifolds so that the outlet clearances and reinforcing plates from any weld joints are a minimum of 5 times cylinder thickness or 2 inches, whichever is greater. Orient longitudinal weld joints in adjacent cylinder sections so that there is a minimum offset of 5 times cylinder thickness or 2 inches, whichever is greater.
- G. Steel Welding Fittings: Conform to ASTM A234 - Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- H. Flange Bolt Pattern: per Section 15000.
- I. Marking: Place a mark indicating the true vertical axis of the special on the top and bottom of the special.

#### **2.4 CEMENT MORTAR LINING (SHOP-APPLIED)**

- A. Meet the requirements of straight pipe (AWWA C205) with the provisions that handwork lining reinforcement be positioned approximately in the center of the lining.
- B. Reinforcement: 2-inch x 4-inch No. 12 welded wire fabric extending circumferentially around the pipe. Securely fasten fabric to the pipe. Splices shall be lapped 4 inches and the free ends tied or looped to ensure continuity.
- C. Comply with the requirements of Section 15061 Part 2 where applicable.

#### **2.5 POLYURETHANE COATING (SHOP-APPLIED)**

- A. Per Section 15061.
- B. Coat flanges and blind flanges with polyurethane. Apply two coats minimum, and alternate colors between coats.
- C. Do not coat machined surfaces of flanges.
- D. Where the coating is adjacent to cement mortar lined surfaces, such as flanged outlets or flanged pipe ends, apply the coating first. Extend the coating two inches minimum onto the surface of pipe that will be lined with cement mortar. After the coating has cured, roughen the surface and overlap the coating a minimum of two inches with the cement mortar lining. Taper the cement mortar lining over the coating to the base of the flange where it is welded to the pipe.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- A. Comply with the requirements of Section 15061, Part 3 where applicable.

#### **3.2 INSPECTION AND FIELD TESTING**

- A. Per Section 15061.

**END OF SECTION**

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**SECTION 15200**  
**VALVES, GENERAL**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies the general requirement for valves, actuators, and appurtenances. The provisions of this Section apply to all valves and valve actuators except where otherwise indicated.

**1.2 QUALITY ASSURANCE**

- A. Valve Manufacturer's Qualifications: All valve manufacturers shall have a successful record of not less than 5 years in the manufacture of the valves indicated.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Valve name, size, Cv factor, cavitation limits, port diameter, pressure rating, and identification number (if any).
  2. Complete information on valve actuator, including size, manufacturer, model number, and mounting.
  3. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand-wheels, position indicators, integral control systems, and control systems.
  4. Certified drawings and material specifications in accordance with AWWA and other applicable standards.
  5. Include manufacturer's published recommendations for seating and unseating torque coefficient, dynamic torque, and bearing friction for calculation of maximum operating torque.
  6. Certifications and Test Reports: Records of test performed in accordance with AWWA and other applicable standards.
  7. Certification that the required coating has been applied and tested in the manufacturing plant prior to shipment.
  8. Certification that valves have been subjected to performance, leakage, and hydrostatic testing in accordance with AWWA and other applicable criteria.
- C. Operation and Maintenance Manual information for each type of valve and configuration.
- D. Spare Parts List: A Spare Parts List shall contain the required information for each type of valve.
- E. Factory Test Data: Provide signed, dated, and certified factory test data shall be submitted before shipment of the valve. The data shall also include certification of quality and test results for factory-applied coatings.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. Unit Responsibility: A single manufacturer shall be made responsible for coordination of design, assembly, testing, and furnishing of each type of valve.
- B. Single Manufacturer: Where two or more valves of the same type or size are required, the valves shall be furnished by the same manufacturer.
- C. Acceptable Manufacturers per individual valve sections.

**2.2 PRODUCTS**

- A. General: All valves shall be new and of current manufacture. Buried valves shall be provided with valve boxes, covers and valve extensions.

B. Manual Actuators:

1. General:

- a. Unless otherwise indicated, valves shall be furnished with manual actuators opening counter clockwise when viewed from the top. Direction of opening and the word OPEN to be cast in the handwheel or valve bonnet.
- b. Valves in sizes up to and including 4 inches shall have direct acting lever or handwheel actuators.
- c. Larger valves shall have gear-assisted manual actuators, with an operating pull of maximum 60 pounds on the rim of the handwheel.
- d. All gear-assisted valves shall be hermetically-sealed and grease-packed to withstand at least 20 feet of submergence.
- e. Valves 6 inches to 30 inches in diameter may have traveling-nut actuators, worm-gear actuators, spur- or bevel-gear actuators, as appropriate for each valve.

2. Buried Valves:

- a. Unless otherwise indicated, buried valves shall have extension stems to grade, with square nuts and steel pipe extensions and valve boxes.
- b. Where so indicated, buried valves shall be in cast-iron valve boxes with covers of ample size to allow operation of the valve actuators. Covers of valve boxes shall be permanently labeled as indicated in the Drawings. Wrench-nuts shall comply with AWWA C500.
- c. Manual Worm-Gear Actuator:
  - 1) The actuator shall consist of a single or double reduction gear unit contained in a weather-proof cast-iron or steel body with cover and minimum 12-inch diameter handwheel.
  - 2) The actuator shall be capable of 90-degree rotation and shall be equipped with travel stops capable of limiting the valve opening and closing.
  - 3) The actuator shall consist of spur or helical gears and worm-gearing. The spur or helical gears shall be of hardened alloy steel and the worm-gear shall be alloy bronze. The worm-gear shaft and the handwheel shaft shall be of 17-4 PH or similar stainless steel.
  - 4) All gearing shall be accurately cut with hobbing machines. Ball or roller bearings shall be used throughout. Actuator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the actuator. All gearing shall be designed for a 100 percent overload.

C. Protective Coating and Lining:

1. In accordance with AWWA C550 unless otherwise indicated.
2. Either two-part liquid material or heat-activated (fusion) material except only heat-activated material if specified as "fusion" or "fusion-bonded" epoxy.
3. Minimum 7-mil dry film thickness except where limited by valve operating tolerances.
4. Provide an additional 4 mils minimum to epoxy coating, inside and outside, for butterfly valves.
5. The valve manufacturer shall certify in writing that the required coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Alternatively, if required coatings are applied outside of manufacturing plant, the manufacturer shall warrant the valve to the same standard provided for factory coated valves.
6. Flange faces of valves shall not be epoxy coated.
7. Lining shall be NSF approved for potable water.

D. Valve Testing:

1. At a minimum, unless otherwise indicated, each valve body 4 inches and larger shall be tested hydrostatically to 1.5 times its rated 100 degrees F design water-working pressure, for a period of 5 minutes, without showing any leaks or loss of pressure. In addition, each valve 4 inches and larger shall undergo a functional test to demonstrate satisfactory operation throughout its operating cycle, and a closure test at rated 100 degrees F water-working pressure for a period of 5 minutes to demonstrate tight shut-off. Stem seal leakage shall not be a cause for rejection. All valves 3 inches and smaller shall undergo the manufacturer's standard test.

E. Valve Marking: All valve bodies shall be permanently marked in accordance with MSS SP25.

## **2.3 MATERIALS**

- A. Per individual valve sections.

## **2.4 VALVE CONSTRUCTION**

- A. Bodies: Valve bodies shall be cast, forged, or welded of the materials indicated, with smooth interior passages. Wall thicknesses shall be uniform in agreement with the applicable standards for each type of valve, without casting defects, pinholes, or other defects that could weaken the body. All welds on welded bodies shall be done by certified welders and shall be ground smooth. Valve ends shall be as indicated, and be rated for the maximum temperature and pressure to which the valve will be subjected.
- B. Flanges:
  - 1. Per Section 15000.
- C. Bonnets: Valve bonnets shall be clamped, screwed, or flanged to the body and shall be of the same material, temperature, and pressure rating as the body. The bonnets shall have provision for the stem seal with the necessary glands, packing nuts, or yokes.
- D. Valve Stems: Valve stems shall be of the materials indicated, or, if not indicated, of the best commercial material for the specific service, with adjustable stem packing, O-rings, Chevron V-type packing, or other suitable seal.
- E. Internal Parts: Internal parts and valve trim shall be as indicated for each individual valve. Where not indicated, valve trim shall be of Type 316 stainless steel or other best suited material.
- F. Nuts and Bolts: All nuts and bolts on valve flanges and supports shall be in accordance with Section 15000.
- G. Flange Bolt Pattern: Per Section 15000.

## **2.5 VALVE ACCESSORIES**

- A. All valves shall be furnished complete with the accessories required to provide a functional system.

## **2.6 SPARE PARTS**

- A. Where indicated, furnish the required spare parts suitably packaged and labeled with the valve name, location, and identification number. Also furnish the name, address, and telephone number of the nearest distributor for the spare parts of each type of valve. All spare parts are intended for use only by the District, after expiration of the warranty period.

## **2.7 VALVE STEM EXTENSION**

- A. Per the Drawings.

# **PART 3 - EXECUTION**

## **3.1 VALVE INSTALLATION**

- A. General: All valves, actuating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the manufacturer's written instructions and as indicated. Valves shall be firmly supported to avoid undue stresses on the pipe.
- B. Extension stems: In concrete chambers, extension stems shall be installed to hang from the valve box to prevent the valve actuator from bearing the full weight of the stem extension.
- C. Access: All valves shall be installed with easy access for actuation, removal, and maintenance and to avoid interference between valve actuators and structural members, walls, or other equipment.
- D. Valve Accessories: Where combinations of valves, sensors, switches, and controls are indicated, properly assemble and install such items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

- E. Extension Stem for Buried Valve Operator: Furnish a steel operating extension stem with 2-inch operating nut to bring the operating nut to a point 6 inches below the valve box lid.

**END OF SECTION**

**SECTION 15202**  
**BUTTERFLY VALVES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies butterfly valves, actuators, and appurtenances.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Valve name, size, Cv factor, cavitation limits, port diameter, pressure rating, and identification number (if any).
  2. Complete information on valve actuator, including size, manufacturer, model number, and mounting.
  3. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand-wheels, position indicators, integral control systems, and control systems.
  4. Certified drawings and material specifications in accordance with AWWA and other applicable standards.
  5. Include manufacturer's published recommendations for seating and unseating torque coefficient, dynamic torque, and bearing friction for calculation of maximum operating torque.
  6. Certifications and Test Reports: Records of test performed in accordance with AWWA and other applicable standards.
  7. Certification that valves have been subjected to performance, leakage, and hydrostatic testing in accordance with AWWA and other applicable criteria.
- C. Operation and Maintenance Manual information.

**PART 2 - PRODUCTS**

**2.1 RUBBER SEATED BUTTERFLY VALVES**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. DeZurik.
  2. Clow.
  3. Mueller/Linseal.
  4. Pratt a Mueller Water Company.
  5. Bray.
  6. Pentair/Keystone.
  7. Approved Equal.
- B. Comply with AWWA C504.
- C. Materials:
1. Valve bodies:
    - a. ASTM A126, Class B or ASTM A536 Grade 65-45-12 ductile iron.
    - b. Wafer valves may be constructed of ASTM A48, Class 40 cast iron.
  2. Valve shafts:
    - a. One-piece stainless steel, Type 304.
    - b. Pins: 304 stainless steel.
    - c. Bushings/Packing/O-rings: EPDM, RTFE or TFE.
    - d. Bearings: Reinforced TFE or equal.
  3. Valve discs:
    - a. 304 Stainless Steel disk.
  4. Valve seats:

- a. Water: Buna-N.
  - 5. Shaft bearing: Bronze, TFE-coated stainless steel or reinforced TFE.
  - 6. Shaft seal in addition to any sealing provided by seat: Suitable synthetic rubber rings or PTFE V-ring suitable for operating conditions.
  - 7. Bolts, nuts, and trim: Stainless steel.
- D. Design Requirements:
- 1. Seat type: Resilient.
  - 2. Body type:
    - a. Wafer Lug (laying length may vary from AWWA C504).
    - b. Equip wafer type with fully tapped anchor lugs drilled per ASME B16.5.
  - 3. Direct buried valves with the following pressure ratings:
    - a. Beginning of project to Station 283+80: 250 PSI rated.
    - b. Station 283+80 to end of Project: 150 PSI rated.
  - 4. Shaft diameter: One-piece constant diameter.
  - 5. Flange bolt pattern per Section 15000.
- E. Buried valves shall be provided with valve boxes, covers, and valve extensions as indicated.

## **2.2 SPARE PARTS**

- A. Per Section 01750.
- B. Two (2) 36-inch-diameter rubber-seated butterfly valves.

## **PART 3 - EXECUTION**

### **3.1 VALVE INSTALLATION**

- A. Valve installation: Per Section 15200.
- B. Flanged valve bolt holes shall straddle vertical centerline of pipe. Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.
- C. Extension Stem for Buried Valve Operator: Furnish a steel operating extension stem with 2-inch operating nut to bring the operating nut to a point 6 inches below the valve box lid.

### **3.2 TESTS AND INSPECTION**

- A. Valve may be either tested while testing pipelines or as a separate step.
- B. Test that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other, in both directions for two-way valve and applications.
- C. Count and record number of turns to open and close valve. Account for any discrepancies with manufacturer's data.

**END OF SECTION**

**SECTION 15206**  
**GATE VALVES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies gate valves, actuators, and appurtenances.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.

B. Shop Drawings:

1. Valve name, size, Cv factor, cavitation limits, port diameter, pressure rating, and identification number (if any).
2. Complete information on valve actuator, including size, manufacturer, model number, and mounting.
3. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand-wheels, position indicators, integral control systems, and control systems.
4. Certified drawings and material specifications in accordance with AWWA and other applicable standards.
5. Include manufacturer's published recommendations for seating and unseating torque coefficient, dynamic torque, and bearing friction for calculation of maximum operating torque.
6. Certifications and Test Reports: Records of test performed in accordance with AWWA and other applicable standards.
7. Certification that valves have been subjected to performance, leakage, and hydrostatic testing in accordance with AWWA and other applicable criteria.

- C. Operation and Maintenance Manual information.

**PART 2 - PRODUCTS**

**2.1 RESILIENT WEDGE GATE VALVES**

A. General:

1. All valves shall be of the inside screw, non-rising stem type. The valve actuators shall be as indicated, with counter-clockwise opening stems.
2. Valves shall be resilient wedge type rated as follows:
  - a. Beginning of project to Station 283+80: 250 PSI rated.
  - b. Station 283+80 to end of Project: 150 PSI rated.
3. Buried valves shall be provided with valve boxes, covers, and valve extensions as indicated.

B. Acceptable Manufacturers:

1. Mueller.
2. Clow.
3. American Flow Control.
4. M & H.
5. Crane Company.
6. Milwaukee Valve Company.
7. Approved Equal.

C. Materials:

1. Stem, stem nut: Bronze.
2. Body: Ductile iron.
3. Wedge: Ductile iron encapsulated with nitrile rubber or SBR rubber.
4. Flange bonnets with non-rising stem (NRS) conforming to ASTM A536.
5. Bolts, nuts, and trim: Stainless steel.

- D. Design requirements:
  - 1. Provide valves with clear waterways the full diameter of the valve.
  - 2. Pressure Ratings:
    - a. Beginning of Project to Station 283+80: 250 PSI rated.
    - b. Station 283+80 to end of Project: 150 PSI rated.
  - 3. NRS O-ring stem seal.
  - 4. Meet or exceed the requirements of AWWA C515.
- E. Actuators: Unless otherwise indicated, gate valves shall have 2-inch square operating nuts.
- F. Special Coating and Lining: Provide NSF approved lining and epoxy or fusion bonded epoxy coating in accordance with AWWA C550.
- G. Flange Bolt Patterns: Per Section 15000.

### **PART 3 - EXECUTION**

#### **3.1 VALVE INSTALLATION**

- A. Valve installation: Per Section 15200.
- B. Where larger buried valves utilize smaller bypass valves, provide a second valve box installed over the bypass valve operating nut.
- C. Do not install gate valves inverted or with the stems sloped more than 45 degrees from the upright unless the valve was ordered and manufactured specifically for this orientation.
- D. Extension Stem for Buried Valve Operator: Furnish a steel operating extension stem with 2-inch operating nut to bring the operating nut to a point 6 inches below the valve box lid.

**END OF SECTION**

**SECTION 15230**  
**MISCELLANEOUS VALVES AND METERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section specifies the following valves and accessories:
  - 1. Combination air vacuum and air release valves.
  - 2. Ball valves.
  - 3. Corporation stops and pipe saddles.
  - 4. Pressure reducing valves.
  - 5. Water meters.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings for Valves:
  - 1. Valve name, size, Cv factor, cavitation limits, port diameter, pressure rating, and identification number (if any).
  - 2. Complete information on valve actuator, including size, manufacturer, model number, and mounting.
  - 3. Assembly drawings showing part nomenclature, materials, dimensions, weights, and relationships of valve handles, hand-wheels, position indicators, integral control systems, and control systems.
  - 4. Certified drawings and material specifications in accordance with AWWA and other applicable standards.
  - 5. Include manufacturer's published recommendations for seating and unseating torque coefficient, dynamic torque, and bearing friction for calculation of maximum operating torque.
  - 6. Certifications and Test Reports: Records of test performed in accordance with AWWA and other applicable standards.
  - 7. Certification that valves have been subjected to performance, leakage, and hydrostatic testing in accordance with AWWA and other applicable criteria.
- C. Product Technical Data for Corporation Stops, Pipe Saddles, and Water Meters, including:
  - 1. Product information showing compliance with this Section.
  - 2. Copies of manufacturer's written directions regarding material handling, delivery, storage, and installation.
- D. Operation and Maintenance Manual information.

**PART 2 - PRODUCTS**

**2.1 COMBINATION AIR VACUUM AND AIR RELEASE VALVES**

- A. Conform to AWWA C512.
- B. Combination Air Vacuum and Air Release Valves:
  - 1. Combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting large quantities of air while a system is being filled or drained, respectively.
  - 2. Dual body with the air release valve installed as an appendage to main valve.
- C. Acceptable Manufacturers:
  - 1. Crispin.
  - 2. APCO.
  - 3. Val-Matic.
  - 4. A.R.I. Flow Control.

5. No Approved Equal.

D. Materials:

1. Body and cover: Cast iron, ductile iron, or cast steel.
2. Float, linkage and hardware: Stainless steel.
3. Seals and gaskets shall be of a material insuring water tightness.
4. Seat: Buna-N.

E. Design requirements:

1. Size: As indicated in the Drawings.
2. Working pressure: As indicated in the Drawings.
3. Minimum orifice sizes: As indicated in the Drawings.

F. Provide isolation valve as indicated in the Drawings.

G. Provide control for slow release of air through valve to prevent valve slamming shut from excessive air or water velocity through the valve.

## 2.2 BALL VALVES 1/4 INCH TO 3 INCH DIAMETER

A. Comply with MSS SP-110.

B. Acceptable Manufacturers:

1. Apollo.
2. Jamesbury.
3. Watts.
4. Stockham.
5. Nibco.
6. Mueller.

C. Materials:

1. Body: Bronze.
2. Stem and stem gland nut: Brass.
3. Ball: Brass, chrome plated.
4. Seats, stuffing box ring, and thrust washer: reinforced Teflon.
5. Handle: Vinyl coated or stainless steel.

D. Design Requirements:

1. Rated for 250 psi cold water working pressure.
2. Handles showing direction of opening.
3. Stuffing boxes adjustable for wear.
4. Stem with reinforced Teflon stuffing box ring and blowout-proof design.
5. Renewable reinforced Teflon seats.
6. Ball design which does not allow media contact with stem.
7. Balancing stop for all applications.

## 2.3 CORPORATION STOPS

A. Unless otherwise indicated, corporation stops shall be made of solid brass for key operation, with screwed ends with corporation thread or iron pipe thread, as required. Corporation stops shall be suitable for pressure of 250 psi minimum unless otherwise indicated.

B. Acceptable Manufacturers:

1. Mueller Company.
2. James Jones Company
3. Ford Meter Box Company, Inc.
4. Approved Equal.

## 2.4 PIPE SADDLES

A. Double Strap Service Saddles, cast iron or ductile iron, nylon coated, stainless steel straps, tapped for iron pipe threads, ROMAC Style 202 NS.

### MISCELLANEOUS VALVES AND METERS

## 2.5 PRESSURE REDUCING VALVES – GREATER THAN 4 INCHES

- A. Pressure-reducing control:
  - 1. Acceptable manufacturers:
    - a. Cla-val, Model 90-01.
  - 2. Design requirements: Modulate basic valve to maintain a uniform downstream pressure as set on control pilots.
  - 3. Materials:
    - a. Body: Ductile iron.
    - b. Seat insert: Stainless steel.
    - c. Disc: Buna-N.
    - d. Diaphragm: Nylon fabric bonded with synthetic rubber.
  - 4. Design requirements:
    - a. Assemble all control features and hardware on basic valve at factory.
    - b. Use corrosion-resistant metal for all exposed portions of the control.
    - c. Include with valve control:
      - 1) Stop valves.
      - 2) Strainer.
      - 3) Valves for opening and closing speed control.
      - 4) Pilot valves.
      - 5) Solenoid valves.
      - 6) Pressure switches as necessary to provide control function.
    - d. Electric components:
      - 1) 110 V, 1 PH.
      - 2) In weatherproof enclosure unless indicated otherwise.
  - 5. Flange Bolt Pattern: Per Section 15000.

