

# **CITY OF CANNON BEACH**



## **WATER RESILIENCY PROJECT PHASE 1 SEISMIC IMPROVEMENTS**

### **CONTRACT DOCUMENTS**

**DATE: 10-10-2023**

WORK UNDER THIS CONTRACT IS FUNDED BY THE FEDERAL SAFE DRINKING WATER  
REVOLVING LOAN FUND (SDWRLF) THROUGH BUSINESS OREGON AND  
A PARTNERSHIP OF LOCAL AND/OR PRIVATE FUNDS

**OWNER: KAREN LA BONTE  
CITY OF CANNON BEACH  
PO BOX 368  
163 EAST GOWER STREET  
CANNON BEACH, OREGON 97110  
(503) 436-8068**

**ENGINEER: TRAVIS TORMANEN  
WINDSOR ENGINEERS  
27300 NE 10TH AVENUE  
RIDGEFIELD, WA 98642  
(360) 912-9224**

# **CITY OF CANNON BEACH**

## **WATER RESILIENCY PROJECT PHASE 1 - SEISMIC IMPROVEMENTS**

PROJECT MANUAL

163 E. GOWER STREET  
CITY OF CANNON BEACH, OREGON 97110

DATE: 10-10-2023

WORK UNDER THIS CONTRACT IS FUNDED BY THE FEDERAL SAFE DRINKING WATER  
REVOLVING LOAN FUND (SDWRLF) THROUGH BUSINESS OREGON AND  
A PARTNERSHIP OF LOCAL AND/OR PRIVATE FUNDS

PREPARED BY  
WINDSOR ENGINEERS

**CITY OF CANNON BEACH**  
**WATER RESILIENCY PROJECT PHASE 1 - SEISMIC IMPROVEMENTS**

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**END OF SECTION**

**SECTION 00 01 02  
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**PART 1 GENERAL**

**1.01 PROJECT IDENTIFICATION**

- A. Project Name: Cannon Beach Water Resiliency Project Phase 1 Seismic Improvements, located at: North, Main, and South (Tolovana) Reservoir.
- B. The Owner: City of Cannon Beach

**1.02 PROJECT DESCRIPTION**

- A. Summary Project Description: The project consists of the construction of or improvements to reservoir tanks, valves, and water main pipe as it relates to seismic activities.

**1.03 PROCUREMENT TIMETABLE**

- A. The Owner reserves the right to change the schedule or terminate the entire procurement process at any time.

**1.04 PROCUREMENT DOCUMENTS**

- A. Availability of Documents: Complete sets of procurement documents may be obtained electronically:
  - 1. From the City of Cannon Beach – Contact Jennifer Barrett, [barrett@ci.cannon-beach.or.us](mailto:barrett@ci.cannon-beach.or.us) or at (503) 436-8052.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 00 01 07  
CERTIFICATE PAGE**

**CITY OF CANNON BEACH**

**PROJECT NAME: WATER RESILIENCY PROJECT PHASE 1 - SEISMIC IMPROVEMENTS**

The engineering material and data contained in the Plans and Specifications were prepared under the supervision and direction of the undersigned, whose seal as a registered professional engineer is affixed below.



SPECIFICATIONS:  
DIVISIONS 00, 01, 02, 03, 31, 32, 33, 40  
CHARLES MCDONALD, PE  
WINDSOR ENGINEERS



SPECIFICATIONS:  
DIVISION 25, 26, 48  
SEAN WANTAJA, PE  
WINDSOR ENGINEERS

**END OF SECTION**

**SECTION 00 01 20  
SCHEDULES AND CHECKLIST**

<b>ITEMS</b>	<b>DATE</b>
SUBMITTAL AND REVIEW BY BUSINESS OREGON	FRIDAY JULY 14, 2023
INVITATION TO BID (ITB) ISSUED	<b>FRIDAY OCTOBER 13, 2023</b>
<b>MANDATORY PRE-BID MEETING</b>	<b>TUESDAY OCTOBER 31, 2023 10:00 AM</b>
REQUEST DEADLINE FOR: SUBSTITUTION, CLARIFICATION, OR CHANGE AND SOLICITATION PROTEST DEADLINE	THURSDAY NOVEMBER 2, 2023
LAST ADDENDA ISSUED	WEDNESDAY NOVEMBER 8, 2023
<b>BIDS DUE/ BID OPENING</b>	<b>WEDNESDAY NOVEMBER 15, 2023 2:00 PM</b>
<b>FIRST-TIER SUBCONTRACTOR DISCLOSURE</b>	<b>WEDNESDAY NOVEMBER 15, 2023 4:00 PM</b>
NOTICE OF INTENT TO AWARD (ESTIMATED)	FRIDAY NOVEMBER 21, 2023
CITY COUNCIL APPROVAL OF AWARD (ESTIMATED)	TUESDAY DECEMBER 5, 2023
NOTICE OF AWARD (ESTIMATED)	DECEMBER 6, 2023
ANTICIPATED CONTRACT START / NOTICE TO PROCEED (ESTIMATED)	JANUARY 15, 2024
ANTICIPATED SUBSTANTIAL COMPLETION	OCTOBER 1, 2024
ANTICIPATED FINAL COMPLETION (ESTIMATED)	OCTOBER 31, 2024

**NOTE:** The City of Cannon Beach reserves the right to deviate from this schedule. With current supply chain issues, the project timeline may need to be adjusted accordingly.

## BID REQUIREMENTS CHECKLIST

The following is a listing of bid submission components.

SECTION	SECTION NAME	SUBMIT TIME
00 41 00	SIGNED BID FORM – ALL PAGES	SUBMIT WITH BID
	CONSTRUCTION CONTRACTORS BOARD LICENSE	SUBMIT WITH BID
00 41 10	BIDDER RESPONSIBILITY INFORMATION FORM – ALL PAGES	SUBMIT WITH BID
00 41 20	BID BOND	SUBMIT WITH BID
00 41 30	BIDDERS WARRANTY	SUBMIT WITH BID
00 41 40	BIDDERS CERTIFICATIONS	SUBMIT WITH BID
00 41 50	FIRST-TIER SUBCONTRACTOR DISCLOSURE	SUBMIT WITH BID OR WITHIN 2 HOURS AFTER
00 41 60	CERTIFICATE OF NON-COLLUSION	SUBMIT WITH BID
00 41 70	CONTRACTOR'S CERTIFICATION REGARDING DRUG TESTING PROGRAM	SUBMIT WITH BID
00 41 80	PUBLIC IMPROVEMENT CONTRACT	SUBMIT WITH BID
00 72 30	OREGON STATUTORY PUBLIC WORKS BOND	SUBMIT WITH BID
00 72 40	CERTIFICATION OF WORKERS COMPENSATION COVERAGE	SUBMIT WITH BID
00 73 00	ANY ADDITIONAL ITEMS SPECIFIED IN SUPPLEMENTARY INSTRUCTIONS TO BIDDERS	SUBMIT WITH BID

The bid requirements checklist is provided for the bidder's convenience. Bidder is advised to thoroughly review the Invitation to Bid documents to be certain that it has met all requirements and included all required documents, forms and information in its bid. In the event of a conflict between the bid requirements checklist and other Invitation to Bid documents, other Invitation to Bid documents shall take precedence.

**END OF SECTION**

**SECTION 00 11 13  
INVITATION TO BID**

Sealed bids for the **Cannon Beach Water Resiliency Project Phase 1 – Seismic Improvements** Project will be received by Karen La Bonte, Public Works Director, for the Owner, City of Cannon Beach, at 163 E Gower, Cannon Beach, Oregon 97110 on **Wednesday, November 15, 2023 at 2:00 p.m., Pacific Time**, at which time and place they will be publicly opened and read aloud at the address listed above unless government restrictions prevent that from happening. In that case, the City will arrange for a virtual bid opening via Zoom. No bids will be accepted after this time.

All bidders shall submit, in a separate, sealed envelope, within two working hours of the bid opening time, on the bid date, a completed First-Tier Subcontractor Disclosure Form in compliance with ORS 279C.370.

In general, the elements of work include, but are not limited to:

- Removal of roadway materials and watermain structures, valves and piping.
- Site Grading
- Water main
- Reservoir Improvements
- Isolation Valve Installation
- Electrical Controls Installation
- Shake Alarm System Installation

Responsive bidders shall demonstrate proven experience working around sensitive, critical infrastructure like watermain, reservoirs, seismic control panels, work within City limits, etc.

Project bidding documents are available electronically by contacting Jennifer Barrett, [barrett@ci.cannon-beach.or.us](mailto:barrett@ci.cannon-beach.or.us) or (503) 436-8052, or can be viewed at City of Cannon Beach, at 163 E Gower, Cannon Beach, Oregon 97110.

This PROJECT IS subject to both Prevailing Wage Rates and Davis Bacon. All bidders shall comply with the provisions of ORS 279C.800-870 [workers on public works to be paid not less than prevailing rate of wage for projects over \$50,000.00] and the Federal Department of Labor's Davis-Bacon Wage Determination. Contractors submitting bids are required to be registered with the Construction Contractor's Board.

A mandatory pre-bid conference will be held **Tuesday, October 31 at 10:00 am** at Cannon Beach City Hall, 163 E Gower, Cannon Beach, OR 97110.

Statements made by the City's Representative OR City Personnel at the conference are not binding on the City unless confirmed by written addendum by the City.

Bid security in the amount of not less than 5% of the bid must accompany each bid in accordance with the Instructions to Bidders. The Owner reserves the right to reject any bid not in compliance with all prescribed public bidding procedures and requirements, may reject a bid that does not comply with requirement to demonstrate bidder's responsibility under ORS 279C.375(3)(b), and may reject, for good cause, any or all bids upon a finding of the Owner that it is in the public interest to do so in accordance with ORS 279C.395. The Owner reserves the right to waive any bid irregularities or informalities. No bidder may withdraw or modify the bidder's bid after the hour set for the opening thereof, until after the lapse of 30 days from the bid opening.