## 2.6 WATER METERS – GREATER THAN 1 INCH

- A. Magnetic Flow Meters (Inline):
  - 1. Acceptable Manufacturers:
    - a. Badger.
    - b. Approved Equal.
  - 2. Instrumentation/ Electrical Design and Fabrication:
    - a. Utilize characterized field principle of electromagnetic induction to produce signal directly proportional to flow rate.
    - b. Transmitter electronics shall use microprocessor based architecture and be configured using parameters.
    - c. NEMA 6 rated and submergence-proof to 5 meters.
    - d. Unit shall provide for both analog and digital inputs.
    - e. High input impedance pre-amplifiers.
      - 1) Minimum impedance:  $10^{10}$  ohms.
    - f. Provide cable between magnetic flow meter and transmitter.
      - 1) Cable shall be potted and fitted by manufacturer at the factory.
    - g. Minimum 16 character alphanumeric display shall be provided to indicate user-defined flow units and total flow. All menu commands shall be viewed on this display.
    - h. Unit calibration shall be possible without disassembly of the unit.
    - i. Pulsed DC magnetic field excitation. Pulse width configurable to 0.5 to 1000 milliseconds.
    - j. Automatic zero.
    - k. Adjustable low flow cutoff.
    - l. Minimum signal lock (empty tube zero) to prevent false measurement when tube is empty.
    - m. 4-20 mA DC HART isolated output into maximum 800 ohms.
    - n. Power supply: 117 V  $\pm$ 10 PCT, 60 Hz.
    - o. Indication of flow rate and totalized flow at transmitter. Totalized shall be maintained in memory for up to 10 years.
    - p. Grounding requirements:

- 1) As required by manufacturer.
- q. Meter to be capable of uni-directional or bi-directional flow.
3. Mechanical design and fabrication:
  - a. Provide steel wafer body design rated for piping system operating and test conditions. Meter shall be epoxy lined and coated.
  - b. Flange Bolt Pattern: ANSI B16.1 Class 125.
  - c. Electrodes shall be 316 stainless steel.
  - d. All meters shall be NSF 61 certified.
4. Performance:
  - a. Inaccuracy:  $\pm 0.4$  percent of rate.
5. Warranty:
  - a. 2 year from shipment date for defective workmanship and materials.

## **2.7 ACCESSORIES**

- A. Furnish any accessories required to provide a completely operable valve.
- B. Furnish any accessories required to provide a completely operable magnetic flow meter.

## **2.8 INTERNAL EPOXY COATING**

- A. Provide internal epoxy coating suitable for potable water for all iron body valves, water meters, and other equipment in accordance with AWWA C550.

## **2.9 MAINTENANCE MATERIALS**

- A. Provide one set of any special tools or wrenches required for operation or maintenance for each type valve.

## **2.10 SPARE PARTS**

- A. Per Section 01750.
- B. Spare parts as recommended by manufacturer for the 8-inch and 36-inch-diameter magnetic flow meters.

# **PART 3 - EXECUTION**

## **3.1 INSTALLATION**

- A. General: The Contractor shall assemble and install all equipment specified herein, in strict accordance with the manufacturer's published instructions, under the supervision of the manufacturer's representative, under the general review of the District. All installations shall be accomplished by competent craftsmen in a workmanlike manner.
- B. The meters shall be installed in easily accessible locations for each of reading and maintenance. Wherever possible, all meters shall be installed in such a way to provide the manufacturer's recommended straight approach and straight piping downstream. All meters shall be firmly supported from the structure or from the floor with approved supports. In-line meters shall be installed to provide full-line flow and not less than the manufacturer's recommended head at all times.
- C. All valves shall be installed in accordance with manufacturer's instructions and with provisions of Section 15200.
- D. PRVs set at pressures to match the pressure provided by the existing valve or as directed by the District.

## **3.2 FIELD QUALITY CONTROL**

- A. Cleanup:
  1. After completion and testing of its work, the Contractor shall remove all debris from the site, clean all meters, controls, cabinets, and other metering appurtenances, to hand over each system in perfect operating condition.
- B. Testing:

1. After installation, inspect and operate valve to ensure all parts are operable and valve seats properly.
2. Equipment shall be prepared for operational use in accordance with manufacturer's instructions, including bench test and calibration, where required.
3. Each item shall be subjected to an operating test over the total range of capability of the equipment. Where applicable, tests shall be conducted in accordance with the Test Code of the Standards of the Hydraulic Institute. The Contractor shall obtain copies of factory test certifications and shall notify the District one week in advance of all tests to be conducted on site.
4. Check and adjust valves, meters, and accessories in accordance with manufacturer's instructions and place into operation.

### **3.3 ACCEPTANCE BY DISTRICT**

- A. Final acceptance of the equipment is contingent on satisfactory operation after installation.

**END OF SECTION**

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**SECTION 15510**  
**FIRE HYDRANTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section specifies dry-barrel fire hydrants and accessories.

**1.2 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Product technical data:
  - 1. Acknowledgement that products submitted meet the requirements of the standards referenced.
  - 2. Manufacturer's installation instructions.
  - 3. Acknowledge and verify dimensions and provide list of integral parts and materials.

**PART 2 - PRODUCTS**

**2.1 FIRE HYDRANT**

- A. Acceptable Manufacturers:
  - 1. Mueller Centurion 250.
  - 2. American AVK Nostalgic.
  - 3. American Darling B62B.
  - 4. No Approved Equal.
- B. Design and Fabrication:
  - 1. Traffic Model Fire Hydrants:
    - a. Per Drawings.
    - b. Meet AWWA C502 with a dry top.
    - c. Center stem compression, 5-1/4-inch valve opening, two 2-1/2-inch hose and one 5-1/4-inch steamer nozzles with National Standard Threads, 6-inch restrained joint or flanged inlet connection, open left 1-1/4-inch pentagon operating nut, and gaskets in the nozzles.
    - d. Use the bury line as control to ensure proper installation of hydrants. At no time shall finish grade be less than 3 inches below the bury line, or higher than the bury line of the hydrant. If a hydrant is not provided with a bury line, use the bottom flange of the hydrant as control and set finish grade exactly 4 inches below the bottom flange, or as directed by the District. A brass seating ring is required.
  - 2. Gravel for Drainage:
    - a. Granular Drain Backfill for drainage under the fire hydrants. Gravel free of organic matter, sand, loam, clay, and other small particles that tend to restrict water flow through the gravel.

**PART 3 - EXECUTION**

**3.1 GENERAL**

- A. Per Drawings.

**3.2 HANDLING**

- A. Loading and unloading: Handle hydrants to prevent damage to the hydrant and coating. Load and unload hydrants using hoists and slings so as to avoid shock or damage, and under no circumstances allow them to be dropped, skidded, or rolled. Damaged hydrants will be rejected. If damage is confined to the coating, it may be repaired in a manner satisfactory to the District. Immediately place all damaged hydrants apart from the undamaged and remove the damaged hydrants from the site.

- B. End Caps: Provide factory applied end cap on pipe connection end. Maintain end cap through shipping, storage, and handling to prevent damage and prevent dirt and moisture from entering the hydrant.

### **3.3 INSTALLATION**

- A. Install hydrants at locations indicated in accordance with AWWA M17 and the following:
  - 1. Remove foreign material from barrel of hydrant before placement.
  - 2. Install hydrants plumb with their nozzles parallel with the roadway and the pumper nozzle facing the hydrant lateral. Set hydrants to the established grade. Surround all hydrants by a concrete pad as indicated in the Drawings. Place hydrant pads flush with the surrounding grade.
  - 3. No hydrant shall have more than 5-foot bury. If deeper, do not use extensions; use bends to gain appropriate height.
  - 4. Place each hydrant on a concrete base not less than 3 inches thick and 12 inches square.
  - 5. Flange shall be set no higher than 6 inches above the concrete base as indicated in the Drawings.
  - 6. Provide hydrant drainage at the base of the hydrant by placing construction filter fabric or plastic against the native earth, and Granular Drain Backfill material from the bottom of the trench to at least 6 inches above the waste opening in the hydrant and to a distance of 1 foot around the bowl.
  - 7. Firmly tamp carefully compacted backfill around hydrant to surface of ground and to a distance of 5 feet in front of hydrant.

### **3.4 COATINGS AND FINISHES**

- A. Re-paint all hydrants with one final coat of rust-preventive paint, at least 6 mils dry film thickness. Apply paint with a brush only. Keep paint off brass components.
  - 1. Color:
    - a. Less than 80 PSI: TNEMEC Safety Yellow.
    - b. 80 PSI and greater PSI: TNEMEC Light Blue.

### **3.5 SERVICE**

- A. Cover out-of-service hydrants with black plastic bags. Bags shall remain on the hydrant until the hydrant passes inspection and is placed in service.

### **3.6 HYDRANT OPERATION**

- A. Following installation, no person shall operate a Skagit PUD fire hydrant without first obtaining a hydrant Operating Permit. Operate a Skagit PUD hydrants with an auxiliary gate valve, meter, and double check backflow device attached and secured to the hydrant.

**END OF SECTION**

**SECTION 16000**  
**ELECTRICAL - BASIC REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Basic requirements for electrical systems.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. Aluminum Association (AA):
    - a. ADM, Aluminum Design Manual.
  2. American Institute of Steel Construction (AISC):
    - a. Steel Construction Manual.
  3. American National Standards Institute (ANSI).
  4. ASTM International (ASTM):
    - a. A36/A36M, Standard Specification for Carbon Structural Steel.
    - b. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - c. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C2, National Electrical Safety Code (NESC).
  6. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  7. National Electrical Manufacturers Association (NEMA):
  8. Underwriters Laboratories, Inc. (UL).
- B. Products to be listed by a Nationally Recognized Testing Laboratory (NRTL) in accordance with applicable product standards.
1. Applicable product standards including, but not limited to, ANSI, FM, IEEE, NEMA and UL.
  2. NRTL includes, but is not limited to, CSA Group Testing and Certification (CS), FM Approvals LLC (FM), Intertek Testing Services NA, Inc. (ETL), and Underwriters Laboratories, Inc. (UL).

**1.3 DEFINITIONS**

- A. For the purposes of providing materials and installing electrical work the following definitions shall be used.
1. Outdoor area: Exterior locations where the equipment is normally exposed to the weather and including below grade structures, such as vaults, manholes, handholes and in-ground pump stations.
  2. Architecturally finished interior area: Offices, laboratories, conference rooms, restrooms, corridors and other similar occupied spaces.
  3. Non-architecturally finished interior area: Pump, chemical, mechanical, electrical rooms and other similar process type rooms.
  4. Highly corrosive and corrosive area: Areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
  5. Hazardous areas: Class I, II or III areas as defined in NFPA 70.

- 6. Shop fabricated: Manufactured or assembled equipment for which a UL test procedure has not been established.

**1.4 SYSTEM DESCRIPTION**

- A. Single Electrical Subcontractor
  - 1. Furnish and coordinate electrical system through a single electrical system subcontractor.
- B. The electrical subcontractor shall be responsible for functional operation, supervision of installation, final connections, programming and settings of intelligent electronic devices included in electrical panels, preparation of Drawings and Operation and Maintenance Manuals, start-up, training, demonstration of substantial completion and all other aspects of the electrical system.
- C. Ensure coordination of electrical system with other work to ensure that necessary power panelboards, transformers, wiring, conduits, contacts, relays, converters, and incidentals are provided in order to power, transmit, receive, and control signals for the equipment and devices in this Contract.
- D. Prior to Shop Drawing preparation, the Electrical Subcontractor shall inspect the existing equipment and as-constructed electrical documentation so as to be able to fully coordinate the interface of new and existing electrical system, instrumentation and controls.
- E. All costs associated with this Work shall be incorporated into the original bid.
- F. Although such Work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure, complete and compatible installation.
- G. Coordinate installation of the service transformer and metering with the serving utility.
  - 1. The serving utility for this Project is Puget Sound Energy.
  - 2. Contractor shall comply with utility standards.
  - 3. Contractor shall prepare service application for new electric service and coordinate installation with utility.
    - a. Location of transformer and meter shall be coordinated with utility prior to installation.
  - 4. Furnish and install components as noted in the table below and as required by utility.
    - a. Beaver Lake Rd 120/240 V single phase 100A 3 wire electrical service:

Item	Furnish	Install
Pole Mounted Transformer	Utility	Utility
Connection at Transformer	Utility	Utility
Secondary Service Box (SSB)	Contractor	Contractor
Secondary Cable	Contractor	Contractor
Secondary Conduit	Contractor	Contractor
Trenching/Backfill for Secondary Circuit and SSB	Contractor	Contractor
Meter Base with Bypass and Socket (Rack Mounted)	Contractor	Contractor
Meter	Utility	Utility

- b. Submit Meter Base with Bypass and Socket to the serving utility company and obtain approval prior to ordering equipment.
      - c. Furnish and install all electrical system components shown on drawings, unless specifically stated otherwise.
- 5. Under no circumstances shall equipment be taken out of service without the Owner's permission.
- 6. Comply with requirements of Specification Section 01060.

- H. During construction locate all underground electrical within the construction work zone and protect it from damage.

## **1.5 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. See individual specification sections for submittal requirements for products defined as equipment.
  - 2. General requirements:
    - a. Provide manufacturer's technical information on products to be used, including product descriptive bulletin.
    - b. Include data sheets that include manufacturer's name and product model number.
      - 1) Clearly identify all optional accessories.
    - c. Acknowledgement that products are NRTL listed or are constructed utilizing NRTL recognized components.
    - d. Manufacturer's delivery, storage, handling and installation instructions.
    - e. Product installation details.
    - f. Short Circuit Current Rating (SCCR) nameplate marking per NFPA 70, include any required calculations.
    - g. See individual specification sections for any additional requirements.
  - 3. Fabrication and/or layout drawings:
    - a. Concrete and reinforcing steel, per Division 03 requirements.
- C. Operation and Maintenance Manuals:
  - 1. See Specification Section 01730 for requirements for:
    - a. The content process of Operation and Maintenance Manuals.
- D. When a Specification Section includes products specified in another Specification Section, each Specification Section shall have the required Shop Drawing transmittal form per Specification Section 01300 and all Specification Sections shall be submitted simultaneously.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. See Division 01 Specifications.
- B. Protect nameplates on electrical equipment to prevent defacing.

## **1.7 AREA DESIGNATIONS**

- A. Designation of an area will determine the NEMA rating of the electrical equipment enclosures, types of conduits and installation methods to be used in that area.
  - 1. Outdoor areas:
    - a. Wet.
    - b. Also, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.
  - 2. Indoor areas:
    - a. Dry.
    - b. Also, wet, corrosive and/or hazardous when specifically designated on the Drawings or in the Specifications.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, refer to specific Electrical Specification Sections and specific material paragraphs below for acceptable manufacturers.
- B. Provide all components of a similar type by one (1) manufacturer.

## 2.2 MATERIALS

- A. Electrical Equipment Support Pedestals and/or Racks:
  - 1. Manufacturers:
    - a. Modular strut:
      - 1) Unistrut Building Systems.
      - 2) B-Line by Eaton.
      - 3) Globe Strut.
      - 4) Superstrut by Thomas & Betts.
      - 5) Approved Equal.
  - 2. Material requirements:
    - a. Modular strut:
      - 1) Galvanized steel: ASTM A123/123M or ASTM A153/A153M.
      - 2) Stainless steel: AISI Type 316.
      - 3) PVC coated galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 MIL PVC coating.
      - 4) Aluminum: AA Type 6063-T6.
    - b. Structural members (e.g., I beams, L and C channels):
      - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
      - 2) Aluminum: AA Type 6061-T6 or 6063-T6.
    - c. Mounting plates:
      - 1) Galvanized steel: ASTM A36/A36M steel with galvanizing per ASTM A123/A123M.
      - 2) Aluminum: AA Type 6063-T6.
    - d. Mounting hardware:
      - 1) Galvanized steel.
      - 2) Stainless steel.
    - e. Concrete and reinforcing steel: See Division 03 specifications.
- B. Equipment pads (interior and exterior):
  - 1. Concrete and reinforcing steel: See Division 03 specifications.
- C. Field touch-up of galvanized surfaces.
  - 1. Zinc-rich primer.
    - a. One coat, 3.0 MILS, ZRC by ZRC Products.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install and wire all equipment, including prepurchased equipment, and perform all tests necessary to assure conformance to the Drawings and Specification Sections and ensure that equipment is ready and safe for energization.
- B. Install equipment in accordance with the requirements of:
  - 1. NFPA 70.
  - 2. IEEE C2.
  - 3. The manufacturer's instructions.
- C. In general, conduit routing is not shown on the Drawings.
  - 1. The Contractor is responsible for routing all conduits including those shown on one-line and control block diagrams and home runs shown on floor plans.
  - 2. Conduit routings and stub-up locations that are shown are approximate; exact routing to be as required for equipment furnished and field conditions.
- D. When complete branch circuiting is not shown on the Drawings:

1. A homerun indicating panelboard name and circuit number will be shown and the circuit number will be shown adjacent to the additional devices (e.g., light fixture and receptacles) on the same circuit.
  2. The Contractor is to furnish and install all conduit and conductors required for proper operation of the circuit.
  3. The indicated home run conduit and conductor size shall be used for the entire branch circuit.
  4. See Specification Section 16120 for combining multiple branch circuits in a common conduit.
- E. Do not use equipment that exceed dimensions or reduce clearances indicated on the Drawings or as required by the NFPA 70.
- F. Install equipment plumb, square and true with construction features and securely fastened.
- G. Install electrical equipment, including pull and junction boxes, minimum of 6 IN from process, gas, air and water piping and equipment.
- H. Install equipment so it is readily accessible for operation and maintenance, is not blocked or concealed and does not interfere with normal operation and maintenance requirements of other equipment.
- I. Device Mounting Schedule:
1. Unless indicated otherwise on the Drawings, mounting heights are as indicated below:
    - a. Panelboard (to top): 72 IN.
- J. Avoid interference of electrical equipment operation and maintenance with structural members, building features and equipment of other trades.
1. When it is necessary to adjust the intended location of electrical equipment, unless specifically dimensioned or detailed, the Contractor may make adjustments of up to 6 IN in equipment location with the Engineer's approval.
- K. Provide electrical equipment support system per the following area designations:
1. Dry areas:
    - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
    - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
  2. Wet areas:
    - a. Galvanized system consisting of galvanized steel channels and fittings, nuts and hardware.
    - b. Field touch-up cut ends and scratches of galvanized components with the specified primer during the installation, before rust appears.
- L. Provide all necessary anchoring devices and supports rated for the equipment load based on dimensions and weights verified from approved submittals, or as recommended by the manufacturer.
1. See Division 03 Specifications.
  2. Do not cut, or weld to, building structural members.
  3. Do not mount safety switches or other equipment to equipment enclosures, unless enclosure mounting surface is properly braced to accept mounting of external equipment.
- M. Provide non-metallic corrosion resistant spacers to maintain 1/4 IN separation between metallic equipment and/or metallic equipment supports and mounting surface in wet areas, on below grade walls and on walls of liquid containment or processing areas such as Basins, Clarifiers, Digesters, Reservoirs, etc.
- N. Do not place equipment fabricated from aluminum in direct contact with earth or concrete.

#### ELECTRICAL - BASIC REQUIREMENTS

- O. Screen or seal all openings into equipment mounted outdoors to prevent the entrance of rodents and insects.
- P. Do not use materials that may cause the walls or roof of a building to discolor or rust.
- Q. Provide field markings and/or documentation of available short-circuit current (available fault current) and related information for equipment as required by the NFPA 70 and other applicable codes.
- R. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
  - 1. Determine the SCCR rating by one of the following methods:
    - a. Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
    - b. Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
    - c. Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
  - 2. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the equipment or control panel circuit originates.
  - 3. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.

### **3.2 FIELD QUALITY CONTROL**

- A. Verify exact rough-in location and dimensions for connection to electrified equipment, provided by others.
  - 1. See Division 01 Specifications for openings and penetrations in structures.
- B. Replace equipment and systems found inoperative or defective and re-test.
- C. The protective coating integrity of support structures and equipment enclosures shall be maintained.
  - 1. Repair galvanized components utilizing a zinc rich paint.
  - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
  - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the component.
  - 4. Repair surfaces which will be inaccessible after installation prior to installation.
  - 5. See Specification Section 16110 for requirements for conduits and associated accessories.
- D. Replace nameplates damaged during installation.

### **3.3 DEMONSTRATION**

- A. Demonstrate equipment in accordance with Division 01 Specifications.

**END OF SECTION**

**SECTION 16110**  
**RACEWAYS AND BOXES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Material and installation requirements for:
    - a. Conduits.
    - b. Conduit fittings.
    - c. Conduit supports.
    - d. Pull and junction boxes.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. Aluminum Association (AA).
  2. American Iron and Steel Institute (AISI).
  3. ASTM International (ASTM):
    - a. A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    - b. A153/A153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    - c. D2564, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
  4. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. RN 1, Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
    - c. TC 2, Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
    - d. TC 3, Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing.
    - e. TC 14.AG, Aboveground Reinforced Thermosetting Resin Conduit and Fittings.
    - f. TC 14.BG, Belowground Reinforced Thermosetting Resin Conduit and Fittings.
  5. National Electrical Manufacturers Association/American National Standards Institute (NEMA/ANSI):
    - a. C80.1, Electric Rigid Steel Conduit (ERSC).
    - b. C80.3, Steel Electrical Metallic Tubing (EMT).
    - c. C80.5, Electrical Aluminum Rigid Conduit (ERAC).
    - d. OS 1, Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
  6. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  7. Underwriters Laboratories, Inc. (UL):
    - a. 1, Standard for Flexible Metal Conduit.
    - b. 6, Electrical Rigid Metal Conduit - Steel.
    - c. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
    - d. 360, Standard for Liquid-Tight Flexible Metal Conduit.
    - e. 467, Grounding and Bonding Equipment.
    - f. 514A, Metallic Outlet Boxes.
    - g. 514B, Conduit, Tubing, and Cable Fittings.
    - h. 651, Standard for Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings.
    - i. 797, Electrical Metallic Tubing - Steel.
    - j. 870, Standard for Wireways, Auxiliary Gutters, and Associated Fittings.