The selected contractor and all contractors performing work within the City are required to obtain a City business license prior to start of work.

Advertised in the Astorian (Tu/Th/Sa) October 14, 17, 19, 21, 24, 26, 28.

Advertised in the DJC (M/W/F) October 13, 16, 18, 20, 23, 25, 27.

BY ORDER OF THE CITY OF CANNON BEACH

**END OF SECTION**

**SECTION 00 21 13  
INSTRUCTIONS TO BIDDERS**

**1. PHASE 1 - SEISMIC IMPROVEMENTS**

IN GENERAL, THE ELEMENTS OF WORK INCLUDE, BUT ARE NOT LIMITED TO:

- Removal of paved materials and water main structures, valves and piping.
- Site Grading
- Reservoir Improvements
- Piping-valving and new tie ins
- Electrical Controls Installation
- Shake Alarm System Installation

*The Contractor acknowledges to and for the benefit of the City of Cannon Beach ("Purchaser") and the State of Oregon (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (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 Requirement, unless a waiver of the requirement 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 Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.*

**2. ADDENDA AND INTERPRETATIONS:**

No interpretation of the meaning of the plans, specifications or other prebid documents will be made to any bidder verbally.

Every request for such interpretation should be in writing and either addressed or emailed to City of Cannon Beach Public Works Department, Attn: Jennifer Barrett, , PO Box 368, Cannon Beach, OR 97110, EMAIL [barrett@ci.cannon-beach.or.us](mailto:barrett@ci.cannon-beach.or.us). To be given consideration questions or requests must be received at least ten days prior to the date fixed for the opening of bids. Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications which, if issued, will be delivered via email or facsimile transmission to all prospective bidders not later than 72 hours prior to the bid opening, at the respective addresses furnished for such purposes.

Failure of any bidder to receive any such addendum of interpretation shall not relieve such bidder from any obligation under the bidder's bid as submitted. All addenda so issued shall become part of the contract documents.

If a Bidder believes that this solicitation is contrary to law, or that the solicitation document is unnecessarily restrictive, is legally flawed or improperly specifies a brand name they may file a solicitation protest within ten (10) days of the closing date. If a Bidder fails to file the protest within ten days of the closing date, the Bidder may not challenge the contract on grounds under this subsection in any future administrative or legal proceeding.

A solicitation protest must be filed in writing with the City Manager and Public Works Director and contain the information required by ORS 279B.405(4).

If the protest is timely filed and meets the requirements listed above, the Owner shall consider the protest and issue a decision in writing within ten (10) days after receipt. Otherwise, the Owner shall promptly notify the Bidder that the protest fails to meet the requirements of this subsection and give the reasons for the failure.

A. REQUEST FOR APPROVAL OF AN "APPROVED SUBSTITUTION": Bidders shall provide the named product unless another is approved through a substitution request, or a product exemption has been issued (ORS 279C.345). Other brands of quality, merit and utility will be considered upon proper submittal of the request with appropriate documentation:

- 1). Requests must provide all of the information necessary for the City to determine product acceptability.
- 2). Failure to provide sufficient information with the request will cause the request to be rejected.
- 3). Any product subsequently approved for substitution will be listed on an Addenda issued by the City.

B. REQUEST FOR CLARIFICATION: Any Bidder who finds discrepancies in, or omissions from, any provision of the Instructions to Bidders (ITB), Plans, Specifications, or Contract Documents, or has doubt as to the meaning, shall make a request for clarification in writing, to the contact listed on Page 2 of the ITB. To be considered, the request for clarification must be received by the Request Deadline as specified in 1.06 B.

C. REQUEST FOR CHANGES TO CONTRACTUAL TERMS OR SPECIFICATIONS OR PLANS: Any Bidder may submit a request for changes to contractual terms, Plans, or Specifications, in writing, to the contact listed on Page 2 of the ITB. To be considered, the request for changes must be received by the Request Deadline specified in 1.07 B. above. The request must include the specific changes requested, and the reason for requested changes supported by factual documentation, and any proposed changes.



D. PROTEST OF CONTRACT TERMS AND CONDITIONS OR SPECIFICATIONS: Any Bidder may submit a protest of solicitation terms and conditions, in writing, in accordance with OAR 137-049-0260 to the contact listed on Page 2 of the ITB. To be considered, the protest must be received by the deadline specified in 1.07 B. above. The protest shall include the legal and factual grounds for the protest, a description of the resulting prejudice to the Bidder if the protest is not granted, and a statement of the relief or changes proposed.

E. RESPONSE TO REQUESTS FOR CLARIFICATION: Clarifications, whether verbal, or in writing, or included in an addendum as "*clarification*", do not change Plans, Specifications, contractual terms, or procurement requirements of an ITB. If a request for clarification raises an issue that the City determines should be handled by formally amending the ITB, the City will do so only by announcing such a change in an Addendum, not through information identified as a "clarification."

F. RESPONSE TO REQUESTS FOR BRAND APPROVAL, REQUESTS FOR SUBSTITUTION, REQUESTS FOR CHANGE, AND PROTESTS: The City shall promptly respond to each properly-submitted written request for brand approval, request for substitution, request for change, and protest. Where appropriate, the City will issue ITB revisions via email.

Failure to protest solicitation terms and conditions, Contract terms and conditions or Specifications, as indicated in this section, precludes appeal or protest of a decision to award based upon such solicitation terms and conditions, Contract terms and conditions, or Specifications.

G. PROTEST OF ADDENDUM: Requests for clarification, requests for change and protests of Addendum must be received by the time and date specified in the Addendum or they will not be considered.

### **3. TIME OF COMPLETION:**

The work to be performed under this contract shall be completed within the timeframe below, after the date of written Notice to Proceed by the Owner to the Contractor with such extensions of time as provided for in the General Conditions.

**FINAL COMPLETION AND ACCEPTANCE ON: OCTOBER 31, 2024**

### **4. QUALIFICATIONS OF BIDDER AND SUBCONTRACTOR:**

Bid security in the amount of not less than 5% of the bid must accompany each bid in accordance with the Instructions to Bidders. The Owner reserves the right to reject any bid not in compliance with all prescribed public bidding procedures and requirements, may reject a bid that does not comply with requirement to demonstrate bidder's responsibility under ORS 279C.375(3)(b), and may reject, for good cause, any or all bids upon a finding of the Owner that it is in the public interest to do so in accordance with ORS 279C.395. The Owner reserves the right to waive any bid irregularities or informalities. No bidder may withdraw or modify the bidder's bid after the hour set for the opening thereof, until after the lapse of 30 days from the bid opening.

Each bid must contain a statement as to whether the bidder is a resident bidder, as defined in ORS 279A.120. Contractors submitting bids are required to be registered with the Construction Contractor's Board. All Subcontractors performing work described in ORS 701.005(2) (i.e., construction work) are required to be registered with the Construction Contractors Board or licensed by the State Landscape Contractors Board in accordance with ORS 701.026 to 701.035 before the Subcontractors commence work under the contract. Contractors or Subcontractors need not be licensed under ORS 468A.720 [asbestos abatement].

The Contractor and every Subcontractor shall each have a public works bond filed with the Construction Contractors Board before starting work on the project, unless exempt under ORS 279C.836(7) and (8).

Each Bidder shall submit a completed Bidder's Responsibility Information Form along with its Bid. The Bidder's Responsibility Information Form will be used to evaluate the qualifications of any Bidder whose Bid is under consideration for Contract Award.

Prior to award and execution of a contract, the City will evaluate whether the apparent successful Bidder meets the applicable standards of responsibility identified in ORS 279C.375. In doing so, the City may investigate Bidder and request information in addition to that already required in this document, when the City, in its sole discretion, considers it necessary or advisable. Submission of a signed Bid shall constitute approval for the City to obtain any information that the City deems necessary to conduct the evaluation.

The contract is to be awarded by competitive bid, the City of Cannon Beach shall award the contract to the contractor whose bid will best serve the interests of the City taking into account price as well as any other applicable factor(s) such as, but not limited to: experience, specific expertise, availability, project understanding, contractor capacity and responsibility that is not otherwise disqualified.

The City may postpone the award of the Contract after announcement of the apparent successful Bidder in order to complete its investigation and evaluation. Failure of the apparent successful Bidder to demonstrate responsibility shall render the Bidder non-responsive and shall constitute grounds for Bid rejection.

Any Bidder who fails to submit a complete Bidder Responsibility Information Form will be deemed to be non-responsive and will not be considered for Award of Contract.

If a Bidder is found not to be responsible, documentation of the reasoning will be sent to the Oregon Construction Contractor's Board (OCCB). Such documentation will be based upon the criteria set forth in ORS 279C.375(3).

The City may reject a bid that does not comply with applicable public contracting procedures and requirements, including the requirement to demonstrate the bidder's responsibility under ORS 279C.375 (3)(b).

## **5. CONDITIONS OF WORK:**

Each bidder must investigate and be fully informed of the conditions relating to the construction of the project and the employment of labor thereon. Failure to do so will not relieve a successful bidder of the bidder's obligation to furnish all material and labor necessary to carry out the provisions of this contract. Insofar as possible the Contractor, in carrying out the Contractor's work, must employ such methods or means as will not cause any interruption of work.

## **6. BIDDER'S REPRESENTATION:**

Each bidder is responsible for inspecting the site and for reading and being thoroughly familiar with the Contract Documents. The failure or omission of any bidder to do any of the foregoing shall in no way relieve the bidder from any obligation in respect to the bidder's bid. Each bidder, by submitting a bid, represents that:

- A. The bidder has read and understands the Bidding Documents and the bidder's bid is made in accordance therewith.

- B. The bidder has inspected the site(s), has become familiarized with the site conditions under which the work is to be performed, and has correlated the bidder's observations with the requirements of the proposed Contract Documents.
- C. The bidder's bid is based upon the products, systems, and equipment described in the bidding documents without exception.