- k. 1203, Standard for Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations. 2420, Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
- l. 2515, Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.

### **1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Conduit fittings.
      - 2) Support systems.
    - b. See Specification Section 16000 for additional requirements.
  - 2. Fabrication and/or layout drawings:
    - a. Identify dimensional size of pull and junction boxes to be used.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. See Specification Section 16000.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Rigid metal conduits:
    - a. Allied Tube and Conduit.
    - b. Western Tube and Conduit Corporation.
    - c. Wheatland Tube.
    - d. Approved Equal.
  - 2. PVC coated rigid metal conduits:
    - a. Ocal by Thomas & Betts.
    - b. Robroy Industries.
  - 3. Approved Equal. Rigid nonmetallic conduit:
    - a. Prime Conduit.
    - b. Cantex, Inc.
    - c. Osburn Associates, Inc.
    - d. Champion Fiberglass, Inc.
    - e. United Fiberglass of America, Inc.
    - f. Approved Equal.
  - 4. Flexible conduit:
    - a. AFC Cable Systems.
    - b. Anamet, Inc.
    - c. Electri-Flex Company.
    - d. Southwire Company, LLC.
    - e. Approved Equal.
  - 5. Conduit fittings and accessories:
    - a. Appleton by Emerson Electric Co.
    - b. Crouse-Hinds by Eaton.
    - c. Thomas & Betts.
    - d. Approved Equal.
  - 6. Support systems:
    - a. Unistrut by Atkore International, Inc.
    - b. B-Line by Eaton.

## **RACEWAYS AND BOXES**

- c. Superstrut by Thomas & Betts.
- d. Approved Equal.
- 7. Outlet, pull and junction boxes:
  - a. Appleton by Emerson Electric Co.
  - b. Crouse-Hinds by Eaton
  - c. Steel City by Thomas & Betts.
  - d. Hoffman Engineering.
  - e. Approved Equal.

## 2.2 RIGID METAL CONDUITS

- A. Rigid Galvanized Steel Conduit (RGS):
  - 1. Mild steel with continuous welded seam.
  - 2. Metallic zinc applied by hot-dip galvanizing or electro-galvanizing.
  - 3. Threads galvanized after cutting.
  - 4. Internal coating: Baked lacquer, varnish or enamel for a smooth surface.
  - 5. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6.
- B. PVC-Coated Rigid Steel Conduit (PVC-RGS):
  - 1. Nominal 40 MIL Polyvinyl Chloride Exterior Coating:
    - a. Coating: Bonded to hot-dipped galvanized rigid steel conduit conforming to NEMA/ANSI C80.1.
    - b. The bond between the PVC coating and the conduit surface: Greater than the tensile strength of the coating.
  - 2. Nominal 2 mil, minimum, urethane interior coating.
  - 3. Urethane coating on threads.
  - 4. Conduit: Epoxy prime coated prior to application of PVC and urethane coatings.
  - 5. Female Ends:
    - a. Have a plastic sleeve extending a minimum of one pipe diameter or 2 IN, whichever is less beyond the opening.
    - b. The inside diameter of the sleeve shall be the same as the outside diameter of the conduit to be used with it.
  - 6. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.1, UL 6, NEMA RN 1.
- C. Rigid Aluminum Conduit (RAC):
  - 1. AA Type 6063 aluminum alloy, T-1 temper.
  - 2. Maximum copper content of 0.10 PCT.
  - 3. Extruded, seamless.
  - 4. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.

## 2.3 RIGID NONMETALLIC CONDUIT

- A. Schedules 40 (PVC-40) and 80 (PVC-80):
  - 1. Polyvinyl-chloride (PVC) plastic compound which includes inert modifiers to improve weatherability and heat distribution.
  - 2. Rated for direct sunlight exposure.
  - 3. Fire retardant and low smoke emission.
  - 4. Shall be suitable for use with 90 DEGC wire and shall be marked "maximum 90 DEGC".
  - 5. Standards: NFPA 70 Type PVC, NEMA TC 2, UL 651.
- B. HDPE – Duraliner SDR 9 or equivalent for Horizontal Directional Drilling segment:
  - 1. Smooth wall
  - 2. Orange in color
  - 3. Preinstalled locatable tape
  - 4. Procured to allow for a maximum of three field welds
- C. Fiberglass:
  - 1. Epoxy based resin system using an anhydride curing agent.
  - 2. Continuous E-glass roving.

3. Winding angle approximately 54.75 DEG.
4. Smooth internal walls with all fibers imbedded in the epoxy.
5. Above grade rated: Halogen free additive for flame spread and smoke control.
6. Ultraviolet inhibitor: Carbon black.
7. Two-step curing process.
8. Tensile strength: 11,000 PSI per ASTM D2105.
9. Dimensions: Iron Pipe Size (IPS).
10. Wall thickness:
  - a. Standard: 3/4 IN to 4 IN nominal size.
  - b. Medium: 5 IN to 6 IN nominal size.
  - c. Extra Heavy for "bullet proof" and Class 1, Division 2 areas: 3/4 IN to 6 IN nominal size.
11. Integral bell and spigot.
12. Conduits and fittings to be joined with an interference joint and epoxy adhesive creating a concrete and water tight connection.
13. Standard: NFPA 70 Type RTRC, NEMA TC14.AG, NEMA TC14.BG, UL 2420, UL 2415.

## **2.4 FLEXIBLE CONDUIT**

- A. Flexible Galvanized Steel Conduit (FLEX):
  1. Formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
  2. Standard: NFPA 70 Type FMC, UL 1.
- B. PVC-Coated Flexible Galvanized Steel (liquid-tight) Conduit (FLEX-LT):
  1. Core formed of continuous, spiral wound, hot-dip galvanized steel strip with successive convolutions securely interlocked.
  2. Extruded PVC outer jacket positively locked to the steel core.
  3. Liquid and vaportight.
  4. Standard: NFPA 70 Type LFMC, UL 360.

## **2.5 CONDUIT FITTINGS AND ACCESSORIES**

- A. Fittings for Use with RGS:
  1. General:
    - a. In hazardous locations listed for use in Class I, Groups C and D locations.
  2. Locknuts:
    - a. Threaded steel or malleable iron.
    - b. Gasketed or non-gasketed.
    - c. Grounding or non-grounding type.
  3. Bushings:
    - a. Threaded, insulated metallic.
    - b. Grounding or non-grounding type.
  4. Hubs: Threaded, insulated and gasketed metallic for raintight connection.
  5. Couplings:
    - a. Threaded straight type: Same material and finish as the conduit with which they are used on.
    - b. Threadless type: Gland compression or self-threading type, concrete tight.
  6. Unions: Threaded galvanized steel or zinc plated malleable iron.
  7. Conduit bodies (ells and tees):
    - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
    - b. Standard and mogul size.
    - c. Cover:
      - 1) Clip-on type with stainless steel screws.
      - 2) Gasketed or non-gasketed galvanized steel, zinc plated cast iron or cast copper free aluminum.
  8. Conduit bodies (round):

- a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
- b. Cover: Threaded screw on type, gasketed, galvanized steel, zinc plated cast iron or cast copper free aluminum.
- 9. Sealing fittings:
  - a. Body: Zinc plated cast iron or cast copper free aluminum with threaded hubs.
  - b. Standard and mogul size.
  - c. With or without drain and breather.
  - d. Fiber and sealing compound: UL listed for use with the sealing fitting.
- 10. Service entrance head:
  - a. Malleable iron, galvanized steel or copper free aluminum.
  - b. Insulated knockout cover for use with a variety of sizes and number of conductors.
- 11. Expansion couplings:
  - a. 2 IN nominal straight-line conduit movement in either direction.
  - b. Galvanized steel with insulated bushing.
  - c. Gasketed for wet locations.
  - d. Internally or externally grounded.
- 12. Expansion/deflection couplings:
  - a. 3/4 IN nominal straight-line conduit movement in either direction.
  - b. 30 DEG nominal deflection from the normal in all directions.
  - c. Metallic hubs, neoprene outer jacket and stainless steel jacket clamps.
  - d. Internally or externally grounded.
  - e. Watertight, raintight and concrete tight.
- 13. Standards: UL 467, UL 514B, UL 1203.
- B. Fittings for Use with PVC-RGS:
  - 1. The same material and construction as those fittings listed under paragraph "Fittings for Use with RGS" and coated as defined under paragraph "PVC Coated Rigid Steel Conduit (PVC-RGS)."
- C. Fittings for Use with FLEX:
  - 1. Connector:
    - a. Zinc plated malleable iron.
    - b. Squeeze or clamp-type.
  - 2. Standard: UL 514B.
- D. Fittings for Use with FLEX-LT:
  - 1. Connector:
    - a. Straight or angle type.
    - b. Metal construction, insulated and gasketed.
    - c. Composed of locknut, grounding ferrule and gland compression nut.
    - d. Liquid tight.
  - 2. Standards: UL 467, UL 514B.
- E. Fittings for Use with Rigid Nonmetallic PVC Conduit:
  - 1. Coupling, adapters and conduit bodies:
    - a. Same material, thickness, and construction as the conduits with which they are used.
    - b. Homogeneous plastic free from visible cracks, holes or foreign inclusions.
    - c. Bore smooth and free of blisters, nicks or other imperfections which could damage the conductor.
  - 2. Solvent cement for welding fittings shall be supplied by the same manufacturer as the conduit and fittings.
  - 3. Standards: ASTM D2564, NEMA TC 3, UL 651, UL 514B.
- F. Fittings for Use with Rigid Nonmetallic Fiberglass Conduit:
  - 1. Coupling and adapters shall be of the same material, thickness, and construction as the conduit.

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2. Epoxy adhesive for joining conduits and fittings shall be supplied by the same manufacturer as the conduit and fittings and shall provide a concrete and water tight connection.
3. Standard: NFPA 70 Type RTRC, NEMA TC14.AG, NEMA TC14.BG, UL 2420, UL 2415.

G. Weather and Corrosion Protection Tape:

1. PVC based tape, 10 mils thick.
2. Protection against moisture, acids, alkalis, salts and sewage and suitable for direct bury.
3. Used with appropriate pipe primer.

**2.6 ALL RACEWAY AND FITTINGS**

A. Mark Products:

1. Identify the nominal trade size on the product.
2. Stamp with the name or trademark of the manufacturer.

**2.7 PULL AND JUNCTION BOXES**

A. NEMA 4 Rated:

1. Body and cover: 14 GA steel finished with rust inhibiting primer and manufacturers standard paint inside and out.
2. Seams continuously welded and ground smooth.
3. No knockouts.
4. External mounting flanges.
5. Hinged or non-hinged cover held closed with stainless steel screws and clamps.
6. Cover with oil resistant gasket.

B. Miscellaneous Accessories:

1. Rigid handles for covers larger than 9 SQFT or heavier than 25 LBS.
2. Split covers when heavier than 25 LBS.
3. Weldnuts for mounting optional panels and terminal kits.
4. Terminal blocks: Screw-post barrier-type, rated 600 volt and 20 ampere minimum.

C. Standards: NEMA 250, UL 50.

**2.8 SUPPORT SYSTEMS**

A. Multi-conduit Surface or Trapeze Type Support and Pull or Junction Box Supports:

1. Material requirements.
  - a. Galvanized steel: ASTM A123/A123M or ASTM A153/A153M.
  - b. Stainless steel: AISI Type 316.
  - c. PVC coat galvanized steel: ASTM A123/A123M or ASTM A153/A153M and 20 MIL PVC coating.

B. Single Conduit and Outlet Box Support Fasteners:

1. Material requirements:
  - a. Zinc plated steel.
  - b. Stainless steel.
  - c. Malleable iron.
  - d. PVC coat malleable iron or steel: 20 MIL PVC coating.
  - e. Steel protected with zinc phosphate and oil finish.

**2.9 OPENINGS AND PENETRATIONS IN WALLS AND FLOORS**

A. Sleeves, smoke and fire stop fitting through walls and floors:

1. See Division 01 Specifications.

**PART 3 - EXECUTION**

**3.1 RACEWAY INSTALLATION – GENERAL**

- A. All raceways and appurtenances to be installed by a licensed Electrician.

- B. Shall be in accordance with the requirements of:
  - 1. NFPA 70.
  - 2. Manufacturer instructions.
- C. Size of Raceways:
  - 1. Raceway sizes are shown on the Drawings, if not shown on the Drawings, then size in accordance with NFPA 70.
  - 2. Unless specifically indicated otherwise, the minimum raceway size shall be:
    - a. Conduit: 1 IN.
    - b. Wireway: 2-1/2 IN x 2-1/2 IN.
- D. Field Bending and Cutting of Conduits:
  - 1. Utilize tools and equipment recommended by the manufacturer of the conduit, designed for the purpose and the conduit material to make all field bends and cuts.
  - 2. Do not reduce the internal diameter of the conduit when making conduit bends.
  - 3. Prepare tools and equipment to prevent damage to the PVC coating.
  - 4. Degrease threads after threading and apply a zinc rich paint.
  - 5. Debur interior and exterior after cutting.
- E. Male threads of conduit systems shall be coated with an electrically conductive anti-seize compound.
- F. The protective coating integrity of conduits, fittings, outlet, pull and junction boxes and accessories shall be maintained.
  - 1. Repair galvanized components utilizing a zinc rich paint.
  - 2. Repair painted components utilizing touch up paint provided by or approved by the manufacturer.
  - 3. Repair PVC coated components utilizing a patching compound, of the same material as the coating, provided by the manufacturer of the conduit; or a self-adhesive, highly conformable, cross-linked silicone composition strip, followed by a protective coating of vinyl tape.
    - a. Total nominal thickness: 40 MIL.
  - 4. Repair surfaces which will be inaccessible after installation prior to installation.
- G. Remove moisture and debris from conduit before pull rope is pulled into place.
  - 1. Pull mandrel with diameter nominally 1/4 IN smaller than the interior of the conduit, to remove obstructions.
  - 2. Swab conduit by pulling a clean, tight-fitting rag through the conduit.
  - 3. Tightly plug ends of conduit with tapered wood plugs or plastic inserts until wire is pulled.
- H. Only nylon or polyethylene rope shall be installed between pull boxes as part of this contract. This will be used to pull in fiber optic cable along the conduit system in the future.
- I. Where portions of a raceway are subject to different temperatures and where condensation is known to be a problem, as in cold storage areas of buildings or where passing from the interior to the exterior of a building, the raceway shall be sealed to prevent circulation of warm air to colder section of the raceway.
- J. Fill openings in walls, floors, and ceilings and finish flush with surface.
  - 1. See Division 01 Specifications.

### **3.2 RACEWAY ROUTING**

- A. Raceways shall be routed in the field unless otherwise indicated.
  - 1. Conduit and fittings shall be installed, as required, for a complete system that has a neat appearance and is in compliance with all applicable codes.
  - 2. Run in straight lines parallel to or at right angles to building lines.
  - 3. Do not route conduits:
    - a. Through areas of high ambient temperature or radiant heat.
    - b. In suspended concrete slabs.

### **RACEWAYS AND BOXES**

- c. In concrete members including slabs, slabs on grade, beams, walls, and columns unless specifically located and detailed on structural Drawings.
  - 4. Locate sleeves or conduits penetrating floors, walls, and beams so as not to significantly impair the strength of the construction. Do not place conduit penetrations in columns.
  - 5. Conduit shall not interfere with, or prevent access to, piping, valves, ductwork, or other equipment for operation, maintenance and repair.
  - 6. Provide pull boxes or conduit bodies as needed so that there is a maximum of 360 DEG of bends in the conduit run or in long straight runs to limit pulling tensions.
- B. All conduits within a structure shall be installed exposed except as follows:
  - 1. As indicated on the Drawings.
  - 2. Concealed above gypsum wall board or acoustical tile suspended ceilings.
  - 3. Conduits in architecturally finished areas shall be concealed.
- C. Maintain minimum spacing between parallel conduit and piping runs in accordance with the following when the runs are greater than 30 FT:
  - 1. Between instrumentation and telecommunication: 1 IN.
  - 2. Between instrumentation and 125 V, 48 V and 24 VDC, 2 IN.
  - 3. Between instrumentation and 600 V and less AC power or control: 6 IN.
  - 4. Between instrumentation and greater than 600 VAC power: 12 IN.
  - 5. Between telecommunication and 125 V, 48 V and 24 VDC, 2 IN.
  - 6. Between telecommunication and 600 V and less AC power or control: 6 IN.
  - 7. Between telecommunication and greater than 600 VAC power: 12 IN.
  - 8. Between 125 V, 48 V and 24 VDC and 600 V and less AC power or control: 2 IN.
  - 9. Between 125 V, 48 V and 24 VDC and greater than 600 VAC power: 2 IN.
  - 10. Between 600 V and less AC and greater than 600 VAC: 2 IN.
  - 11. Between process, gas, air and water pipes: 6 IN.
- D. Conduits shall be installed to eliminate moisture pockets.
  - 1. Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.
- E. Conduit shall not be routed on the exterior of structures except as specifically indicated on the Drawings.
- F. Where sufficient room exists within the housing of roof-mounted equipment, the conduit shall be stubbed up inside the housing.

### 3.3 RACEWAY APPLICATIONS

- A. Permitted Raceway Types Per Wire or Cable Types:
  - 1. Power wire or cables: All raceway types.
  - 2. Control wire or cables: All raceway types.
  - 3. Instrumentation cables: Metallic raceway except nonmetallic may be used underground.
  - 4. Telecommunication cables: All raceway types.
- B. Permitted Raceway Types Per Area Designations:
  - 1. Dry areas:
    - a. RGS.
  - 2. Wet areas:
    - a. RGS.
  - 3. All bends:
    - a. Long sweeping bends only
    - b. Fiberglass only for all non-metallic conduit
    - c. Bends between each pull vault/box shall not exceed 270 degrees unless approved by the owner.
- C. Permitted Raceway Types Per Routing Locations:
  - 1. In stud framed walls:

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- a. EMT.
  - 2. In concrete block or brick walls:
    - a. PVC-40.
  - 3. Above acoustical tile ceilings:
    - a. EMT.
    - b. NEMA 1 rated wireway.
  - 4. Embedded in poured concrete walls and floors:
    - a. PVC-40.
    - b. PVC-RGS when emerging from concrete into areas designated as wet, corrosive or highly corrosive.
    - c. Fiberglass (above or below grade rated).
  - 5. Beneath floor slab-on-grade:
    - a. PVC-40.
    - b. Fiberglass (above or below grade rated).
  - 6. Through floor penetrations, see Division 01 Specifications:
    - a. Fiberglass (above grade rated) in areas designated as wet, corrosive or highly corrosive.
    - b. PVC-RGS in areas designated as wet, corrosive or highly corrosive.
  - 7. Direct buried conduits and ductbanks:
    - a. PVC-40.
    - b. At road crossings:
      - 1) PVC-80.
    - c. Fiberglass (above or below grade rated).
  - 8. Concrete encased ductbanks:
    - a. PVC-40.
- D. FLEX-LT conduits shall be install as the final conduit connection to light fixtures, dry type transformers, motors, electrically operated valves, instrumentation primary elements, and other electrical equipment that is liable to vibrate.
- 1. The maximum length shall not exceed:
    - a. 6 FT to light fixtures.
    - b. 3 FT to motors.
    - c. 2 FT to all other equipment.
- E. Underground Conduit: See Specification Section 16111.

### **3.4 CONDUIT FITTINGS AND ACCESSORIES**

- A. Conduit Seals:
- 1. Installed in conduit systems located in hazardous areas as required by the NFPA 70.
  - 2. Fill plug and drain shall be accessible.
  - 3. Pour the conduit seals in a two-step process.
    - a. Pour the seal and leave cover off.
    - b. After seal is dry, inspect for proper sealing, install cover and mark (for example, paint or permanent marker) as complete.
- B. Rigid nonmetallic conduit and fittings shall be joined utilizing solvent cement.
- 1. Immediately after installation of conduit and fitting, the fitting or conduit shall be rotated 1/4 turn to provide uniform contact.
- C. Install Expansion Fittings:
- 1. Where conduits are exposed to the sun and conduit run is greater than 200 FT.
  - 2. Elsewhere as identified on the Drawings.
- D. Install Expansion/Deflection Fittings:
- 1. Where conduits enter a structure.
    - a. Except electrical manholes and handholes.
    - b. Except where the ductbank is tied to the structure with rebar.
  - 2. Where conduits span structural expansions joints.

## RACEWAYS AND BOXES

3. Elsewhere as identified on the Drawings.
- E. Threaded connections shall be made wrench-tight.
- F. Conduit joints shall be watertight:
  1. Where subjected to possible submersion.
  2. In areas classified as wet.
  3. Underground.
- G. Terminate Conduits:
  1. In metallic outlet boxes:
    - a. RGS:
      - 1) Conduit hub and locknut.
      - 2) Insulated bushing and two locknuts.
      - 3) Use grounding type locknut or bushing when required by NFPA 70.
  2. In NEMA 4 and NEMA 4X rated enclosures:
    - a. Watertight, insulated and gasketed hub and locknut.
  3. When stubbed up through the floor into floor mount equipment:
    - a. With an insulated grounding bushing on metallic conduits.
    - b. With end bells on nonmetallic conduits.
- H. Threadless couplings shall only be used to join new conduit to existing conduit when the existing conduit end is not threaded and it is not practical or possible to cut threads on the existing conduit with a pipe threader.

### 3.5 CONDUIT SUPPORT

- A. Permitted multi-conduit surface or trapeze type support system per area designations and conduit types:
  1. Dry or wet:
    - a. Galvanized system consisting of: Galvanized steel channels and fittings, nuts and hardware and conduit clamps.
  2. Conduit type shall be compatible with the support system material.
    - a. Galvanized steel system may be used with RGS.
    - b. Stainless steel system may be used with RGS.
    - c. PVC coated galvanized steel system may be used with PVC-RGS, PVC-40, PVC-80 and Fiberglass.
    - d. Fiberglass system may be used with PVC-40 and PVC-80, PVC-RGS and Fiberglass.
- B. Permitted single conduit support fasteners per area designations and conduit types:
  1. Architecturally finished areas:
    - a. Material: Zinc plated steel, or steel protected with zinc phosphate and oil finish.
    - b. Types of fasteners: Spring type hangers and clips, straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
    - c. Provide anti-rattle conduit supports when conduits are routed through metal studs.
  2. Dry or wet:
    - a. Material: Zinc plated steel, stainless steel and malleable iron.
    - b. Types of fasteners: Straps, hangers with bolts, clamps with bolts and bolt on beam clamps.
  3. Conduit type shall be compatible with the support fastener material.
    - a. Zinc plated steel, steel protected with zinc phosphate and oil finish and malleable iron fasteners may be used with RGS.
    - b. Stainless steel system may be used with RGS.
    - c. PVC coated fasteners may be used with PVC-RGS, PVC-40 and PVC-80.
    - d. Nonmetallic fasteners may be used with PVC-40, PVC-80 and fiberglass.
- C. Conduit Support General Requirements:
  1. Maximum spacing between conduit supports per NFPA 70.
  2. Support conduit from the building structure.

3. Do not support conduit from process, gas, air or water piping; or from other conduits.
4. Provide hangers and brackets to limit the maximum uniform load on a single support to 25 LBS or to the maximum uniform load recommended by the manufacturer if the support is rated less than 25 LBS.
  - a. Do not exceed maximum concentrated load recommended by the manufacturer on any support.
  - b. Conduit hangers:
    - 1) Continuous threaded rods combined with struts or conduit clamps: Do not use perforated strap hangers and iron bailing wire.
  - c. Do not use suspended ceiling support systems to support raceways.
  - d. Hangers in metal roof decks:
    - 1) Utilize fender washers.
    - 2) Not extend above top of ribs.
    - 3) Not interfere with vapor barrier, insulation, or roofing.
5. Conduit support system fasteners:
  - a. Use sleeve-type expansion anchors as fasteners in masonry wall construction.
  - b. Do not use concrete nails and powder-driven fasteners.

### **3.6 OUTLET, PULL AND JUNCTION BOX INSTALLATION**

#### **A. General:**

1. Install products in accordance with manufacturer's instructions.
2. See Specification Section 16000 and the Drawings for area classifications.
3. Fill unused punched-out, tapped, or threaded hub openings with insert plugs.
4. Size boxes to accommodate quantity of conductors enclosed and quantity of conduits connected to the box.

#### **B. Pull and Junction Boxes:**

1. Install pull or junction boxes in conduit runs where indicated or required to facilitate pulling of wires or making connections.
  - a. Make covers of boxes accessible.
2. Permitted uses of NEMA 4 enclosure:
  - a. Pull or junction box surface mounted in areas designated as wet.

### **END OF SECTION**

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**SECTION 16111**  
**ELECTRICAL: EXTERIOR UNDERGROUND**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Material and installation requirements for:
    - a. Handhole.
    - b. Underground conduits and ductbanks.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Association of State Highway and Transportation Officials (AASHTO):
    - a. HB-17, Standard Specifications for Highway Bridges.
  - 2. ASTM International (ASTM):
    - a. A536, Standard Specification for Ductile Iron Castings.
  - 3. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  - 4. Society of Cable Telecommunications Engineers (SCTE):
    - a. 77, Specifications for Underground Enclosure Integrity.

**1.3 DEFINITIONS**

- A. Direct-Buried Conduit(s):
  - 1. Individual (single) underground conduit.
  - 2. Multiple underground conduits, arranged in one or more planes, in a common trench.

**1.4 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
  - 2. Fabrication and/or layout drawings:
    - a. Provide dimensional drawings of each handhole indicating all specified accessories and conduit entry locations.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Prefabricated composite handholes:
    - a. Armorcast Products Company.
    - b. Quazite by Hubbell.
    - c. Synertech by Oldcastle Enclosure Solutions.
    - d. Approved Equal.
  - 2. Precast handholes:
    - a. Lister Industries Ltd.
    - b. Oldcastle Enclosure Solutions.
    - c. Jensen Precast and Utility Concrete Products.

- d. Approved Equal.
- 3. Handhole and ductbank accessories:
  - a. Cantex, Inc.
  - b. Condux International, Inc.
  - c. Neenah Enterprises, Inc.
  - d. Prime Conduit.
  - e. Thomas and Betts.
  - f. Underground Devices, Inc.
  - g. Unistrut by Atkore International, Inc.
  - h. Approved Equal.

## 2.2 HANDHOLES

- A. Prefabricated Composite Material Handholes:
  - 1. Handhole body and cover: Fiberglass reinforced polymer concrete conforming to all test provisions of SCTE 77.
  - 2. Minimum load ratings: SCTE 77 Tier 5.
  - 3. Open bottom.
  - 4. Stackable design as required for specified depth.
  - 5. Cover:
    - a. Engraved legend of "ELECTRIC" or "COMMUNICATIONS".
    - b. Non-gasketed bolt down with stainless steel penta head bolts.
    - c. Lay-in non-bolt down, when cover is over 100 LBS.
    - d. One or multiple sections so the maximum weight of a section is 125 LBS.
  - 6. Cover lifting hook: 24 IN minimum in length.
- B. Precast Handholes:
  - 1. Fiberglass reinforced polymer concrete or steel reinforced cement concrete structures:
  - 2. AASHTO live load rating: H-20 for full deliberate vehicle traffic.
  - 3. Mating edges: Tongue and groove type.
  - 4. Cable pulling eyes opposite all conduit entrances.
    - a. Coordinate exact location with installation contractor.

## 2.3 CONCRETE MANHOLE AND HANDHOLE ACCESSORIES

- A. Cover and Frame:
  - 1. Minimum ¼-inch-thick mill finish aluminum cover with recessed locking latch.
  - 2. AASHTO live load rating: H-20.
  - 3. Cast the legend "ELECTRICAL" or "COMMUNICATIONS" into handhole covers.
- B. Cable Racks and Hooks:
  - 1. Material: Heavy-duty nonmetallic (glass reinforced nylon).
  - 2. Hook loading capacity: 400 LBS minimum.
  - 3. Rack loading capacity: Four hooks maximum.
  - 4. Hook deflection: 0.25 IN maximum.
  - 5. Hooks: Length, as required, with positive locking device to prevent upward movement.
  - 6. Mounding hardware: Stainless steel.
- C. Cable Pulling Irons:
  - 1. 7/8 IN DIA hot-dipped galvanized steel.
  - 2. 6000 LB minimum pulling load.
- D. Ground Rods and Grounding Equipment: See Specification Section 16450.

## 2.4 UNDERGROUND CONDUIT AND ACCESSORIES

- A. Concrete and reinforcing steel: See Division 03 Specifications.
- B. Conduit: See Specification Section 16110.
- C. Duct Spacers/Supports:

1. High density polyethylene or high impact polystyrene.
2. Interlocking web or mesh design.
3. Provide 3 IN minimum spacing between conduits.
4. Accessories, as required:
  - a. Hold down bars.
  - b. Ductbank strapping.

### **PART 3 - EXECUTION**

#### **3.1 GENERAL**

- A. Drawings indicate the intended location of handholes and routing of ductbanks and direct buried conduit.
  1. Field conditions may affect actual routing.
- B. Handhole Locations:
  1. Approximately where shown on the Drawings.
  2. As required for pulling distances.
  3. As required to keep pulling tensions under allowable cable tensions.
  4. As required for number of bends in ductbank routing.
  5. Shall not be installed in a swale or ditch.
  6. Determine the exact locations after careful consideration has been given to the location of other utilities, grading, and paving.
  7. Locations are to be approved by the Engineer prior to excavation and placement or construction of manholes and handholes.
- C. Install products in accordance with manufacturer's instructions.
- D. Install handholes in conduit runs where indicated or as required to facilitate pulling of wires or making connections.
- E. Comply with the Drawings and Specification Section 02221 for trenching, backfilling, and compacting.

#### **3.2 HANDHOLES**

- A. Prefabricated Composite Material Handholes:
  1. For use in areas subjected to occasional non-deliberate vehicular traffic.
  2. Place handhole on a foundation of compacted 1/4 to 1/2 IN crushed rock or gravel a minimum of 8 IN thick and 6 IN larger than handholes footprint on all sides.
  3. Provide concrete encasement ring around handhole per manufacturers installation instructions (minimum of 10 IN wide x 12 IN deep).
  4. Install so that the surrounding grade is 1 IN lower than the top of the handhole.
  5. Size: As indicated on the Drawings or as required for the number and size of conduits.
  6. Provide cable rails and pulling eyes as needed.
- B. Precast Handholes:
  1. For use in vehicular and non-vehicular traffic areas.
  2. Construction:
    - a. Grout or seal all joints, per manufacturer's instructions.
    - b. Support cables on walls by cable racks:
      - 1) Provide a minimum of two racks, install symmetrically on each wall of handholes.
        - a) Provide additional cable racks, as required, so that both ends of cable splices will be supported horizontally.
      - 2) Equip cable racks with adjustable hooks: Quantity of cable hooks as required by the number of conductors to be supported.
    - c. In each handhole, drive 3/4 IN x 10 FT long copper clad ground rod into the earth with approximately 6 IN exposed above finished floor.
      - 1) Drill opening in floor for ground rod.

- 2) Connect all metallic components to ground rod by means of #8 AWG minimum copper wire and approved grounding clamps.
- 3) Utilize a ground bar in the manhole or handhole if the quantity of ground wires exceeds three.
  - a) Connect ground bar to ground rod with a #2/0 AWG minimum copper wire.
3. Place handhole on a foundation of compacted 1/4 to 1/2 IN crushed rock or gravel a minimum of 8 IN thick and 6 IN larger than handholes footprint on all sides.
4. Install so that the top of cover is 1 IN above finished grade.
  - a. Where existing grades are higher than finished grades, install sufficient number of courses of curved segmented concrete block between top of handhole frame to temporarily elevate manhole cover to existing grade level.
5. After installation is complete, backfill and compact soil around handholes.
6. Handhole size:
  - a. As indicated on the Drawings or as required for the number and size of conduits entering or as indicated on the Drawings.
  - b. Minimum floor dimension of 4 FT x 4 FT and minimum depth of 4 FT.

### 3.3 UNDERGROUND CONDUITS

#### A. General Installation Requirements:

1. Ductbank types per location:
  - a. Direct-buried conduit(s):
    - 1) As indicated in the drawings.
2. Do not place concrete or soil until conduits have been observed by the Engineer.
3. Ductbanks shall be sloped a minimum of 4 IN per 100 FT or as detailed on the Drawings.
  - a. Low points shall be at handholes.
4. During construction and after conduit installation is complete, plug the ends of all conduits.
5. Provide conduit supports and spacers.
  - a. Place supports and spacers for rigid nonmetallic conduit on maximum centers as indicated for the following trade sizes:
    - 1) 1 IN and less: 3 FT.
    - 2) 1-1/4 to 3 IN: 5 FT.
    - 3) 3-1/2 to 6 IN: 7 FT.
  - b. Place supports and spacers for rigid steel conduit on maximum centers as indicated for the following trade sizes:
    - 1) 1 IN and less: 10 FT.
    - 2) 1-1/4 to 2-1/2 IN: 14 FT.
    - 3) 3 IN and larger: 20 FT.
  - c. Securely anchor conduits to supports and spacers to prevent movement during placement of concrete or soil.
6. Stagger conduit joints at intervals of 6 IN vertically.
7. Make conduit joints watertight and in accordance with manufacturer's recommendations.
8. Accomplish underground changes in direction of runs exceeding a total of 15 DEG by long sweep bends having a minimum radius of 10 FT.
  - a. Sweep bends may be made up of one or more curved or straight sections or combinations thereof.
9. Furnish manufactured elbows at end of runs as the conduit transitions to above grade.
  - a. Minimum radius of 18 IN for conduits less than 3 IN trade size and 36 IN for conduits 3 IN trade size and larger.
10. Field cuts requiring tapers shall be made with the proper tools and shall match factory tapers.
11. After the conduit run has been completed:
  - a. Prove joint integrity and test for out-of-round duct by pulling a test mandrel through each conduit.
    - 1) Test mandrel:
      - a) Length: Not less than 12 IN.

- b) Diameter: Approximately 1/4 IN less than the inside diameter of the conduit.
    - b. Clean the conduit by pulling a heavy duty wire brush mandrel followed by a rubber duct swab through each conduit.
  - 12. Pneumatic rodding may be used to draw in lead wire.
    - a. Install a heavy nylon cord free of kinks and splices in all unused new ducts.
    - b. Extend cord 3 FT beyond ends of conduit.
  - 13. Transition from rigid nonmetallic conduit to rigid metallic conduit, per Specification Section 16110, prior to entering a structure or going above ground.
    - a. Except rigid nonmetallic conduit may be extended directly to handholes and other exterior pad mounted electrical equipment where the conduit is concealed within the enclosure.
    - b. Terminate rigid PVC conduits with end bells.
    - c. Terminate steel conduits with insulated bushings.
  - 14. Placement of conduits stubbing into handholes shall be located to allow for proper bending radiuses of the cables.
- B. Concrete Encased Ductbank:
- 1. Ductbank system consists of conduits completely encased in minimum 2 IN of concrete and with separations between different cabling types as required in Specification Section 16110 or as detailed on the Drawings.
  - 2. Install so that top of concrete encased duct, at any point:
    - a. Is not less than 24IN below grade.
    - b. Is below pavement sub-grading.
  - 3. Where identified and for a distance 10 FT either side of the area, the concrete shall be reinforced.
    - a. The reinforcement shall consist of #4 bars and #4 ties placed 12 IN on center, in accordance with Division 03 Specification Sections or as detailed on the Drawings.
    - b. Conduit supports to be staggered to minimize weak vertical shear point.
  - 4. Conduit supports shall provide a uniform minimum clearance of 3 IN between the bottom of the trench and the bottom row of conduit.
  - 5. Conduit separators shall provide a uniform minimum clearance of 3 IN between conduits or as required in Specification Section 16110 for different cabling types.
- C. Direct-Buried Conduit(s):
- 1. Install so that the top of the uppermost conduit, at any point:
    - a. Is not less than 30 IN below grade.
    - b. Is below pavement sub-grading.
  - 2. Provide a uniform minimum clearance of 3 IN between conduits or as required in Specification Section 16110 for different cabling types.
    - a. Maintain the separation of multiple planes of conduits by one of the following methods:
      - 1) Install the multilevel conduits one level at a time.
        - a) Each level is backfilled with the appropriate amount of soil and compaction, per Specification Section 02221, to maintain the required separations.
        - b) Provide 1 FT concrete cap per electrical details.

**END OF SECTION**

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## SECTION 16120

### WIRE AND CABLE: 600 VOLT AND BELOW

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
1. Material and installation requirements for:
    - a. Building wire.
    - b. Power cable.
    - c. Control cable.
    - d. Instrumentation cable.
    - e. Wire connectors.
    - f. Insulating tape.
    - g. Pulling lubricant.

##### 1.2 QUALITY ASSURANCE

- A. Referenced Standards:
1. Insulated Cable Engineers Association (ICEA):
    - a. S-58-679, Standard for Control Cable Conductor Identification.
  2. National Electrical Manufacturers Association (NEMA):
    - a. ICS 4, Industrial Control and Systems: Terminal Blocks.
  3. National Electrical Manufacturers Association/Insulated Cable Engineers Association (NEMA/ICEA):
    - a. WC 57/S-73-532, Standard for Control Cables.
    - b. WC 70/S-95-658, Non-Shielded Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
  4. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
    - b. 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.
  5. Telecommunications Industry Association/Electronic Industries Alliance/American National Standards Institute (TIA/EIA/ANSI):
    - a. 568, Commercial Building Telecommunications Cabling Standard.
  6. Underwriters Laboratories, Inc. (UL):
    - a. 44, Standard for Safety Thermoset-Insulated Wires and Cables.
    - b. 83, Standard for Safety Thermoplastic-Insulated Wires and Cables.
    - c. 467, Standard for Safety Grounding and Bonding Equipment.
    - d. 486A, Standard for Safety Wire Connectors and Soldering Lugs for use with Copper Conductors.
    - e. 486C, Standard for Safety Splicing Wire Connections.
    - f. 510, Standard for Safety Polyvinyl Chloride, Polyethylene and Rubber Insulating Tape.
    - g. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
    - h. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.
    - i. 2250, Standard for Safety Instrumentation Tray Cable.

##### 1.3 DEFINITIONS

- A. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.

- B. Instrumentation Cable:
  - 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
  - 2. The following are specific types of instrumentation cables:
    - a. Analog signal cable:
      - 1) Used for the transmission of low current (e.g., 4-20mA DC) or low voltage (e.g., 0-10 VDC) signals, using No. 16 AWG and smaller conductors.
      - 2) Commonly used types are defined in the following:
        - a) TSP: Twisted shielded pair.
        - b) TST: Twisted shielded triad.
    - b. Digital signal cable: Used for the transmission of digital signals between computers, PLC's, RTU's, etc.
- C. Power Cable: Multi-conductor, insulated, with outer sheath containing building wire, No. 8 AWG and larger.
- D. Control Cable: Multi-conductor, insulated, with outer sheath containing building wires, No. 14, No. 12 or No. 10 AWG.
- E. Building Wire: Single conductor, insulated, with or without outer jacket depending upon type.

#### **1.4 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. Product technical data:
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Wire connectors.
      - 2) Insulating tape.
      - 3) Cable lubricant.
    - b. See Specification Section 16000 for additional requirements.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. See Specification Section 16000.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Building wire, power and control cable:
    - a. General Cable.
    - b. Okonite Company.
    - c. Southwire Company.
    - d. Approved Equal.
  - 2. Instrumentation cable:
    - a. Analog cable:
      - 1) Alphawire.
      - 2) Belden Inc.
      - 3) General Cable.
      - 4) Approved Equal.
  - 3. Wire connectors:
    - a. 3M Co.
    - b. Thomas and Betts.
    - c. Phoenix Contact.

- d. Approved Equal.
- 4. Insulating and color coding tape:
  - a. 3M Co.
  - b. Plymouth Bishop Tapes.
  - c. Red Seal Electric Co.
  - d. Approved Equal.

## 2.2 MANUFACTURED UNITS

### A. Building Wire:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Conductors shall be stranded, except for conductors used in lighting and receptacle circuits which may be stranded or solid.
- 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 for type THHN/THWN and THHN/THWN-2 insulation.
- 5. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 for type XHHW-2 insulation.

### B. Power Cable:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 3. Conform to NEMA/ICEA WC 70/S-95-658 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
- 4. Conform to NEMA/ICEA WC 70/S-95-658 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
- 5. Number of conductors as required, including a bare ground conductor.
- 6. Individual conductor color coding:
  - a. ICEA S-58-679, Method 4.
  - b. See PART 3 of this Specification Section for additional requirements.
- 7. Conform to NFPA 70 Type TC.

### C. Control Cable:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
- 3. Conform to NEMA/ICEA WC 57/S-73-532 and UL 83 and UL 1277 for type THHN/THWN insulation with an overall PVC jacket.
- 4. Conform to NEMA/ICEA WC 57/S-73-532 and UL 44 and UL 1277 for type XHHW-2 insulation with an overall PVC jacket.
- 5. Number of conductors as required, provided with or without bare ground conductor of the same AWG size.
  - a. When a bare ground conductor is not provided, an additional insulated conductor shall be provided and used as the ground conductor (e.g., 6/c No. 14 w/g and 7/c No. 14 are equal).
- 6. Individual conductor color coding:
  - a. ICEA S-58-679, Method 1, Table E-2.
  - b. See PART 3 of this Specification Section for additional requirements.
- 7. Conform to NFPA 70 Type TC.

### D. Electrical Equipment Control Wire:

- 1. Conductor shall be copper with 600 V rated insulation.
- 2. Conductors shall be stranded.
- 3. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.

4. Conform to UL 44 for Type SIS insulation.
  5. Conform to UL 83 for Type MTW insulation.
- E. Instrumentation Cable:
1. Surface mark with manufacturer's name or trademark, conductor size, insulation type and UL label.
  2. Analog cable:
    - a. Tinned copper conductors.
    - b. 300 V or 600 V PVC insulation with PVC jacket.
    - c. Twisted with 100 PCT foil shield coverage with drain wire.
    - d. Six (6) twists per foot minimum.
    - e. Individual conductor color coding: ICEA S-58-679, Method 1, Table E-2.
    - f. Conform to UL 2250, UL 1581 and NFPA 70 Type ITC.
  3. Digital cable:
    - a. As recommended by equipment (e.g., PLC, RTU) manufacturer.
    - b. Horizontal voice and data cable:
      - 1) Category 6 per TIA/EIA/ANSI 568.
      - 2) Cable shall be label-verified.
      - 3) Cable jacket shall be factory marked at regular intervals indicating verifying organization and performance level.
      - 4) Conductors: No. 24 AWG solid untinned copper.
      - 5) Rated CMP per NFPA 70.
    - c. Conform to NFPA 262 and NFPA 70 Type ITC.
- F. Wire Connectors:
1. Twist/screw on type:
    - a. Insulated pressure or spring type solderless connector.
    - b. 600 V rated.
    - c. Ground conductors: Conform to UL 486C and/or UL 467 when required by local codes.
    - d. Phase and neutral conductors: Conform to UL 486C.
  2. Compression and mechanical screw type:
    - a. 600 V rated.
    - b. Ground conductors: Conform to UL 467.
    - c. Phase and neutral conductors: Conform to UL 486A.
  3. Terminal block type:
    - a. High density, screw-post barrier-type with white center marker strip.
    - b. 600 V and ampere rating as required, for power circuits.
    - c. 600 V, 20 ampere rated for control circuits.
    - d. 300 V, 15 ampere rated for instrumentation circuits.
    - e. Conform to NEMA ICS 4 and UL 486A.
- G. Insulating and Color Coding Tape:
1. Pressure sensitive vinyl.
  2. Premium grade.
  3. Heat, cold, moisture, and sunlight resistant.
  4. Thickness, depending on use conditions: 7, 8.5, or 10 MIL.
  5. For cold weather or outdoor location, tape must also be all-weather.
  6. Color:
    - a. Insulating tape: Black.
    - b. Color coding tape: Fade-resistant color as specified herein.
  7. Comply with UL 510.
- H. Pulling Lubricant: Cable manufacturer's standard containing no petroleum or other products which will deteriorate insulation.