#### **7. PREBID MEETING:**

A mandatory pre-bid conference will be held **Tuesday, October 31 at 10:00 am** starting at City of Cannon Beach, 163 E Gower, Cannon Beach, OR 97110.

#### **8. DISCLOSURE OF FIRST-TIER SUBCONTRACTORS:**

In accordance with ORS 279C.370, each bidder must submit in a separate sealed envelope, a completed First-Tier Subcontractor Disclosure Form within two working hours after the date and time of the bid opening. The separate envelope must be clearly labeled "FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM" and shall be marked with the bidder's name, address and project title. The list shall identify any first-tier subcontractors that will be furnishing labor or furnishing labor and materials meeting the minimum amount specified in ORS 279C.370. A bidder shall submit the required disclosure form either with its bid submission or within two working hours after the date and time of the bid closing deadline.

Failure to submit a completed disclosure form in a separate sealed envelope by the disclosure deadline of two working hours after the bid opening time will result in a nonresponsive bid. A nonresponsive bid will not be considered by the Owner for award. The Owner will consider for contract award only those bids for which the required disclosure form has been submitted.

The bidder is specifically advised that any person, firm or party to whom it is proposed to award a subcontract under this contract must be acceptable to the Owner. Substitution of affected first-tier subcontractors shall be made only in accordance with ORS 279C.585. The Contractor shall notify the Owner in writing of all proposed changes in subcontractors prior to making any changes in subcontractors. No subcontractor doing work in excess of 5% of the total amount of the bid, but at least \$15,000, and who is not listed on the disclosure form shall be used without the written approval of the Owner.

#### **INSTRUCTIONS FOR FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM**

Bidders are required to disclose information about certain first-tier subcontractors when the contract value for a Public Improvement project is greater than \$100,000 (see ORS 279C.370). Specifically, when the contract amount of a first-tier subcontractor furnishing labor or furnishing labor and materials on the contract, if awarded, whose subcontract value would be greater than or equal to:

- (i) 5% of the total project bid, but at least \$15,000; or
- (ii) \$350,000 regardless of the percentage of the total project bid;

the bidder must disclose on the disclosure form and submit the following information about the first-tier subcontractors either with the bid submission or within two working hours after bid closing:

- 1) the subcontractor's name,
- 2) the dollar value of the subcontract, and

3) the category of work that the subcontractor would be performing.

If the bidder will not be using any subcontractors that are subject to the above disclosure requirements, the bidder is required to indicate "NONE" on the disclosure form.

#### **9. PREPARATION OF BIDS:**

Bids shall be submitted on the attached Bid Form. All blanks must be appropriately filled in. Where so indicated by the make up of the Bid Form, sums shall be expressed in both words and figures, and in case of discrepancy between the two, the amount in words shall govern. Bidders shall make no additional stipulations on the Bid Form nor qualify any bid in any manner. Only one copy of the Bid Form is required.

#### **10. BID SECURITY:**

Each bid must be accompanied by a cashier's check, a certified check of the bidder, an irrevocable letter of credit issued by an institution as defined in ORS 279C.380, or a bid bond prepared on the form of the bid bond attached hereto, duly executed by the bidder as principal and having as surety thereon a surety company approved by the Owner, in the amount of 5% of the bid. Such bid security will be returned to all except the three bidders whose bid best serves the interests of the City, consistent with the criteria set out in ORS 279C.414 within seven days after the opening of bids. The remaining bid security will be returned promptly after the Owner and the accepted bidder has executed the contract. If no award has been made within 30 days after the date of the opening of bids, upon demand of the bidder at any time thereafter, so long as the bidder has not been notified of the acceptance of the bidder's bid, the bid shall be returned. The bid security of the successful bidder will be retained until the Performance Bond and Payment Bond have been executed and approved, after which it will be returned.

#### **11. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT:**

The successful bidder, upon the bidder's failure or refusal to execute and deliver the contract and bonds required within 10 days after the bidder has received notice of the acceptance of the bidder's bid, shall forfeit to the Owner, as liquidated damages for such failure or refusal, the security deposited with the bidder's bid.

Consequently, the contractor agrees to pay the city the sum of \$200 per day, not as a penalty but as liquidated damages, for each day elapsed beyond the substantial completion date set forth in the bid document. The total liquidated damages shall be deducted from the final payment due the contractor. The city may waive its right to claim part or all of the liquidated damages due under this provision, but such full or partial waiver shall not negate or abridge any other right of action the city may have to enforce the provisions of this contract. Contractor will not contest such sums as being other than a reasonable measure of delay damages in the event those damages become payable under these provisions.

#### **12. SUBMISSION OF BIDS:**

EACH BID MUST BE SUBMITTED IN A SEALED ENVELOPE MARKED:

"BID ENCLOSED"

**PROJECT NAME: CANNON BEACH WATER RESILIENCY PROJECT PHASE 1 – SEISMIC IMPROVEMENTS**

and bearing on the outside the name and address of the bidder. For mailed bids, this sealed envelope may be enclosed in a mailing envelope addressed to the Owner. Bids shall be submitted at the designated location prior to the time and date for receipt of bids indicated in the Advertisement for Bids or any extension thereof made by Addendum. Bids received after the time and date for receipt of bids (the bid closing deadline) will be returned unopened. Oral, telephonic, faxed, or telegraphic submissions of bids are invalid and will not receive consideration. THE OFFICIAL TIME WILL BE ESTABLISHED BY THE CLOCK AT THE BID RECEIPT DESK.