WIRE AND CABLE: 600 VOLT AND BELOW

**PART 3 - EXECUTION**

**3.1 INSTALLATION**

- A. Permitted Usage of Insulation Types:
  - 1. Type XHHW-2:
    - a. Building wire and power and control cable in architectural and non-architectural finished areas.
    - b. Building wire and power and control cable in conduit in outdoor areas and below grade.
    - c. Building wire and power and control cable in cable tray in outdoor areas.
  - 2. Type THHN/THWN and THHN/THWN-2:
    - a. Building wire and power and control cable No. 8 AWG and smaller in architectural and non-architectural finished areas.
  - 3. Type SIS and MTW:
    - a. For the wiring of control equipment within control panels and field wiring of control equipment within switchgear, switchboards, motor control centers.
- B. Conductor Size Limitations:
  - 1. Feeder and branch power conductors shall not be smaller than No. 12 AWG unless otherwise indicated on the Drawings.
  - 2. Control conductors shall not be smaller than No. 14 AWG unless otherwise indicated on the Drawings.
  - 3. Instrumentation conductors shall not be smaller than No. 18 AWG unless otherwise indicated on the Drawings.
- C. Color Code All Wiring as Follows:
  - 1. Building wire:

	240 V, 208 V, 240/120 V, 208/120 V	480 V, 480/277 V
Phase 1	Black	Brown
Phase 2	Red *	Orange
Phase 3	Blue	Yellow
Neutral	White	White or Gray
Ground	Green	Green

\* Orange when it is a high leg of a 120/240 V Delta system.

- a. Conductors No. 6 AWG and smaller: Insulated phase, neutral and ground conductors shall be identified by a continuous colored outer finish along its entire length.
- b. Conductors larger than No. 6 AWG:
  - 1) Insulated phase and neutral conductors shall be identified by one of the following methods:
    - a) Continuous colored outer finish along its entire length.
    - b) 3 IN of colored tape applied at the termination.
  - 2) Insulated grounding conductor shall be identified by one of the following methods:
    - a) Continuous green outer finish along its entire length.
    - b) Stripping the insulation from the entire exposed length.
    - c) Using green tape to cover the entire exposed length.
  - 3) The color coding shall be applied at all accessible locations, including but not limited to: Junction and pull boxes, wireways, manholes and handholes.
- 2. Power cables ICEA S-58-679, Method 4 with:
  - a. Phase and neutral conductors identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
  - b. Ground conductor: Bare.

3. Control cables ICEA S-58-679, Method 1, Table E-2:
  - a. When a bare ground is not provided, one of the colored insulated conductors shall be re-identified by stripping the insulation from the entire exposed length or using green tape to cover the entire exposed length.
  - b. When used in power applications the colored insulated conductors used as phase and neutral conductors may have to be re-identified with 3 IN of colored tape, per the Table herein, applied at the terminations.
- D. Install all wiring in raceway unless otherwise indicated on the Drawings.
- E. Feeder, branch, control and instrumentation circuits shall not be combined in a raceway, cable tray, junction or pull box, except as permitted in the following:
  1. Where specifically indicated on the Drawings.
  2. Where field conditions dictate and written permission is obtained from the Engineer.
  3. Control circuits shall be isolated from feeder and branch power and instrumentation circuits but combining of control circuits is permitted.
    - a. The combinations shall comply with the following:
      - 1) 12 VDC, 24 VDC and 48 VDC may be combined.
      - 2) 125 VDC shall be isolated from all other AC and DC circuits.
      - 3) AC control circuits shall be isolated from all DC circuits.
  4. Instrumentation circuits shall be isolated from feeder and branch power and control circuits but combining of instrumentation circuits is permitted.
    - a. The combinations shall comply with the following:
      - 1) Analog signal circuits may be combined.
      - 2) Digital signal circuits may be combined but isolated from analog signal circuits.
  5. Multiple branch circuits for similar loads may be combined in a common raceway, such as multiple lighting circuits or multiple receptacle circuits or other 120Vac circuits. Do not combine lighting and receptacle circuits.
    - a. Do not combine control device circuits with lighting or receptacle circuits.
    - b. Contractor is responsible for making the required adjustments in conductor and raceway size, in accordance with all requirements of the NFPA 70, including but not limited to:
      - 1) Up sizing conductor size for required ampacity de-ratings for the number of current carrying conductors in the raceway.
      - 2) The neutral conductors may not be shared.
      - 3) Up sizing raceway size for the size and quantity of conductors.
- F. Ground the drain wire of shielded instrumentation cables at one end only.
  1. The preferred grounding location is at the load (e.g., control panel), not at the source (e.g., field mounted instrument).
- G. Splices and terminations for the following circuit types shall be made in the indicated enclosure type using the indicated method.
  1. Feeder and branch power circuits:
    - a. Device outlet boxes:
      - 1) Twist/screw on type connectors.
    - b. Junction and pull boxes and wireways:
      - 1) Twist/screw on type connectors for use on No. 8 and smaller wire.
      - 2) Compression, mechanical screw or terminal block or terminal strip type connectors for use on No. 6 AWG and larger wire.
    - c. Motor terminal boxes:
      - 1) Twist/screw on type connectors for use on No. 10 AWG and smaller wire.
      - 2) Insulated mechanical screw type connectors for use on No. 8 AWG and larger wire.
    - d. Handholes:

WIRE AND CABLE: 600 VOLT AND BELOW

- 1) Twist/screw on type connectors pre-filled with epoxy for use on No. 8 AWG and smaller wire.
  - 2) Watertight compression or mechanical screw type connectors for use on No. 6 AWG and larger wire.
2. Control circuits:
    - a. Junction and pull boxes: Terminal block type connector.
    - b. Handholes: Twist/screw on type connectors pre-filled with epoxy.
    - c. Control panels and motor control centers: Terminal block or strips provided within the equipment or field installed within the equipment by the Contractor.
  3. Instrumentation circuits can be spliced where field conditions dictate and written permission is obtained from the Engineer.
    - a. Maintain electrical continuity of the shield when splicing twisted shielded conductors.
    - b. Junction and pull boxes: Terminal block type connector.
    - c. Control panels and motor control centers: Terminal block or strip provided within the equipment or field installed within the equipment by the Contractor.
  4. Non-insulated compression and mechanical screw type connectors shall be insulated with tape or hot or cold shrink type insulation to the insulation level of the conductors.
- H. Insulating Tape Usage:
1. For insulating connections of No. 8 AWG wire and smaller: 7 MIL vinyl tape.
  2. For insulating splices and taps of No. 6 AWG wire or larger: 10 MIL vinyl tape.
  3. For insulating connections made in cold weather or in outdoor locations: 8.5 MIL, all weather vinyl tape.
- I. Color Coding Tape Usage: For color coding of conductors.

### **3.2 FIELD QUALITY CONTROL**

- A. Acceptance Testing:
1. See Division 01 Specifications.

**END OF SECTION**

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**SECTION 16450**  
**GROUNDING AND BONDING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Material and installation requirements for grounding and bonding system(s).

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. ASTM International (ASTM):
    - a. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
  2. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 837, Standard for Qualifying Permanent Connections Used in Substation Grounding.
  3. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  4. Underwriters Laboratories, Inc. (UL):
    - a. 467, Grounding and Bonding Equipment.
- B. Assure ground continuity is continuous throughout the entire Project.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Product technical data.
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section except:
      - 1) Grounding clamps, connectors, and terminals.
      - 2) Exothermic welding system.
    - b. See Specification Section 16000 for additional requirements.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Ground rods and bars and grounding clamps, connectors and terminals:
    - a. ERICO by Pentair.
    - b. Harger Lightning & Grounding.
    - c. Burndy by Hubbell.
    - d. Approved Equal.
  2. Exothermic weld connections:
    - a. ERICO by Pentair - Cadweld.
    - b. Harger Lightning & Grounding - Ultraweld.
    - c. Burndy by Hubbell - Thermoweld.
    - d. Approved Equal.

**2.2 COMPONENTS**

- A. Wire and Cable:
1. Bare conductors: Soft drawn stranded copper meeting ASTM B8.

2. Insulated conductors: Color coded green, per Specification Section 16120.
- B. Conduit: As specified in Specification Section 16110.
- C. Ground Bars:
1. Solid copper:
    - a. 1/4 IN thick.
    - b. 2 or 4 IN wide.
    - c. 24 IN long minimum in main service entrance electrical rooms, 12 IN long elsewhere.
  2. Predrilled grounding lug mounting holes.
  3. Stainless steel or galvanized steel mounting brackets.
  4. Insulated standoffs.
- D. Ground Rods:
1. 5/8 IN x 10 FT.
  2. Copper-clad:
    - a. 10 MIL minimum uniform coating of electrolytic copper molecularly bonded to a rigid steel core.
    - b. Corrosion resistant bond between the copper and steel.
    - c. Hard drawn for a scar-resistant surface.
- E. Grounding Clamps, Connectors and Terminals:
1. Mechanical type:
    - a. Standards: UL 467.
    - b. High copper alloy content.
  2. Compression type for interior locations:
    - a. Standards: UL 467.
    - b. High copper alloy content.
    - c. Non-reversible.
    - d. Terminals for connection to bus bars shall have two bolt holes.
  3. Compression type suitable for direct burial in earth or concrete:
    - a. Standards: UL 467, IEEE 837.
    - b. High copper alloy content.
    - c. Non-reversible.
    - d. Factory filled with oxide inhibiting compound.
- F. Exothermic Weld Connections:
1. Copper oxide reduction by aluminum process.
  2. Molds properly sized for each application.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. General:
1. Install products in accordance with manufacturer's instructions.
  2. Size grounding conductors and bonding jumpers in accordance with NFPA 70, Article 250, except where larger sizes are indicated on the Drawings.
  3. Remove paint, rust, or other non-conducting material from contact surfaces before making ground connections. After connection, apply manufacturers approved touch-up paint to protect metallic surface from corrosion.
  4. Do not splice grounding electrode conductors except at ground rods.
  5. Install ground rods and grounding electrode conductors in undisturbed, firm soil.
    - a. Provide excavation required for installation of ground rods and conductors.
    - b. Use driving studs or other suitable means to prevent damage to threaded ends of sectional rods.
    - c. Unless otherwise specified, connect conductors to ground rods with compression type connectors or exothermic weld.

## **GROUNDING AND BONDING**

- d. Provide sufficient slack in conductor to prevent conductor breakage during backfill or due to ground movement.
  - e. Backfill excavation completely, thoroughly tamping to provide good contact between backfill materials and ground rods and conductors.
6. Do not use exothermic welding if it will damage the structure the grounding conductor is being welded to.
- B. Grounding Electrode System:
- 1. Provide a grounding electrode system in accordance with NFPA 70, Article 250 and as indicated on the Drawings.
    - a. All grounding electrode conductors terminate on a main ground bar located adjacent to the service entrance equipment.
  - 2. Grounding electrode conductor terminations:
    - a. Ground bars mounted on wall: Use a two-hole compression type conductor terminal and bolt it to the ground bar with two bolts.
    - b. Ground bars in electrical equipment: Use compression type conductor terminal and bolt it to the ground bar or manufacture's provided mechanical type termination device.
    - c. Piping systems: Use mechanical type connections.
    - d. Building steel, below grade and encased in concrete: Use compression type connector or exothermic weld.
    - e. Building steel, above grade: Use a two-hole compression type conductor terminal and bolt to the steel with two bolts or exothermic weld.
    - f. Ground rod: Compression type or exothermic weld, unless otherwise specified.
  - 3. Ground ring grounding system:
    - a. Ground ring consists of ground rods and a conductor looped around the structure.
    - b. Placed at a minimum of 10 FT from the structure foundation and 2 FT-6 IN below grade.
    - c. Provide a minimum of four ground rods placed at the corners of the structure and additional rods so that the maximum distance between ground rods does not exceed 50 FT.
    - d. Building/Structure grounding:
      - 1) Bond building/structure metal support columns to the ground ring at all corners of the structure.
    - e. Grounding conductor: Bare conductor, size as indicated on the Drawings.
- C. Supplemental Grounding Electrode:
- 1. Provide the following grounding in addition to the equipment ground conductor supplied with the feeder conductors whether or not shown on the Drawings.
    - a. See Grounding Electrode System paragraph for conductor termination requirements.
  - 2. Metal light poles:
    - a. Connect metal pole and pole base reinforcing steel to a ground rod.
    - b. Grounding conductor: Bare #6 AWG minimum.
  - 3. Equipment support rack and pedestals mounted outdoors:
    - a. Connect metallic structure to a ground rod.
    - b. Grounding conductor: #6 AWG minimum.
- D. Raceway Bonding/Grounding:
- 1. Install all metallic raceway so that it is electrically continuous.
  - 2. Provide an equipment grounding conductor in all raceways with insulation identical to the phase conductors, unless otherwise indicated on the Drawings.
  - 3. NFPA 70 required grounding bushings shall be of the insulating type.
  - 4. Provide double locknuts at all panels.
  - 5. Bond all conduits, at entrance and exit of equipment, to the equipment ground bus or lug.
  - 6. Provide bonding jumpers if conduits are installed in concentric knockouts.

## GROUNDING AND BONDING

7. Make all metallic raceway fittings and grounding clamps tight to ensure equipment grounding system will operate continuously at ground potential to provide low impedance current path for proper operation of overcurrent devices during possible ground fault conditions.
- E. Equipment Grounding:
1. Ground all utilization equipment with an equipment grounding conductor.
- F. Handhole Grounding:
1. Provide a ground rod and ground bar, when indicated or as needed, in each handhole with exposed metal parts.
    - a. Expose a minimum of 4 IN of the rod above the floor for field connections to the rod.
  2. Connect all exposed metal parts (e.g., conduits and cable racks) to the ground rod.

### **3.2 FIELD QUALITY CONTROL**

- A. Leave grounding system uncovered until observed by Owner.
- B. Acceptance testing:
1. See Division 01 Specifications.

**END OF SECTION**

**SECTION 16470**  
**PANELBOARDS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Branch circuit panelboards.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. PB 1, Panelboards.
  2. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  3. Underwriters Laboratories, Inc. (UL):
    - a. 50, Enclosures for Electrical Equipment, Non-Environmental Considerations.
    - b. 67, Standard for Panelboards.

**1.3 DEFINITIONS**

- A. Branch Circuit Panelboard: Bus rating of 400A and less or where labeled as Branch Circuit Panelboard on the Drawings.

**1.4 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Product technical data.
    - a. Provide submittal data for all products specified in PART 2 of this Specification Section.
    - b. See Specification Section 16000 for additional requirements.
  2. Fabrication and/or layout drawings:
    - a. Panelboard layout with alphanumeric designation, branch circuit breakers size and type, as indicated in the panelboard schedules.
- C. Contract Closeout Information:
1. Operation and Maintenance Data:
    - a. See Specification Section 01730 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
  2. Panelboard schedules with as-built conditions.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Eaton.
  2. ABB/GE.
  3. Square D by Schneider Electric.
  4. Siemens Corporation.
  5. Approved Equal.

## 2.2 MANUFACTURED UNITS

- A. Standards: NEMA PB 1, NFPA 70, UL 50, UL 67.
- B. Ratings:
  - 1. Current, voltage, number of phases, number of wires as indicated on the Drawings.
  - 2. Short Circuit Current Rating (SCCR) and/or Ampere Interrupting Current (AIC) ratings equal to or greater than the interrupting rating indicated on the Drawings or in the schedule.
    - a. Series rating is not acceptable.
    - b. When fault current or minimum interrupting rating is not indicated, use rating of upstream equipment or infinite bus calculation of transformer secondary.
  - 3. Service Entrance Equipment rated when indicated on the Drawings or when shown to be fed from a utility source.
- C. Construction:
  - 1. Interiors factory assembled and designed such that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors.
  - 2. Multi-section panelboards: Feed-through or sub-feed lugs.
  - 3. Main lugs: Solderless type approved for copper and aluminum wire.
- D. Bus Bars:
  - 1. Main bus bars:
    - a. Tin plated aluminum or tin plated copper sized to limit temperature rise to a maximum of 65 DEGC above an ambient of 40 DEGC.
    - b. Drilled and tapped and arranged for sequence phasing of the branch circuit devices.
  - 2. Ground bus and isolated ground bus, when indicated on the Drawings: Solderless mechanical type connectors.
  - 3. Neutral bus bars: Insulated 100 PCT rated or 200 PCT rated, when indicated on the Drawings and with solderless mechanical type connectors.
- E. Overcurrent and Short Circuit Protective Devices:
  - 1. Main overcurrent protective device:
    - a. Molded case circuit breaker.
  - 2. Branch overcurrent protective devices:
    - a. Bolt-on molded case circuit breaker.
  - 3. Factory installed.
- F. Enclosure:
  - 1. Boxes: Code gage galvanized steel, furnish without knockouts.
  - 2. Trim assembly: Code gage steel finished with rust inhibited primer and manufacturers standard paint inside and out.
  - 3. Branch circuit panelboard:
    - a. Trims supplied with hinged door-in-door construction.
      - 1) Outer door:
        - a) Allows access to the interior of the enclosure.
        - b) Hinged to the enclosure.
        - c) Opened by removal of screws or by operating a mechanical latch located behind the inner door.
      - 2) Inner door:
        - a) Allows access to breakers (non-live parts).
        - b) Hinged to outer door.
        - c) Opened by operation of a keyed corrosion resistant chrome-plated combination lock and catch. Locks for all branch circuit panelboards keyed alike.
    - b. Trims for surface mounted panelboards, same size as box.
    - c. Trims for flush mounted panelboards, overlap the box by 3/4 IN on all sides.
    - d. Nominal 20 IN wide and 5-3/4 IN deep with gutter space in accordance with NFPA 70.
    - e. Clear plastic cover for directory card mounted on the inside of each door.

### PANELBOARDS

- f. Where NEMA 3R or NEMA 12 rating is indicated: Door gasketed.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install as indicated on the Drawings, in accordance with the NFPA 70, and in accordance with manufacturer's instructions.
- B. Support panelboard enclosures from wall studs or modular channels support structure, per Specification Section 16000.
- C. Provide NEMA rated enclosure as indicated on the Drawings. Where enclosure type is not indicated, provide enclosure rating suitable for the atmosphere where equipment is installed.
- D. Field identification:
  - 1. Provide all required tagging and markings per the NFPA 70.
- E. Provide each panelboard with a typed directory:
  - 1. Identify all circuit locations in each panelboard with the load type and location served.
  - 2. Use Owner-furnished mechanical equipment designation if different than designation indicated on the Drawings.
  - 3. Use final building room names and numbers as identified by the Owner if different than designation indicated on the Drawings.
  - 4. Identify spare overcurrent devices.

**END OF SECTION**

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**SECTION 17000**  
**PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Basic requirements for complete instrumentation system for process control.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. The International Society of Automation (ISA):
    - a. 7.0.01, Quality Standard for Instrument Air.
    - b. S5.1, Instrumentation Symbols and Identification.
    - c. S5.3, Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
    - d. S20, Standard Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves.
  2. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
  3. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC).
  4. Underwriters Laboratories, Inc. (UL):
    - a. 913, Standard for Safety, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.
- B. Qualifications:
1. System Integrator:
    - a. Quality Controls Corporation (QCC) is the sole sourced system integrator for this project.
- C. Miscellaneous:
1. Comply with electrical classifications and NEMA enclosure types shown on Drawings.

**1.3 DEFINITIONS**

- A. Calibrate: To standardize a device so that it provides a specified response to known inputs.
- B. Hazardous Areas: Class I, II or III areas as defined in NFPA 70.
- C. Highly Corrosive and Corrosive Areas: Rooms or areas identified on the Drawings where there is a varying degree of spillage or splashing of corrosive materials such as water, wastewater or chemical solutions; or chronic exposure to corrosive, caustic or acidic agents, chemicals, chemical fumes or chemical mixtures.
- D. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.
- E. System Integrator: A Contractor/Subcontractor who combines instrumentation, control devices, hardware, software, and networking products from multiple vendors to provide a fully functioning control system.

**1.4 SYSTEM DESCRIPTION**

- A. Control System Requirements:
1. This Specification Section provides the general requirements for the control system.

2. The control system consists of all primary elements, transmitters, switches, controllers, computers, communication devices, recorders, indicators, panels, signal converters, signal boosters, amplifiers, special power supplies, special or shielded cable, special grounding or isolation, auxiliaries, software, wiring, and other devices required to provide complete control of the plant as specified in the Contract Documents.
- B. Utilization of System Integrator:
1. Utilize Quality Controls Corporation (QCC) to provide a fully functioning control system.
    - a. The System Integrator shall be responsible for the provision of an integrated control system fully functioning in accordance with the requirements of the Contract Documents.
  2. Provide all required coordination of instrumentation with other work to ensure that necessary wiring, conduits, contacts, relays, converters, and incidentals are provided in order to transmit, receive, and control necessary signals to other control elements, to control panels, and to receiving stations.
  3. Judy Reservoir Site:
    - a. There is an existing Mount Vernon and Sedro-Woolley meter vault control system at Judy Reservoir site. Control system is located inside Water Treatment Plant (WTP) building. New Mount Vernon and Sedro-Woolley meter vault control systems shall be provided at Judy Reservoir and utilize existing control system interface.
      - 1) Modify existing SCADA panel LD #13 per contract drawings.
      - 2) Provide Meter Head Panel MHP-201.
  4. Beaver Lake Road Site:
    - a. Provide new process control equipment at Beaver Lake road for new meter and PRV vault control system per contract drawings.
      - 1) Meter Head Panel MHP-101.
      - 2) SCADA Control Panel CP-101.

## 1.5 SUBMITTALS

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. Submittals shall be original printed material or clear unblemished photocopies of original printed material.
    - a. Facsimile information is not acceptable.
  2. Limit the scope of each submittal to one Specification Section.
    - a. Each submittal must be submitted under the Specification Section containing requirements of submittal contents.
    - b. Do not provide any submittals for Specification Section 17000.
  3. Product technical data including:
    - a. Equipment catalog cut sheets.
    - b. Instrument data sheets:
      - 1) ISA S20 or approved equal.
      - 2) Separate data sheet for each instrument type.
    - c. Materials of construction.
    - d. Minimum and maximum flow ranges.
    - e. Physical limits of components including temperature and pressure limits.
    - f. Size and weight.
    - g. Electrical power requirements and wiring diagrams.
    - h. NEMA rating of housings.
    - i. Submittals shall be marked with arrows to show exact features to be provided.
  4. Comprehensive asset inventory of all networked components:
    - a. Provide in Excel spreadsheet format.
    - b. Coordinate with the Owner or Engineer to determine the preferred method of delivery to assure security of information contained in asset inventory.
    - c. Include:

### PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS

- 1) Device ID.
  - 2) Manufacturer.
  - 3) Model Number.
  - 4) Serial Number.
  - 5) MAC Address.
  - 6) IP Address.
  - 7) Device Use description.
  - 8) Firmware.
5. Network Diagrams:
- a. Provide in both AUTO CAD and PDF formats.
  - b. Coordinate with the Owner or Engineer to determine the preferred method of delivery to assure security of information contained in Network Diagrams.
  - c. Logical Network Diagram(s):
    - 1) Depict information flow through network(s), and include:
      - a) Major network devices, subnets, and VLANs.
      - b) Include all wireless communication devices.
      - c) Include the following information for each networked device:
        - (1) Device ID.
        - (2) Device description.
        - (3) Manufacturer/model number.
        - (4) MAC address.
        - (5) IP address.
  - d. Physical Network Diagram(s):
    - 1) Show all network components, ports, protocols, connections and cables.
      - a) Include all wireless communication devices.
6. Comprehensive set of wiring diagrams as specified in Section 17110.
  7. Panel fabrication drawings as specified in Section 17110.
  8. PLC equipment drawings.
  9. Nameplate layout drawings.
  10. Drawings, systems, and other elements are represented schematically in accordance with ISA S5.1 and ISA S5.3.
    - a. The nomenclature, tag numbers, equipment numbers, panel numbers, and related series identification contained in the Contract Documents shall be employed exclusively throughout submittals.
  11. All panel and wiring drawings shall be provided in both hardcopy and softcopy.
    - a. Furnish electronic files on owner's designated electronic media.
    - b. Drawings in AUTO CAD format.
  12. Provide a parameter setting summary sheet for each field configurable device.
  13. Certifications:
    - a. Documentation verifying that calibration equipment is certified with NIST traceability.
    - b. Approvals from independent testing laboratories or approval agencies, such as UL, FM or CSA.
      - 1) Certification documentation is required for all equipment for which the specifications require independent agency approval.
  14. Testing reports: Source quality control reports.
- C. Qualifications Submittal:
1. Documentation verifying contractor/subcontractor adherence to specified certifications and qualifications
- D. Contract Closeout Information:
1. Operation and Maintenance Data:
    - a. See Specification Section 01730 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
  2. All Shop Drawings shall be modified with as-built information/corrections.
  3. Instrumentation and Control Equipment Operation and Maintenance Manual Content:

PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS

- a. Provide a printed copy of the following sheets following the Equipment Record sheets or ISA Data Sheets.
    - 1) Loop Check-out Sheet.
    - 2) Instrument (calibration) Certification Sheet.
    - 3) Final Control Element (i.e. control valve) Certification Sheet.
  - b. Provide the following detailed information:
    - 1) Use equipment tag numbers from the Contract Documents to identify equipment and system components.
    - 2) As-constructed fabrication or layout drawings and wiring diagrams.
    - 3) Spreadsheet containing all network devices and their associated MAC and IP addresses and username/password list.
      - a) Coordinate with the Owner or Engineer to determine the preferred method of delivery to assure security of this information.
  - c. Additional information as required in the associated equipment or system Specification Section.
4. Warranties: Provide copies of warranties and list of factory authorized service agents.

## **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. See Division 01 Specifications.
- B. Do not remove shipping blocks, plugs, caps, and desiccant dryers installed to protect the instrumentation during shipment until the instruments are installed and permanent connections are made.

## **PART 2 - PRODUCTS**

### **2.1 NEMA TYPE REQUIREMENTS**

- A. Provide enclosures/housing for control system components in accordance with the area designations provided on the Drawings.
  - 1. Areas designated as wet: NEMA Type 4.

### **2.2 PERFORMANCE AND DESIGN REQUIREMENTS**

- A. Unless stated otherwise, system operating criteria are as follows:
  - 1. Stability: After controls have taken corrective action, as result of a change in the controlled variable or a change in setpoint, oscillation of final control element shall not exceed two cycles per minute or a magnitude of movement of 0.5 PCT full travel.
  - 2. Response: Any change in setpoint or change in controlled variable shall produce a corresponding corrective change in position of final control element and become stabilized within 30 seconds.
  - 3. Agreement: Setpoint indication of controlled variable and measured indication of controlled variable shall agree within 3 PCT of full scale over a 6:1 operating range.
  - 4. Repeatability: For any repeated magnitude of control signal, from either an increasing or decreasing direction, the final control element shall take a repeated position within 0.5 PCT of full travel regardless of force required to position final element.
  - 5. Sensitivity: Controls shall respond to setpoint deviations and measured variable deviations within 1.0 PCT of full scale.
  - 6. Performance: All instruments and control devices shall perform in accordance with manufacturer's specifications.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Wherever feasible, use bottom entry for all conduit entry to instruments and junction boxes.

- B. Install electrical components per the requirements of the Electrical design.
- C. Panel-Mounted Instruments:
  1. Mount and wire so removal or replacement may be accomplished without interruption of service to adjacent devices.
  2. Locate all devices mounted inside enclosures so terminals and adjustment devices are readily accessible without use of special tools and with terminal markings clearly visible.

### 3.2 FIELD QUALITY CONTROL

- A. See Division 01 Specifications.
- B. Maintain accurate daily log of all startup activities, calibration functions, and final setpoint adjustments.
- C. In the event that instrument air is not available during calibration and testing, supply either filtered, dry, instrument quality air from a portable compressor or bottled, dry, instrument quality air.
  1. Do not, under any circumstances, apply hydrostatic test to any part of the air supply system or pneumatic control system.
- D. Instrumentation Calibration:
  1. Verify and document that all instruments and control devices are calibrated to provide the performance required by the Contract Documents.
    - a. Utilize the Instrument Certification Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
  2. Factory furnished calibration certifications are acceptable for the following:
    - a. Flow meters.
  3. On-site calibration verification is required for all other instruments, including “smart” transmitters that have been factory calibrated.
    - a. Provide calibration checks at 0 PCT, 25 PCT, 50 PCT, 75 PCT and 100 PCT of span for pressure transmitters and gages.
      - 1) Check for both increasing and decreasing input signals to detect hysteresis.
    - b. In addition to factory calibration certification, temperature sensors and gages shall be checked at a single point for conformance to required accuracy.
    - c. Level transducers/transmitters shall be checked at two points in addition to zero.
    - d. Analytical sensors shall be calibrated in accordance with manufacturer’s recommendations.
    - e. Check operation of all switches to verify actuation occurs in accordance with manufacturer’s specified accuracy.
    - f. Replace any instrument which cannot be properly adjusted.
    - g. Stroke pneumatic control valves with clean dry air to verify control action, positioner settings, and solenoid functions.
  4. Calibration equipment shall be certified by an independent agency with traceability to NIST.
    - a. Certification shall be up-to-date.
    - b. Use of equipment with expired certifications shall not be permitted.
  5. Calibration equipment shall be at least three times more accurate as the device being calibrated.
- E. Loop check-out requirements are as follows:
  1. Check control signal generation, transmission, reception and response for all control loops under simulated operating conditions by imposing a signal on the loop at the instrument connections.
    - a. Use actual signals where available.
    - b. Closely observe controllers, indicators, transmitters, HMI displays, recorders, alarm and trip units, remote setpoints, ratio systems, and other control components.
      - 1) Verify that readings at all loop components are in agreement.

- 2) Make corrections as required.
  - a) Following any corrections, retest the loop as before.
2. Stroke all control valves, cylinders, drives and connecting linkages from the local control station and from the control room operator interface.
3. Check all interlocks to the maximum extent possible.
4. Utilize the Loop Check-Out Sheet located at the end of this Specification Section (or Engineer approved equivalent) to document on-site calibration checks.
5. In addition to any other as-recorded documents, record all setpoint and calibration changes on all affected Contract Documents and turn over to the Owner.

**END OF SECTION**



# Loop Check-out Sheet

Project Name:		Owner's Project No. (if applicable):	Page of
Project Owner:		Regulatory Agency Project No. (if applicable):	
HDR Project No.:		Date:	

## LEAK AND TERMINATION/CONTINUITY CHECKS

DESCRIPTION	FIELD					CONTROL CAB	
	LEAK CHECK <sub>(1)</sub>			TERM/CONT CHECK <sub>(2)</sub>		TERM/CONT CHECK <sub>(2)</sub>	
	Device Tag No.	Process Conn.	Signal Tube	Device Tag No.	Termination Ident.	Device Tag No.	Termination Ident.

1. Leak check for pneumatic signal tubing to be per ISA-PR7.1.
2. Termination/continuity check includes check at terminated equipment for: (a) correct polarity, (b) appropriate signal generation, transmission and reception, and (c) correct shield & ground terminations.

## OPERATOR INTERFACE CHECK-OUT

### MONITORING POINTS OBSERVED

PARAMETER TYPE	TAG NO.					
PROCESS VAR						
EQUIP STATUS						
ALARM POINT						

### OPERATOR CONTROL FUNCTIONS CHECKED

FUNCTION TYPE	TAG NO.	LOCATION	TAG NO.	LOCATION	TAG NO.	LOCATION

### FINAL CONFIGURED SETTINGS

TAG NO.	SWITCH & ALARM SP	CONTROLLERS			
		Gain	Reset, rpm	Deriv. (rate), min	PV Set Point

Describe all interlocks checked, equipment started/stopped, valves/operators stroked. Describe modes of operation checked, and location of operator interface (local/remote).

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I certify that the control loop referenced on this page has been completely checked and functions in accordance with applicable drawings and specifications.

Certified by: \_\_\_\_\_ Date: \_\_\_\_\_  
 (Work Performed By)

### PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS



# Instrument Certification Sheet

Project Name:	Owner's Project No. (if applicable):
Project Owner:	Regulatory Agency Project No. (if applicable):
HDR Project No.	Date:
Control Loop No.:	
Instrument Tag No.	Transmitter/gauge span:
Manufacturer:	Switch set-point:
Model No.	Switch dead band:
Serial No.	Switch range:

## TRANSMITTERS AND INDICATORS

% OF SPAN	INCREASING INPUT			DECREASING INPUT		
	INPUT	OUTPUT	ERROR (% of span)	INPUT	OUTPUT	ERROR (% of span)
0%						
25%						
50%						
75%						
100%						
Other (if applicable)						
Other (if applicable)						

## SWITCHES

ACTUATION POINT	INCREASING INPUT			DECREASING INPUT		
	INPUT	OUTPUT	ERROR (% of range)	INPUT	OUTPUT	ERROR (% of range)
High (Increasing input)						
Low (Decreasing input)						

Maximum allowable error (per Contract Documents): \_\_\_\_\_

Remarks: \_\_\_\_\_

## CALIBRATION EQUIPMENT UTILIZED

DEVICE TYPE	MFR/MODEL NO.	ACCURACY	NIST TRACEABILITY?

Certified by: \_\_\_\_\_

Date Certified: \_\_\_\_\_

### PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS

Judy Reservoir to Mount Vernon  
Transmission Pipeline Phase 2

17000 - 8

Issued for Bidding  
November 23, 2020

PROCESS CONTROL SYSTEMS GENERAL REQUIREMENTS

Judy Reservoir to Mount Vernon  
Transmission Pipeline Phase 2

17000 - 9

Issued for Bidding  
November 23, 2020

**SECTION 17110**  
**CONTROL SYSTEM EQUIPMENT PANELS AND RACKS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Requirements for control panels and enclosures utilized as follows:
    - a. Unless noted otherwise, all control panels and enclosures housing control components that are specified in Section 17213, or Section 17800.
- B. This Section is only applicable to panels housing Division 16 specified equipment (e.g., motor starters, lighting controls, etc.) when so stated in the applicable Division 16 section.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American National Standards Institute (ANSI).
  - 2. ASTM International (ASTM):
    - a. B75, Standard Specification for Seamless Copper Tube.
  - 3. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. ICS 4, Industrial Control and Systems: Terminal Blocks.
  - 4. National Fire Protection Association (NFPA):
    - a. 70, National Electrical Code (NEC):
      - 1) Article 409, Industrial Control Panels.
      - 2) Article 504, Intrinsically Safe Systems.
  - 5. Underwriters Laboratories, Inc. (UL):
    - a. 508A, Standard for Safety Industrial Control Panels.
    - b. 698A, Standard for Industrial Control Panels Relating to Hazardous (Classified) Locations.
    - c. 913, Standard for Safety Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.
- B. Miscellaneous:
  - 1. Approved supplier of Industrial Control Panels under provisions of UL 508A or UL 698A.
    - a. Entire assembly shall be affixed with a UL 508A or UL 698A label "Listed Enclosed Industrial Control Panel" prior to shipment to the jobsite.
    - b. Control panel(s) without an affixed UL 508A or UL 698A label shall be rejected and sent back to the Contractor's factory.

**1.3 DEFINITIONS**

- A. Panel: Control panels or enclosures listed in the schedule included in this Specification Section.
- B. Foreign Voltages: Voltages that may be present in circuits when the panel main power is disconnected.
- C. Intrinsically Safe:
  - 1. A device, instrument or component that will not produce sparks or thermal effects under normal or abnormal conditions that will ignite a specified gas mixture.
  - 2. Designed such that electrical and thermal energy limits inherently are at levels incapable of causing ignition.
- D. Intrinsically Safe Circuit: A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of flammable or combustible material in air under test conditions as prescribed in UL 913.

- E. Cable: Multi-conductor, insulated, with outer sheath containing either building wire or instrumentation wire.
- F. Instrumentation Cable:
  - 1. Multiple conductor, insulated, twisted or untwisted, with outer sheath.
  - 2. Instrumentation cable is typically either TSP (twisted-shielded pair) or TST (twisted-shielded triad), and is used for the transmission of low current or low voltage signals.
- G. Ground Fault Circuit Interrupter (GFCI): A type of device (e.g., circuit breaker or receptacle) which detects an abnormal current flow to ground and opens the circuit preventing a hazardous situation.
- H. Programmable Logic Controller (PLC): A specialized industrial computer using programmed, custom instructions to provide automated monitoring and control functions by interfacing software control strategies to input/output devices.
- I. Remote Terminal Unit (RTU): An industrial data collection device designed for location at a remote site, that communicates data to a host system by using telemetry such as radio, dial-up telephone, or leased lines.
- J. Input/Output (I/O): Hardware for the moving of control signals into and/or out of a PLC or RTU.
- K. Supervisory Control and Data Acquisition (SCADA): Used in process control applications, where programmable logic controllers (PLCs) perform control functions but are monitored and supervised by computer workstations.
- L. Highway Addressable Remote Transducer (HART): An open, master-slave protocol for bus addressable field instruments.
- M. Digital Signal Cable: Used for the transmission of digital communication signals between computers, PLCs, RTUs, etc.
- N. Uninterruptible Power Supply (UPS): A backup power unit that provides continuous power when the normal power supply is interrupted.
- O. Loop Calibrator: Portable testing and measurement tool capable of accurately generating and measuring 4-20ma DC analog signals.

#### 1.4 SUBMITTALS

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. See Section 17000.
  - 2. Prepared with computer aided design (CAD) software.
  - 3. Printed on 11 by 17 IN sheets.
  - 4. Drawings shall include a title block containing the following:
    - a. Plant or facility name where panel(s) are to be installed.
    - b. Drawing title.
    - c. Drawing number.
    - d. Revision list with revision number and date
    - e. Drawing date.
    - f. Drawing scale.
    - g. Manufacturer name, address, and telephone number.
  - 5. Cover sheet for each drawing set shall indicate the following:
    - a. Plant or facility name.
    - b. Project name.
    - c. Submittal description.
    - d. Revision number.
    - e. Issue date.

#### CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

6. Table of contents sheet(s) shall indicate the following for each drawing in the set:
    - a. Drawing number.
    - b. Drawing title.
    - c. Sheet number.
  7. Legend and abbreviation sheet shall indicate the following:
    - a. Description of symbols and abbreviations used.
    - b. Panel construction notes including enclosure NEMA rating, finish type and color, wire type, wire color strategy, conductor sizes, and wire labeling strategy.
    - c. Confirmation that the panel(s) are to be affixed with a UL 508A or UL 698A label prior to shipment from the factory.
  8. Bill of Material for each panel shall include the following component information:
    - a. Instrument tag number.
    - b. Quantity.
    - c. Functional name or description.
    - d. Manufacturer.
    - e. Complete model number.
    - f. Size or rating.
  9. Panel exterior layout drawings to scale and shall indicate the following:
    - a. Panel materials of construction, dimensions, and total assembled weight.
    - b. Panel access openings.
    - c. Conduit access locations.
    - d. Front panel device layout.
    - e. Nameplate schedule:
      - 1) Nameplate location.
      - 2) Legend which indicates text, letter height and color, and background color.
      - 3) Short Circuit Current Rating (SCCR) marking per NFPA 70 or statement of exception. Include any required calculations.
    - f. Alarm annunciator window engraving schedule.
    - g. Layouts of graphic panels or mosaic displays.
  10. Panel interior layout drawings shall be drawn to scale and shall indicate the following:
    - a. Sub-panel or mounting pan dimensions.
    - b. Interior device layouts.
    - c. PLC/RTU general arrangement layouts.
    - d. Wire-way locations, purpose, and dimensions.
    - e. Terminal strip designations.
    - f. Location of external wiring and/or piping connections.
    - g. Location of lighting fixtures, switches and receptacles.
  11. Wiring diagrams shall consist of the following:
    - a. Panel power distribution diagrams.
    - b. Control and instrumentation wiring diagrams.
    - c. PLC/RTU I/O information:
      - 1) Model number of I/O module.
      - 2) Description of I/O module type and function.
      - 3) Rack and slot number.
      - 4) Terminal number on module.
      - 5) Point or channel number.
      - 6) Programmed point addresses.
      - 7) Signal function and type.
    - d. Wiring diagrams shall identify each wire as it is to be labeled.
- C. Manufacturer catalog cut sheets for enclosure, finish, panel devices, control auxiliaries, and accessories.
- D. Electrical load calculations for each panel:
  1. Total connected load.
  2. Peak electrical demand for each panel.

#### CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

- E. Climate control calculations for each panel.
  - 1. Verify that sufficient dissipation and/or generation of heat is provided to maintain interior panel temperatures within the rated operating temperatures of panel components.
- F. Contract Closeout Information:
  - 1. Operation and Maintenance Data:
    - a. See Section 01300 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
  - 2. See Section 01730.
- G. Informational Submittals:
  - 1. Record Drawings:
    - a. Updated panel drawings delivered with the panel(s) from the Contractor's factory.
    - b. Drawings shall be enclosed in transparent plastic and firmly secured within each panel.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  - 1. Enclosures:
    - a. Hoffman Engineering Co.
    - b. Rittal.
    - c. Hammond Manufacturing.
    - d. Millbank Mfg. Co.
    - e. Approved Equal.
  - 2. Panel heaters:
    - a. Hoffman Enclosures, Inc.
    - b. Rittal.
    - c. Hammond Manufacturing.
    - d. Approved Equal.
  - 3. Heat exchangers and air conditioners:
    - a. Hoffman Enclosures, Inc.
    - b. Rittal.
    - c. Hammond Manufacturing.
    - d. Approved Equal.
  - 4. Cooling fans and exhaust packages:
    - a. Hoffman Enclosures, Inc.
    - b. Rittal.
    - c. Approved Equal.
  - 5. Internal corrosion inhibitors:
    - a. Hoffman Enclosures, Inc.; Model A-HCI.
    - b. Northern Technologies International Corporation (NTIC); Model Zerust VC.
    - c. Cortec Corporation; Model VpCI Emitting Systems.
    - d. Approved Equal.