### **13. MODIFICATION OR WITHDRAWAL OF BID:**

The Contractor may withdraw the Contractor's bid by submitting a written request to withdraw the bid prior to the time of the bid opening. Withdrawn bids may be resubmitted up to the time designated for the receipt of bids provided that they are then fully in conformance with these Instructions to Bidders. Bid Security shall be in an amount sufficient for the bid as modified or resubmitted. A bid may not be withdrawn, modified or canceled by the bidder for 30 days following the time and date designated for the receipt of bids. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the Bidder. Per OAR-137-047-0440

### **14. UNBALANCED BIDS:**

A materially unbalanced bid is defined as, "a bid which generates a reasonable doubt that award to the bidder submitting a mathematically unbalanced bid will result in the lowest ultimate cost to the Owner."

A bid will be considered irregular and may be rejected if the Owner determines that any of the unit prices are significantly or materially unbalanced to the potential detriment of the Owner. The Owner will place specific emphasis on its review of bids that appear to be unbalanced, as it may be to the detriment of the Owner, and other bidders who choose not to unbalance their bids. If the Owner finds that a bid is a detriment to the Owner or not in the best interest of the public, the Owner will act by rejecting all such unbalanced bids.

### **15. CONSIDERATION OF BIDS AND PROTEST OF INTENT TO AWARD:**

The Owner shall have the right to reject any or all bids and to reject a bid not accompanied by the required Bid Security or data required by the Bidding Documents, or to reject a bid, which is in any way incomplete or irregular. The Owner shall have the right to waive any informality or irregularity in any bid received and to accept the bid which, in its judgement, is in its own best interest. All work of this project will be awarded as a single general contract to one Contractor. The contract will be awarded to the contractor whose bid best serves the interests of the City, consistent with the criteria set out in ORS 279C.414." The Owner shall consider all bids immediately after the bid opening.

The Notice of Intent to Award shall serve as notice to all Bidders that the Owner intends to award the contract.

Adversely affected or aggrieved Bidders shall have seven (7) calendar days from the date of the Notice of Intent to Award within which to file a written protest of award. Protests received after that date will not be considered. Protests must specify the grounds upon which the protest is based.

A. Protests must be emailed to Bruce St. Denis - [stdenis@ci.cannon-beach.or.us](mailto:stdenis@ci.cannon-beach.or.us) and Karen La Bonte at [labonte@ci.cannon-beach.or.us](mailto:labonte@ci.cannon-beach.or.us). Protests must comply with CBMC 2.08.160.

B. In order to be an adversely affected or aggrieved Bidder, the Bidder must claim to be eligible for award of the contract as the responsive Bidder that best serves the interests of the City, consistent with the criteria set out in ORS 279C.414 and that any and all lower Bids are ineligible to receive contract award.

C. An actual Bidder who is adversely affected or aggrieved by the award of the contract to another Bidder may protest award, in writing, within the timeline established. The written protest shall state the grounds upon which the protest is based and comply with CBMC 2.08.160(A)(2) No protest of award shall be considered after the deadline.

D. Pursuant to OAR 137-049-0260, no protest against award shall be considered because of the content of Bid Specifications, Plans, or contract Terms after the deadline established for submitting protests of Bid Specifications, Plans or Contract Terms.

The City will respond in writing to intent-to-award protests submitted by adversely-affected or aggrieved Bidders within ten (10) days. The City may also respond to intent-to-award protests submitted by other Bidders for purposes of clarification. However, any response provided by the City is not intended to, and shall not in and of itself constitute, confirmation that the bidder is, in fact, adversely affected or aggrieved, and therefore entitled to protest an intent to award, or that the protest was timely filed.

After expiration of the intent-to-award protest period, and resolution of all protests, the City will proceed with final award. (If the City receives only one Bid, the City may dispense with the intent-to-award protest period and proceed with award of a Contract).

#### **16. SECURITY FOR FAITHFUL PERFORMANCE AND PAYMENT:**

Simultaneously with delivery of the executed contract, the Contractor shall furnish a surety bond or bonds as security for faithful performance of this contract and for the payment of all persons performing labor on the project under this contract and furnishing materials in connection with this contract, as specified in the General Conditions included herein. The surety on such bond or bonds shall be a duly authorized surety company satisfactory to the Owner.

#### **17. POWER OF ATTORNEY:**

Attorneys in fact who sign bid bonds or contract bonds must file with each bond a certified and effective dated copy of their power of attorney.

#### **18. LAWS AND REGULATIONS:**

The bidder's attention is directed to the fact that all federal, state and local laws, ordinances, rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout, and they will be deemed to be included in the same as though herein written out in full. All bidders shall comply with the provisions of ORS 279C.840 (Prevailing Wage Rates).