### **2.2 FABRICATION**

- A. General:
  - 1. Fabricate panels with instrument arrangements and dimensions identified in the Contract Documents.
  - 2. Provide panel(s) with the required enclosure rating per NEMA 250 to meet classifications identified in the Contract Documents.
  - 3. Devices installed in panel openings shall have a NEMA enclosure rating at least equal to the panel enclosure rating.

#### **CONTROL SYSTEM EQUIPMENT PANELS AND RACKS**

- a. Devices that cannot be obtained with an adequate NEMA rating shall be installed behind a transparent viewing window.
  - b. The window shall maintain the required NEMA rating of the enclosure.
  4. Panel(s) shall be completely assembled at the Contractor's factory.
    - a. No fabrication other than correction of minor defects or minor transit damage shall be performed on panels at the jobsite.
  5. Painting:
    - a. Panels fabricated from steel shall have their internal and external surfaces prepared, cleaned, primed, and painted.
      - 1) Mechanically abrade all surfaces to remove rust, scale, and surface imperfections.
      - 2) Provide final surface treatment with 120 grit abrasives or finer, followed by spot putty to fill all voids.
      - 3) Utilize solvent or chemical methods to clean panel surfaces.
      - 4) Apply surface conversion of zinc phosphate prior to painting to improve paint adhesion and to increase corrosion resistance.
      - 5) Electrostatically apply polyester urethane powder coating to all inside and outside surfaces.
      - 6) Bake powder coating at high temperatures to bond coating to enclosure surface.
        - a) Panel interior shall be white with semi-gloss finish.
        - b) Panel exterior shall be ANSI #61 gray with flat finish.
      - 7) Application of alkyd liquid enamel coating shall be allowed in lieu of polyester urethane powder for wall mounted NEMA 1 or NEMA 12 rated panels.
    - b. Panels fabricated from stainless steel, aluminum, or fiberglass shall not be painted.
  6. Finish opening edges of panel cutouts to smooth and true surface conditions.
    - a. Panels fabricated from steel shall have the opening edges finished with the panel exterior paint.
  7. Panels shall meet all requirements of UL 508A or UL 698A.
    - a. If more than one disconnect switch is required to disconnect all power within a panel or enclosure, provide a cautionary marking with the word "CAUTION" and the following or equivalent, "Risk of Electric Shock-More than one disconnect switch required to de-energize the equipment before servicing."
  8. Provide control panel in accordance with NFPA 70, Article 409.
    - a. In the event of any conflict between NFPA 70, Article 409 and UL 508A or UL 698A, the more stringent requirement shall apply.
  9. Provide equipment or control panels with Short Circuit Current Rating (SCCR) labeling as required by NFPA 70 and other applicable codes.
    - a. Determine the SCCR rating by one of the following methods:
      - 1) Method 1: SCCR rating meets or exceeds the available fault current of the source equipment when indicated on the Drawings.
      - 2) Method 2: SCCR rating meets or exceeds the source equipment's Amp Interrupting Current (AIC) rating as indicated on the Drawings.
      - 3) Method 3: SCCR rating meets or exceeds the calculated available short circuit current at the control panel.
    - b. The source equipment is the switchboard, panelboard, motor control center or similar equipment where the control panel circuit originates.
    - c. For Method 3, provide calculations justifying the SCCR rating. Utilize source equipment available fault current or AIC rating as indicated on the Drawings.
- B. Wall Mounted Panels:
1. Seams continuously welded and ground smooth.
  2. Rolled lip around all sides of enclosure door opening.
  3. Gasketed dust tight.
  4. [Door clamps and hasp/staple for padlocking] [Three-point latching mechanism operated by oil tight key-locking handle].
  5. Key doors alike.

#### CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

6. Continuous heavy GA hinge pin on doors.
    - a. Hinges rated for 1.5 times door plus instrument weight.
  7. Front full opening door.
  8. Brackets for wall mounting.
- C. Internal Panel Wiring:
1. Panel wire duct shall be installed between each row of components, and adjacent to each terminal strip.
    - a. Route wiring within the panel in wire-duct neatly tied and bundled with tie wraps.
    - b. Follow wire-duct manufacturer's recommended fill limits.
    - c. Wire-duct shall have removable snap-on covers and perforated walls for easy wire entrance.
    - d. Wire-duct shall be constructed of nonmetallic materials with rating in excess of the maximum voltage carried therein.
  2. Wiring shall be installed such that if wires are removed from one device, source of power will not be disrupted to other devices.
  3. Splicing and tapping of wires permitted only at terminal blocks.
  4. Wire bunches to doors shall be secured at each end so that bending or twisting will be around longitudinal axis of wire.
    - a. Protect bend area with sleeve.
  5. Arrange wiring neatly, cut to proper length, with surplus wire removed.
    - a. Arrange wiring with sufficient clearance.
    - b. Provide abrasion protection for wire bundles that pass through openings or across edges of sheet metal.
  6. AC circuits shall be routed separate from analog signal cables and digital signal cables.
    - a. Separate by at least 6 IN, except at unavoidable crossover points and at device terminations.
  7. Separation of intrinsically safe circuit conductors and non-intrinsically safe circuit conductors:
    - a. Secure conductors so that any intrinsically safe circuit conductor that might come loose from a terminal is unlikely to come into contact with another terminal.
    - b. Separate non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by one of the following methods:
      - 1) Separation of non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by at least 2 IN (50 MM).
      - 2) Separation of non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by use of a grounded metal partition 0.0359 IN (0.91 MM) or thicker.
      - 3) Separation of non-intrinsically safe circuit conductors from intrinsically safe circuit conductors by use of an approved insulating partition that extends to within 0.0625 IN (1.5 MM) of the enclosure walls.
      - 4) Where either (1) all of the intrinsically safe circuit conductors or (2) all of the non-intrinsically safe circuit conductors are in grounded metal-sheathed or metal-clad cables where the sheathing or cladding is capable of carrying fault current to ground.
  8. Separate different intrinsically safe circuit conductors from each other by one of the following means:
    - a. The conductors of each circuit are within a grounded metal shield.
    - b. The conductors of each circuit have insulation with a minimum thickness of 0.01 IN (0.25 MM).
  9. Provide minimum clearance of 0.125 IN (3 MM) between uninsulated parts of intrinsically safe field wiring conductors connected to terminals and grounded metal or other conducting parts.
  10. Wiring to pilot devices or rotary switches shall be individually bundled and installed with a "flexible loop" of sufficient length to permit the component to be removed from panel for maintenance without removing terminations.

#### CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

11. Conductors for AC and DC circuits shall be type MTW stranded copper listed for operation with 600 V at 90 DEGC.
    - a. Conductor size shall be as required for load and 16 AWG minimum.
    - b. Internal panel wiring color code:
      - 1) AC circuits:
        - a) Power wiring: Black.
        - b) Control interconnections: Yellow.
        - c) Neutral: White.
        - d) Ground: Green.
      - 2) Low voltage DC circuits:
        - a) Power wiring: Blue.
        - b) Control interconnections: Violet.
      - 3) Foreign voltage circuits: Pink.
      - 4) Annunciator circuits: Red.
      - 5) Intrinsically safe circuits: Light Blue.
  12. Analog signal cables shall be of 600 V insulation, stranded copper, twisted-shielded pairs.
    - a. Conductor size: 18 AWG minimum.
    - b. Terminate shield drain conductors to ground only at one end of the cable.
  13. High precision 250 ohm resistors with 0.25 PCT accuracy shall be used where 4 - 20 mA DC analog signals are converted to 1 - 5 VDC signals.
    - a. Resistors located at terminal strips.
    - b. Resistors terminated using individual terminal blocks and with no other conductors.
    - c. Resistor leads shall be un-insulated and of sufficient length to allow test or calibration equipment (e.g., HART communicator, loop calibrator) to be properly attached to the circuit with clamped test leads.
  14. Analog signals for devices in separate enclosures shall not be wired in series.
    - a. Loop isolators shall be used where analog signals are transmitted between control enclosures.
  15. Wire and cable identification:
    - a. Wire and cables numbered and tagged at each termination.
    - b. Wire tags:
      - 1) Slip-on, PVC wire sleeves with legible, machine-printed markings.
      - 2) Adhesive, snap-on, or adhesive type labels are not acceptable.
    - c. Markings as identified in the Shop Drawings.
- D. Grounding Requirements:
1. Equipment grounding conductors shall be separated from incoming power conductors at the point of entry.
  2. Minimize grounding conductor length within the enclosure by locating the ground reference point as close as practical to the incoming power point of entry.
  3. Bond electrical racks, chassis and machine elements to a central ground bus.
    - a. Nonconductive materials, such as paint, shall be removed from the area where the equipment contacts the enclosure.
  4. Bond the enclosure to the ground bus.
  5. It is imperative that good electrical connections are made at the point between the ground bus and enclosure.
  6. Panel-mounted devices shall be bonded to the panel enclosure or the panel grounding system by means of locknuts or pressure mounting methods.
  7. Sub-panels and doors shall be bonded to ground.
  8. Associated apparatus (connected to intrinsically safe circuits) and associated cable shields:
    - a. Ground in accordance with the associated control drawing (drawing provided for the intrinsically safe circuit and which contains manufacturer's entity parameters).
- E. Termination Requirements:
1. Wiring to circuits external to the panel connected to interposing terminal blocks.
  2. Terminal blocks rigidly mounted on DIN rail mounting channels.

#### CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

3. Terminal strips located to provide adequate space for entrance and termination of the field conductors.
  4. One side of each strip of terminal blocks reserved exclusively for the termination of field conductors.
  5. Terminal block markings:
    - a. Marking shall be the same as associated wire marking.
    - b. Legible, machine-printed markings.
    - c. Markings as identified in the shop drawings.
  6. Terminal block mechanical characteristics, and electrical characteristics shall be in accordance with NEMA ICS 4.
  7. Terminal blocks with continuous marking strips.
    - a. Each terminal block shall be identified with machine printed labels.
  8. Terminals shall facilitate wire sizes as follows:
    - a. 120 VAC applications: Conductor size 12 AWG minimum.
    - b. Other: Conductor size 14 AWG minimum.
  9. Analog signal cable shield drain conductors shall be individually terminated.
  10. Install minimum of 20 PCT spare terminals.
  11. Bladed, knife switch, isolating type terminal blocks where control voltages enter or leave the panel.
  12. Fused terminal blocks shall be used in the following circuits:
    - a. Control voltage is used to energize a solenoid valve.
    - b. DC power is connected to 2-wire, loop-powered instruments.
  13. Fused terminal blocks shall be provided with blown fuse indicators.
  14. When control circuits require more than one field conductor connected to a single wiring point, a sufficient number of terminal points shall be connected internally to allow termination of only one field conductor per terminal block.
  15. DIN rail mounting channels shall be installed along full length of the terminal strip areas to facilitate future expansion.
  16. Connections to devices with screw type terminals shall be made using spade-tongue, insulated, compression terminators.
  17. Intrinsically safe circuit termination:
    - a. Provide at least 0.25 IN (6 MM) clearance between two terminals for connection of field wiring of different intrinsically safe circuits, unless this clearance is permitted to be reduced by the control drawing this is provided for the intrinsically safe circuit and which contains manufacturer's entity parameters.
    - b. Identify intrinsically safe circuits at terminal and junction locations in a manner that is intended to prevent unintentional interference with the circuits during testing and servicing as required by NEC, Article 504.
- F. Component Mounting and Placement:
1. Components shall be installed per manufacturer instructions.
  2. Mount and wire so removal or replacement may be accomplished without interruption of service to adjacent devices.
  3. Control relays and other control auxiliaries shall be mounted on DIN rail mounting channels where practical.
  4. Front panel devices shall be mounted within a range of 40 to 70 IN above the finished floor, unless otherwise shown in the Contract Documents.
  5. PLC/RTU and I/O rack installation:
    - a. Located such that the LED indicators and switches are readily visible with the panel door open.
    - b. Located such that repair and/or replacement of component can be accomplished without the need to remove wire terminations or other installed components.
  6. Locate power supplies with sufficient spacing for circulation of air.
  7. Where components such as magnetic starters, contactors, relays, and other electromagnetic devices are installed within the same enclosure as the PLC/RTU system components,

#### CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

provide a barrier of at least 6 IN of separation between the “power area containing the electromagnetic devices” and the “control area”.

8. Components mounted in the panel interior shall be fastened to an interior sub-panel using machine screws.
    - a. Fastening devices shall not project through the outer surface of the panel enclosure.
  9. Excess mounting space of at least 20 PCT for component types listed below to facilitate future expansion:
    - a. Fuse holders.
    - b. Circuit breakers.
    - c. Control relays.
    - d. Time delay relays.
    - e. Intrinsically safe barriers and relays.
  10. Components installed on sub-panels shall be provided with a minimum spacing between component and wire duct of 1 IN.
    - a. Minimum of 2 IN separation between terminal strips and wire ducts.
  11. Pneumatic tubes and appurtenances:
    - a. Connect panel air piping and tubing penetrations with bulkhead fittings.
    - b. Pneumatic control tubing shall be 1/4 IN OD.
      - 1) Tubing material: Either soft annealed ASTM B75 copper or flame-resistant polyethylene.
    - c. Main headers within panels shall be minimum 1 IN.
    - d. Compression-type pressure fittings.
    - e. Equip panel instrument leads with ball type isolation valve.
    - f. Route tubing neatly and mount securely.
    - g. Do not route tubing in front of or in wire ducting.
    - h. Code terminal plates.
    - i. Pneumatic devices shall be served by a dual function filter regulator.
  12. In addition to the requirements above, mount and wire so removal or replacement may be accomplished without interruption of service to adjacent devices.
- G. Power Distribution:
1. Main incoming power circuits shall be protected with a thermal magnetic circuit breaker.
    - a. Limit load to maximum of 80 PCT of circuit breaker rating.
  2. Component types listed below shall be individually fused so that they may be individually de-energized for maintenance:
    - a. PLC/RTU power supply modules.
    - b. Single-loop controllers.
    - c. Recorders.
    - d. Alarm annunciators.
  3. Each control panel with PLC/RTU components shall be furnished with power protection in the form of a double conversion UPS.
  4. Equip each panel with necessary power supplies with ratings required for installed equipment and with minimum 25 PCT spare capacity.
  5. Constant voltage transformers, balancing potentiometers, and rectifiers as necessary for specific instrument requirements.
- H. Internal Panel Lighting and Service Receptacles:
1. Panels less than or equal to 4 FT wide:
    - a. One electrical GFCI duplex receptacle.
    - b. One compact fluorescent light fixture with manual switch(es).
  2. Panels or panel faces greater than 4 FT wide:
    - a. One duplex electrical GFCI receptacle per 6 FT of length.
    - b. Continuous fluorescent lighting strip with manual switches.
- I. Environmental Controls:
1. Outdoor panels:

#### CONTROL SYSTEM EQUIPMENT PANELS AND RACKS

- a. Outdoor temperature range of 0 DEGF through 120 DEGF.
  - b. Thermostat controlled heaters to maintain temperature approximately 10 DEGF above ambient dew point for condensation prevention inside the panels.
  - c. Outdoor temperature range of 0 DEGF through 120 DEGF.
  - d. Thermostat controlled closed-loop heat exchangers or closed-loop air conditioners if required to maintain temperature inside each enclosure below the maximum operating temperature rating of the components inside the panel.
  - e. Internal corrosion inhibitors.
2. Environmental control components:
- a. Panel heaters:
    - 1) Thermostat controlled.
    - 2) Fan driven.
    - 3) Components mounted in an anodized aluminum housing.
    - 4) Designed for sub-panel mounting.
    - 5) Powered from 120 VAC and protected with a dedicated circuit breaker.
  - b. Cooling fans and exhaust packages:
    - 1) Cooling fan with louver or grill and replaceable filter.
    - 2) Designed to be mounted within a panel cutout to provide positive airflow through the panel.
    - 3) Cooling fan and exhaust louvers shall be designed and listed to maintain a NEMA 12 enclosure rating.
    - 4) Fitted with replaceable, high-density foam or synthetic fiber.
    - 5) Cooling fan controlled with a separately mounted thermostat with bi-metal sensor and adjustable dial for temperature setting.
    - 6) Powered from 120 VAC and protected with a dedicated circuit breaker.
  - c. Heat exchangers and air conditioners:
    - 1) Dual-loop design to isolate panel interior air from exterior air.
    - 2) Thermostat controlled.
    - 3) Operate from 120 VAC and protected with a dedicated circuit breaker.
  - d. Internal corrosion inhibitors:
    - 1) Contains chemical which vaporizes and condenses on surfaces in the enclosure.
    - 2) Inhibitor shall be applied in accordance with manufacturer instructions for the enclosure volume.
    - 3) Inhibitor shall be applied in the panel(s) prior to shipment from the Contractor's factory.

## **2.3 MAINTENANCE MATERIALS**

- A. Extra Materials:
  - 1. Quantity of 25 PCT replacement lamps for each type installed (minimum of 12 of each type).
  - 2. Minimum 12 replacement filters for each type installed.
  - 3. 1 QT of exterior finish touch-up paint.
  - 4. One complete set of replacement corrosion inhibitors in sealed packages for each panel.

## **PART 3 - EXECUTION**

### **3.1 FACTORY TESTING**

- A. Scope: Inspect and test entire panel assembly to verify readiness for shipment.
- B. Location: Contractor's factory.
- C. Factory Tests:
  - 1. Tests shall be fully documented and signed by the Contractor's factory supervisor.
  - 2. The panel shop shall fully test the control panel for correct wiring.

#### **CONTROL SYSTEM EQUIPMENT PANELS AND RACKS**

- a. Each I/O point shall be checked by measuring or connecting circuits at the field terminal blocks.
3. Burn-in test: Panel(s) shall be fully energized for a minimum period of 48 HRS.
4. A PLC Central Processing Unit (CPU) shall be obtained and connected to the panel(s) if necessary for testing purposes.
5. Testing equipment (such as digital multi-meters, analog loop calibrators, and laptop computers with PLC programming software) shall be used as required for testing.
6. The following functions shall be tested as a minimum:
  - a. Demonstrate functions of the panel(s) required by the Contract Documents.
  - b. Correctness of wiring from all panel field terminals to all I/O points and to all panel components.
  - c. Simulate and test each discrete signal at the field terminal strips.
  - d. Simulate and test each analog signal using loop calibrators.
  - e. Correct operation of communications between PLC system Central Processing Units (CPUs) and Remote I/O bases.
  - f. Correct operation of single-loop controllers (including digital communication to microprocessor based devices).
  - g. Correct operation of all digital communication devices.
  - h. Demonstrate online and offline diagnostic tests and procedures.
  - i. Notify the Engineer in writing a minimum of 15 calendar days prior to the Factory Tests.
    - 1) Engineer has the option to witness all required tests.
7. Make following documentation available to the Engineer at test site during the tests:
  - a. Contract Documents.
  - b. Factory Demonstration Testing procedures.
  - c. List of equipment to be testing including make, model, and serial number.
  - d. Shop Drawing submittal data for equipment being tested.
8. Deficiencies shall be corrected prior to shipment from the Contractor's factory.

### **3.2 INSTALLATION**

- A. Install free-standing panels on 4 IN high concrete housekeeping pads.
- B. Anchor panels in a manner to prevent the enclosure from racking, which may cause the access doors to become misaligned.
- C. Obtain approved panel layouts prior to installation of conduits.
- D. Install products in accordance with manufacturer's instructions.

### **END OF SECTION**

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**SECTION 17213**  
**LEVEL INSTRUMENTATION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Level Switches:
    - a. Float-Tilt Type Level Switch.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
  - 1. American Society of Mechanical Engineers (ASME):
    - a. B16.5, Pipe Flanges and Flanged Fittings.
  - 2. ASTM International (ASTM):
    - a. A106, Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service.
  - 3. American National Standards Institute (ANSI).

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
  - 1. See Specification Section 17000.
- C. Operation and Maintenance Manuals:
  - 1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content of Operation and Maintenance Manuals.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the Articles describing the elements are acceptable.

**2.2 LEVEL SWITCHES**

- A. Float-Tilt Type Level Switch:
  - 1. Acceptable manufacturers:
    - a. Anchor Scientific Inc.
    - b. Consolidated Electric.
    - c. Contegra.
    - d. Approved Equal.
  - 2. Materials:
    - a. Float material: Polypropylene or Teflon coated type 316 stainless steel.
    - b. Cable jacket: PVC, neoprene.
    - c. Cable clamp: Polypropylene or 316 stainless steel.
  - 3. Design and fabrication:
    - a. Mercury-free switch.
    - b. Provide switch complete with flexible electrical cables.
    - c. SPDT contact rated at 1 amp at 120 VAC.
    - d. Direct acting float switch:

- 1) Switch actuates on rising level.
  - 2) Switch deactuates when liquid falls 1 IN below actuation level.
  - e. Terminate cables in junction box.
  - f. Process temperature: max. 120 DEGF.
  - g. Install floats per drawing details.
4. Schedule (or Instrument List):

TAG NUMBER	SERVICE	CONTACT NO / NC / NO-NC	MOUNTING ELEVATION	MOUNTING (Suspended or Pipe)
LSHH101	WATER	NC	FIELD DETERMINE FLOOD LEVEL. MOUNT AT FLOOD LEVEL.	SUSPENDED
LSHH102	WATER	NC	FIELD DETERMINE FLOOD LEVEL. MOUNT AT FLOOD LEVEL.	SUSPENDED
LSHH201	WATER	NC	FIELD DETERMINE FLOOD LEVEL. MOUNT AT FLOOD LEVEL.	SUSPENDED
LSHH202	WATER	NC	FIELD DETERMINE FLOOD LEVEL. MOUNT AT FLOOD LEVEL.	SUSPENDED

### 2.3 ACCESSORIES

- A. Furnish all mounting brackets, hardware and appurtenances required for mounting primary elements and transmitters.
  1. Materials, unless otherwise specified, shall be as follows:
    - a. Bolts, nuts, washers, expansion anchors: 316 stainless steel.
    - b. Mounting brackets:
      - 1) Standard: 316 stainless steel.
      - 2) Highly corrosive areas: Aluminum.
    - c. Mounting plates, angles:
      - 1) Standard: Carbon steel.
      - 2) Corrosive areas: 316 stainless steel.
    - d. Instrument pipe stands:
      - 1) Standard: Hot-dip galvanized 2 IN schedule 40, ASTM A106, Grade B carbon steel.
      - 2) Corrosive areas: 316 stainless steel.
- B. Provide handheld communicator compatible for all intelligent transmitters furnished.
  1. Hand held communicator shall provide capability to check calibration, change transmitter range, and provide diagnostics.
  2. If these features are provided with the intelligent transmitter that is accessible, the hand held communicator is not required.
- C. Cable lengths between sensors and transmitters shall be continuous (without splices) and as required to accommodate locations as shown on Drawings.

## LEVEL INSTRUMENTATION

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install instrument mounting pipe stands level and plumb.
- C. Instrument Valves:
  - 1. Orient stems for proper operation.
  - 2. Install arrays orderly and neat in appearance with true horizontal and vertical lines.
  - 3. Provide a minimum of 2 IN clearance between valve handle turning radii where there are multiple valve handles appearing in a straight line.
  - 4. Valves shall have bonnets and any soft seals removed during welding or soldering into the line.
    - a. When cool, reassemble the valves.
  - 5. Support each valve individually.
    - a. The tubing system does not qualify as support for the valve.
- D. Locate instrument piping and tubing so as to be free of vibration and interference with other piping, conduit, or equipment.
- E. Keep foreign matter out of the system.
- F. Remove all oil on piping and tubing with solvent before piping and tubing installation.
- G. Plug all open ends and connections to keep out contaminants.
- H. Threaded Connection Seals:
  - 1. Use Tite-Seal or acceptable alternate.
  - 2. Use of lead base pipe dope or Teflon tape is not acceptable.
  - 3. Do not apply Tite-Seal to tubing threads of compression fittings.
- I. Instrument Mounting:
  - 1. Mount all instruments where they will be accessible from fixed ladders, platforms, or grade.
  - 2. Mount all local indicating instruments with face forward toward the normal operating area, within reading distance, and in the line of sight.
  - 3. Mount instruments level, plumb, and support rigidly.
  - 4. Mount to provide:
    - a. Protect from heat, shock, and vibrations.
    - b. Provide accessibility for maintenance.
    - c. Free from interference with piping, conduit and equipment.

**END OF SECTION**

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**SECTION 17800**  
**PROGRAMMABLE LOGIC CONTROLLER (PLC) CONTROL SYSTEM**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
1. Programmable logic controller (PLC) control system(s), including Hardware, software, programming, documentation, and training.

**1.2 QUALITY ASSURANCE**

- A. Referenced Standards:
1. The Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. C37.90.2, Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers.
    - b. C62.41.2, Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits.
  2. National Electrical Manufacturers Association (NEMA):
    - a. ICS 1, Industrial Control and Systems General Requirements.
- B. Qualifications:
1. Installation supervisor shall have had experience in overseeing installation and startup of at least three similar installations within the last five years.
  2. Programmer(s) shall have had experience in programming PLCs for at least two projects of similar size and complexity within the last three years.

**1.3 SUBMITTALS**

- A. Procedures: Section 01300.
- B. Shop Drawings:
1. See Specification Section 17000.
  2. Product technical data including:
    - a. Annotated copies of complete PLC software programs.
      - 1) Provide one PDF-format file with fully annotated PLC code that can be read without the native configuration and programming environment on electronic media (DVD or USB drive).
      - 2) Provide written descriptions completely defining all function blocks used in program.
      - 3) Provide list of all addresses referenced in logic diagram with description of data associated with each address (Tag database).
    - b. Results of factory testing or simulation procedures.
    - c. Drawings containing the following information to be submitted as part of Specification Section 17110 (control panels) submittals:
      - 1) Arrangement drawings for PLC system components.
      - 2) Panel and enclosure plans, sections and details.
      - 3) Access opening locations and required clearances for each panel and enclosure.
      - 4) Enclosure internal wiring and terminal blocks.
    - d. DIP Switch and Jumper Settings, if applicable.
    - e. I/O Rack and I/O Module Layout.
    - f. Wiring and Interconnection diagrams.
      - 1) Power Supplies.
      - 2) I/O Points.
      - 3) Communications.
    - g. Catalog cut sheets containing information on PLC components to be submitted as part of these Specification Section submittals.

PROGRAMMABLE LOGIC CONTROLLER (PLC) CONTROL SYSTEM

3. Certifications:
    - a. Qualifications of installation supervisor.
    - b. Qualifications of programmer(s).
  4. Software Licenses:
    - a. Documentation proving all software package licenses are assigned to owner.
- C. Operation and Maintenance Data:
1. See Specification Section 01730 for requirements for:
    - a. The mechanics and administration of the submittal process.
    - b. The content of Operation and Maintenance Manuals.
  2. Program Documentation.
    - a. Program Overview.
    - b. Program Listing.
    - c. I/O Listing.
    - d. Memory Map.
    - e. I/O Cross Reference.
  3. Submit maintenance procedures available to Owner.
    - a. Include the location and phone numbers of service centers (including 24 HR "hot lines").
    - b. Provide specific information including operation and maintenance requirements, programming assistance, troubleshooting guide, parts ordering, field service personnel requests, and service contracts.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
  1. Rockwell Automation: Allen-Bradley.
  2. Approved Equal.
- B. Products nearing their "End of Life" shall not be used. "Used" hardware shall also not be used.

### **2.2 PERFORMANCE AND DESIGN REQUIREMENTS**

- A. See Specification Section 17000.
- B. The PLC system shall accomplish the control requirements of the Loop Descriptions, Drawings, and Specifications.
- C. PLC programming shall be documented and factory tested.
- D. The PLC system shall operate in ambient conditions of 32 to 140 DEGF temperatures and 5 to 95 PCT relative humidity without the need for purging or air conditioning.
- E. Environmental Controls:
  1. Furnish circulation fans in solid state control system enclosures.
  2. Over-temperature switches shall be utilized to provide special cooling if required to maintain operating temperatures within the manufacturer's specified range.
  3. Air conditioning applications shall include means of preventing moisture condensation.
- F. Where the PLC is utilized to control multiple trains of equipment and where the equipment in each train operates as a unit relatively independent of other equipment trains (e.g., facility with multiple boiler units or filter trains), the PLC components (I/O modules, power supplies, etc.) shall be assigned so that the failure of any one component does not affect equipment on all trains.
  1. I/O modules shall be segregated on a train basis unless required otherwise for safety reasons.
  2. Where several equipment units operate in parallel, but are not considered assigned to a particular equipment train (e.g., multiple raw water pumps or chemical feed pumps all discharging into a common system), the PLC I/O modules associated with each equipment unit shall be assigned so that the failure of any one I/O module does not affect all of the parallel operating equipment units.

#### **PROGRAMMABLE LOGIC CONTROLLER (PLC) CONTROL SYSTEM**

## 2.3 HARDWARE

- A. Processor shall include diagnostic indicators for power, mode, low battery, communications ports, and memory and I/O errors.
- B. I/O modules shall be capable of being replaced while under power.
- C. All I/O modules shall report to the CPU should a terminal block fail or be removed.
- D. Analog output modules shall have a resolution of at least 12 bits.
- E. Provide electric isolation between logic and field device.
- F. Field wiring shall not be disturbed when removing or replacing an I/O module.
- G. Power Supply Units:
  - 1. Electrical service to PLC system is 105 to 125 V, 60 Hz,  $\pm 10$  PCT, 1 PH power.
- H. All PLC control system components shall be capable of meeting or exceeding electromagnetic interference tests per IEEE C37.90.2.
- I. Incorporate the following minimum safety measures:
  - 1. Watchdog function to monitor:
    - a. Internal processor clock failure.
    - b. Processor memory failure.
    - c. Loss of communication between processor and I/O modules.
    - d. Processor ceases to execute logic program.
  - 2. Safety function wiring: Emergency shutdown switches shall not be wired into the controller.
  - 3. Safe wiring:
    - a. Unless otherwise specified, activation of alarms and stopping of equipment shall result from the de-energization of control circuits, rather than the energization of control circuits.
    - b. Low voltage control signal wires:
      - 1) Place in conduit segregated for that purpose only.
      - 2) Twisted shielded wire pair.
      - 3) Not located in the same conduit or bundle with power wiring.
  - 4. Initial safety conditions:
    - a. Utilize program module to dictate output states in a known and safe manner prior to running of control program.
    - b. Utilize program each time PLC is re-initiated and the control program activated.
  - 5. Monitoring of internal faults and display:
    - a. Internal PLC system status and faults shall be monitored and displayed.
      - 1) Monitored items shall include:
        - a) Memory ok/loss of memory.
        - b) Processor ok/processor fault.
        - c) Scan time overrun.
  - 6. Control of programs: Protect access to PLC program loading with password protection or with locked, key operated selector switches.
    - a. Provide passwords and/or keys to owner at Substantial Completion.
  - 7. Design PLC system with high noise immunity to prevent occurrence of false logic signals resulting from switching transients, relay and circuit breaker noise or conducted and radiated radio frequency interference.
  - 8. Operator intervention:
    - a. Logic system failure shall not preclude proper operator intervention.
    - b. Safety shutdown of equipment or a system shall require manual operator intervention before the equipment or system operation may be reestablished.

## 2.4 SOFTWARE

- A. All software will be furnished and licensed to owner as required.
  - 1. Once project is accepted as complete, transfer all licenses and media to owner.

### PROGRAMMABLE LOGIC CONTROLLER (PLC) CONTROL SYSTEM

2. All software must be latest edition and licensed to the Owner.
- B. Programming.
1. Languages supported: All application programming in IEC 61131-3 compliant language.
  2. Program PLC utilizing ladder diagram, function block, or structured text format.
  3. Protect program via removable key switch or password to prevent unauthorized changes. Provide password and/or programming keys to owner.
  4. Capable of on-line and off-line programming.
- C. PLC program Structure.
1. Clear, concise, well-annotated logic.
  2. Implement a modular design to allow specific functions to be replicated to ensure consistency.
  3. Program shall align with the control strategies. Include comments reflecting alignment with control strategies.
  4. Include named variables that reflect the actual use of the variable.
  5. Annotate program listing to include the following (using the features of the appropriate PLC programming software):
    - a. Clearly identified variables, I/O points, contacts, and analog values.
    - b. Written description of each functional area.
    - c. Written description of each rung's function.
    - d. Reference to control loop number for each rung where applicable.
    - e. Reference to instrumentation tag number of I/O devices for each rung where applicable.

## 2.5 COMPONENTS

- A. PLC System Central Processor Unit (CPU):
1. CPU shall provide communications with other control systems and man-machine interfaces as specified.
  2. CPU shall include capability to modify logic via an Ethernet port without taking processor off line.
  3. Memory:
    - a. Battery-backed RAM.
    - b. Non-volatile program storage via flash EEPROM:
      - 1) Automatically download to RAM in the event RAM is corrupted.
  4. Memory battery backup shall be capable of 180 days memory retention with fresh battery.
    - a. Provide visual indication of battery status and alarm low battery voltage.
    - b. Memory battery backup shall be capable of 28 days memory retention after the "Battery Low" indicating LED is on.
  5. Plug-in card designed to allow quick field replacement of faulty devices.
    - a. Provide unit designed for field replacement and expansion of memory without requiring rewiring or use of special tools.
  6. 20 PCT minimum spare useable memory capacity after all required programming is in place and operating.
  7. Capable of executing all control functions required by the Specifications and Drawings.
  8. Built-in three-mode (proportional-integral-derivative) control capabilities.
    - a. As directly selectable algorithms requiring no user knowledge of programming languages.
  9. Lighted status indicators for "RUN" and "FAILURE".
  10. Capable of manual or automatic control mode transfer from the operating console stations or from within the control strategy.
    - a. Transfer shall be bumpless and balanceless.
- B. Input/output (I/O) Modules:
1. Provide plug-in modular-type I/O racks with cables to connect to all other required PLC system components.
  2. Provide I/O system with:
    - a. I/O solid state boards with status lights indicating I/O status.
    - b. Electric isolation between logic and field device.
    - c. Capability of withstanding low energy common mode transient to 1000 V without failure.

### PROGRAMMABLE LOGIC CONTROLLER (PLC) CONTROL SYSTEM

- d. Incorporate noise suppression design.
  - e. Capable of meeting or exceeding electrical noise tests, NEMA ICS 1-109.60-109.66.
  - f. Capable of being removed and inserted into the I/O rack under power, without affecting any other I/O modules in the rack.
  - g. Install 20 PCT spare I/O points for each type.
3. Input/output connection requirements:
    - a. Make connections to I/O subsystem by terminating all field wiring on terminal blocks within the I/O enclosure.
    - b. Prewire I/O modules to terminal blocks.
    - c. Provide terminal blocks with continuous marking strip.
    - d. Size terminals to accommodate all active data base points and spares.
    - e. Provide terminals for individual termination of each signal shield.
    - f. Field wiring shall not be disturbed when removing or replacing an I/O module.
  4. Discrete I/O modules:
    - a. Interface to ON/OFF devices.
    - b. I/O status indicator on module front.
    - c. Voltage rating to match circuit voltage.
    - d. Output module current rating:
      - 1) Match maximum circuit current draw.
      - 2) Minimum 1.0 continuous A/point for 120 VAC applications.
    - e. Isolated modules for applications where one module interfaces with devices utilizing different sources of power.
  5. Discrete outputs shall be fused:
    - a. Provide one fuse per common or per isolated output.
    - b. Provide blown fuse indication.
    - c. External fusing shall be provided if output module does not possess internal fusing.
    - d. Fuses provided external to output model shall:
      - 1) Be in accordance with module manufacturer's specifications.
      - 2) Be installed at terminal block.
  6. Analog I/O modules:
    - a. Input modules to accept signals indicated on Drawings or Specifications.
    - b. Minimum 12 bit resolution.
    - c. I/O chassis supplied power for powering connected field devices.
    - d. Differential inputs and outputs.
    - e. User configurable for desired fault-response state.
    - f. Provide output signals as indicated on Drawings and Specifications.
    - g. Individual D/A converter for each output module.
    - h. Individual A/D converter for each input module.
- C. Power Supply Units:
1. Provide regulated power units:
    - a. Designed to operate with PLC system and shall provide power to:
      - 1) All components of PLC system.
      - 2) All two-wire field instruments.
      - 3) Other devices as indicated on Drawings or Specifications.
    - b. Capable of supplying PLC system when all of the specified spare capacity is utilized.
    - c. Each power supply shall be sized such that it will carry no more than 75 PCT of capacity under normal loads.
  2. Electrical service to PLC system is 105 to 125 V, 60 Hz, +1 PCT, 1 PH power.
  3. Separate AC circuit breakers shall be provided for each power supply.
  4. If the PLC system is field expandable beyond the specified spare capacity, and if such expansion requires power supply modification, note such requirements in the submittals and allow room for power supply modification in the PLC system enclosure.
  5. Capable of meeting or exceeding electrical noise tests, NEMA ICS 1-109.60-109.66.
  6. Power distribution:

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- a. Immune to transients and surges resultant from noisy environment.
- b. Shall provide constant voltage level DC distribution to all devices.
- 7. Provide uninterruptible power supply (UPS) to sustain full power to UPS powered loads listed below for a minimum of 30 minutes following loss of primary power and to ensure that the transient power surges and dips do not affect the operation of the PLC system.
  - a. UPS powered loads:
    - 1) All rack mounted PLC components.
    - 2) Local operator consoles.
    - 3) All power supplies furnished with the PLC and associated loads.
  - b. Input:
    - 1) 120 VAC +10 PCT.
    - 2) 60 Hz.
    - 3) Line fuse protection.
  - c. Output:
    - 1) 120 VAC 5 PCT.
    - 2) 60 Hz.
    - 3) Short circuit protected.
    - 4) Instantaneous transfer time.
  - d. IEEE C62.41 Class A voltage surges of 6000 V attenuated to less than 50 V on the output.
  - e. Battery: Maintenance free lead acid.
- D. PLC System Enclosure:
  - 1. In accordance with Specification Section 17110 - Control System Equipment Panels and Racks.
  - 2. Component placement:
    - a. Mount all controller components vertically within the enclosure to allow maximum convection cooling.
    - b. Either install power supplies above all other equipment with at least 10 IN of clearance between the power supply and the enclosure top, or adjacent to other components, but with sufficient spacing for circulation of cooling air.
    - c. Do not place I/O racks directly above the CPU or power supply.
    - d. Locate incoming line devices (isolation or constant voltage transformers, local power disconnects, surge suppressors, etc.) so as to keep power wire runs within an enclosure as short as possible.
    - e. If items such as magnetic starters, contactors, relays, and other electromagnetic devices must be located within the same enclosure as the PLC system components, place a barrier with at least 6 IN of separation between the magnetic area and the control area.
    - f. Place circulating fans close to major heat generating devices.
    - g. Segregate input/output modules into groups of identical type.
  - 3. Wiring and grounding to be in accordance with Specification Section 17110.
  - 4. Termination requirements:
    - a. In accordance with Specification Section 17110.
    - b. Make connections to I/O subsystem by terminating all field wiring on terminal blocks within the enclosure.
    - c. Prewire I/O modules to terminal blocks.
    - d. Size terminals to accommodate all active database points and spares.
    - e. Provide terminals for individual termination of each signal shield.
    - f. Field wiring shall not be disturbed when removing or replacing an I/O module.
- E. PLC System Software and Programming:
  - 1. Provide all hardware and programming required to provide communication between the PLC and the human-machine interface.
  - 2. Provide programming to accomplish all control and monitoring requirements of the Drawings and Specifications.
  - 3. Full documentation capability.
  - 4. Online and offline programming.
  - 5. Offline simulation prior to download.

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6. Program over network capability.
7. Two-step commands requiring PLC programmer verification prior to modification of any programming.

## **2.6 ACCESSORIES**

- A. Provide all accessories required to install and test a complete PLC control system to accomplish the requirements of the Drawings and Specifications.
- B. Provide all programming cables required to configure the PLC logic.

## **2.7 SOURCE QUALITY CONTROL**

- A. Provide a performance test after factory completion and prior to shipment.
  1. Conduct a test where the system is operated continuously and checked for correct operation including loop controls, displays, printing, keyboard functions, alarm responses, and on/off sequencing control.
  2. Conduct testing with simulated I/O to verify each control loop operation.
  3. Allow for Owner and Engineer representatives to witness program testing.
    - a. Provide minimum of 15 days notice prior to testing.
  4. Do not ship prior to successful completion of this testing program.

## **2.8 MAINTENANCE MATERIALS**

- A. Furnish Owner with the following extra materials:
  1. One spare CPU.
  2. One spare I/O card of each card type.
  3. One spare power supply.
- B. Include a complete bill of materials indicating detailed part model number.
- C. Include a complete set of all special tools required to install, maintain and test the PLCs.

# **PART 3 - EXECUTION**

## **3.1 FUNCTIONALITY**

- A. Complete System.
  1. Provide all programming, configuration, coordination, integration, and testing required for furnishing a fully functioning system.

## **3.2 FACTORY TESTING**

- A. After assembly, wiring, configuration, and programming, and prior to shipment of the control system to the project site, verify system functionality by applying test signals to all input points and observing system response at output points.
- B. Submit a factory test report indicating how the system was tested and which items were tested.
- C. After Owner has had sufficient time to review the factory test report, provide an opportunity for Owner and Owner's technical representative to witness a factory acceptance test.
- D. Retain the system in test configuration until approval of the factory acceptance test.

## **3.3 INSTALLATION**

- A. Install PLC control system in accordance with manufacturer's written instructions.

## **3.4 FIELD QUALITY CONTROL**

- A. Employ and pay for services of equipment manufacturer's field service representative(s) to:
  1. Inspect equipment covered by these Specifications.
  2. Supervise adjustments and installation checks.
  3. Maintain and submit an accurate daily or weekly log of all commissioning functions.
    - a. All commissioning functions may be witnessed by the Engineer.

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- b. All reports shall be cosigned by the Contractor and the Engineer if witnessed.
- 4. Conduct startup of equipment and perform operational checks.
- 5. Provide Owner with a written statement that manufacturer's equipment has been installed properly, started up, and is ready for operation by Owner's personnel.

### **3.5 COMMISSIONING AND ACCEPTANCE**

- A. Commission system in accordance with Division 01 Specifications.
- B. Demonstrate system in accordance with Contract Documents and Division 16 Specifications.

### **3.6 TRAINING**

- A. Employee of the manufacturer or certified representative to provide one day of operation and maintenance training at the Project site after the system has successfully undergone all field testing and acceptance procedures.
- B. As a minimum, training shall cover:
  - 1. Hardware overview.
  - 2. Software overview.
  - 3. Documentation.
  - 4. Maintenance.
  - 5. Trouble shooting.
  - 6. Operation, e.g., changing set points, passwords, etc.

### **3.7 DOCUMENTATION**

- A. Update O&M manuals to reflect as-built conditions.

### **3.8 SUPPORT**

- A. Provide on-call technical support for a period of one year after substantial completion. Include a minimum of two site visits to work with owner on any final modifications to the logic.

**END OF SECTION**