On federally funded projects, all bidders shall comply with the provisions of the Davis-Bacon Act (40 U.S.C. 276a). No bid will be considered by the Owner unless the bid contains a statement by the bidder that the provisions of ORS 279C.840 or 40 U.S.C. 276a are to be complied with. The public agency shall pay a fee to the Oregon Bureau of Labor and Industries (BOLI) in the amount of one-tenth of 1% of the contract price; however, there is a minimum fee of \$250 and a maximum fee of \$7,500.

## **19. BID DURATION**

The contractor shall provide and maintain their bid prices for 90 days after bid opening. The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 90 calendar days after the scheduled closing date for receiving bids.

## **20. EXECUTION OF CONTRACT:**

The party to whom the contract is awarded will be required to execute the Contract and obtain the performance bond, payment bond and required insurance within 10 calendar days from the date when Notice of Award is delivered to the bidder. The Notice of Award shall be accompanied by the necessary Contract and bond forms. In case of failure of the bidder to execute the Contract, the Owner may at the Owner's option consider the bidder in default, in which case the Bid Security accompanying the bid shall become the property of the Owner. The Owner within 10 days of receipt of acceptable performance bond, payment bond and Contract signed by the party to whom the Contract was awarded shall sign the Contract and return to such party an executed duplicate of the Contract and a written Notice to Proceed. Should the Owner not execute the Contract and issue a written Notice to Proceed within such period, the bidder may by written notice withdraw the bidders signed Contract. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

The notice to proceed shall be issued within 10 days of the execution of the contract by the owner. Should there be reasons why the notice to proceed cannot be issued within such period, the time may be extended by mutual agreement between the owner and contractor. If the notice to proceed has not been issued within the 10-day period or within the period mutually agreed upon, the contractor may terminate the contract without further liability on the part of either party.

For state funded projects, the durations for contracting may be extended in order to meet the requirements for agency reviews.

**END OF SECTION**

**SECTION 00 21 13.10  
SUBSTITUTION REQUEST FORM**

**ATTENTION:**

**PROJECT NAME:** Cannon Beach Water Resiliency Project Phase 1 – Seismic Improvements

**Date Submitted:**

**Submitted By:** \_\_\_\_\_ **On behalf of:** \_\_\_\_\_  
Proposer of Substitution Contractor (required if post bid)

We hereby submit for consideration, the following product instead of the specified item for above project:

SECTION	PARAGRAPH	SPECIFIED ITEM
<b>Proposed Substitution:</b>		

**If requesting after issuance of Contractor's Notice to Proceed, State reason for request:**

Attach complete dimensional information and technical data, including laboratory tests, if applicable.

Include complete information on changes to Drawings and Specifications which proposed substitution will require for its proper installation.

Submit with request all necessary samples and substantiating data to provide equal quality, performance, and appearance to that specified. Clearly mark Manufacturer's literature to indicate equality or equivalence in performance. Indicate differences in quality of materials and construction.

**Fill in blanks below:** *(please note – failure to provide a complete and thorough answer to any of the questions below will result in rejection of request. A response of Not Applicable, will also be result in rejection).*

A. Does the substitution affect dimensions shown on Drawings: Yes / No <i>If yes, clearly indicate changes:</i>
B. What effect does substitution have on other trades, other Contracts, and contract completion date?
C. What effect does substitution have on applicable code requirements?
D. Differences between proposed substitution and specified item:
E. Manufacturer's warranties of the proposed and specified items are: Same / Different (explain)
F. List of names and addresses of 3 similar projects on which product was used, date of installation, and A/E's name and address: <i>(Attach list with requested information)</i>
G. Cost impact:
H. Has the submitter informed the Contractor of all changes or impacts to other trades and construction, and have all potential costs impacts have been fully addressed without any cost impact to the Owner? Yes / No



**CERTIFICATION OF EQUAL OR EQUIVALENT PERFORMANCE AND ASSUMPTION OF LIABILITY FOR  
EQUAL OR EQUIVALENT PERFORMANCE:**

*The contractor shall certify that the substitution requested meets the performance conditions and requirements listed in the contract documents.*

**The undersigned agrees to pay for costs associated with changes to the building design, including engineering and detailing caused by the requested substitution.**

*(Signature must be by person having authority to legally bind the Contractor/Subcontractor/Supplier to the above terms)*

\_\_\_\_\_  
Signature Printed Name

\_\_\_\_\_  
Firm

\_\_\_\_\_  
Address

\_\_\_\_\_  
Telephone E-mail

**For Use by A/E**

Remarks:

\_\_\_\_\_ Accepted \_\_\_\_\_ Not Accepted \_\_\_\_\_ Accepted as Noted \_\_\_\_\_ Received Too Late

For Use by DES PM:

\_\_\_\_\_ Accepted \_\_\_\_\_ Not Accepted \_\_\_\_\_ Accepted as Noted \_\_\_\_\_ Received Too Late

**Other Comments:**

**SECTION 00 31 00**  
**AVAILABLE PROJECT INFORMATION**

**PART 1 GENERAL**

**1.01 EXISTING CONDITIONS**

- A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:

Geotechnical Report: Entitled Preliminary Geotechnical Evaluation Cannon Beach Seismic Valves, dated November 11, 2021. The original copy is available for inspection at Owner's offices during normal business hours.

**1.02 PROJECT FINANCIAL INFORMATION**

- A. Financing for the project is through the Oregon Infrastructure Finance Authority of the Business Development Department (OBDD) (Project S22002) and the City of Cannon Beach.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.01 OBTAINMENT OF PERMITS**

- A. Owner will obtain the following permits, at no cost to the Contractor; the contractor will provide the necessary information to complete all applications for permits. Costs will be included in other bid items within the contract:
1. Building Permit for all trades.
  2. Pacific Power and Light (if required)
  3. Electrical permits will be applied, coordinated and obtained by the contractor and paid for by the Owner.

**3.02 WORK SEQUENCE**

- A. Refer to section 01 10 00 Summary for order of work.

**END OF SECTION**

**SECTION 00 41 00  
BID FORM**

BID OF \_\_\_\_\_ (hereinafter called "Bidder"), organized and existing under the laws of the State of Oregon, doing business as \_\_\_\_\_. (Insert "a joint venture", "a corporation", "a partnership" or "an individual" as applicable.)

To City of Cannon Beach [hereinafter called "OWNER"]

1. The undersigned Bidder, in compliance with your invitation for bids, including the ADVERTISEMENT FOR BIDS and the INSTRUCTIONS TO BIDDERS, for

**PROJECT NAME: Cannon Beach Water Resiliency Project Phase 1 – Seismic Improvements**

having examined the plans and specifications with related documents and having examined the site of the project work, and being familiar with all the conditions pertaining to the construction of the project, hereby offers to furnish all labor, materials, equipment and supplies necessary to construct the project in accordance with the contract documents within the time set forth therein, and at the unit prices stated below. The prices are to cover all the costs connected with performing the work required under the contract documents, of which this bid is a part.

2. The Bidder submits the unit prices set forth herein as those at which the Bidder will perform the work involved. The extensions in the column headed "Total" are made for the sole purpose of facilitating comparison of bids and if there are any discrepancies between the unit prices and the total amounts shown, the unit prices shall govern.

3. The Bidder certifies, under penalty of perjury, by the submission of this bid, that all requirements of ORS 279C.838-840 (Prevailing Wage Rate Laws) will be complied with throughout the course of this contract. The Bidder further certifies, under penalty of perjury, that the Bidder is a resident bidder, as defined by ORS 279A.120 (1)(b), of the State of Oregon. The Bidder further certifies, under penalty of perjury, that the Bidder is, to the best of the Bidder's knowledge, not in violation of any tax laws described in ORS 305.380 (4).

4. The Bidder acknowledges receipt of the following Addenda numbered \_\_\_\_\_ through \_\_\_\_\_. The Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of bid security. The Bidder agrees that this bid shall be good and may not be withdrawn for a period of 90 calendar days after the scheduled closing date for receiving bids.

5. The Bidder agrees to comply with all the federal, state and local laws, ordinances, rules and regulations that are pertinent to construction contracts of this character even though such laws may not have been quoted or referred to in the contract documents.

6. Upon receipt of written Notice of Award, Bidder will execute the Contract attached within 10 calendar days and deliver a Surety Bond or Bonds as required by the contract documents. The Bid Security accompanying this bid is to become the property of the Owner in the event the contract and bonds are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

7. The Bidder agrees to commence work under this contract within 10 calendar days after issuance to the Bidder of written Notice to Proceed by the Owner. The Bidder agrees to substantially complete the project on or before the dates or within the number of calendar days indicated in Section 2 of the Contract, with such extensions of time as are provided in the General Conditions. The Bidder accepts the provisions of the Contract regarding liquidated damages (Section 20 of the General Conditions of the Agreement) in the event of failure to complete the work of the project on or before the dates or within the number of calendar

days indicated in Section 2 of the Contract, with such extensions of time as are provided in the General Conditions.

8. The Bidder declares that the only persons or parties interested in this bid are those named herein, that this bid is in all respects fair and without fraud, and that it is made without collusion with any other bidder and without collusion with any representatives of the Owner. The Bidder hereby represents that no employee of the Owner, or any partnership or corporation in which an employee of the Owner has an interest, has or will receive any remuneration of any description from the Bidder, either directly or indirectly, in connection, except as specifically declared in writing.

9. The Bidder certifies that the Bidder has not discriminated against minority, women or emerging small business enterprises in obtaining any required subcontracts.

10. The Bidder will complete the work for the following prices in accordance with the Schedule of Contract Prices as follows:

#### **SCHEDULE OF CONTRACT PRICES**

<b>No.</b>	<b>Item</b>	<b>Units</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Total Price</b>
	<b>PART 1 - SITE IMPROVEMENTS</b>				
1	MOBILIZATION	LS	1	\$	\$
2	TEMPORARY SIGNS	LS	1	\$	\$
3	EROSION CONTROL	EA	3	\$	\$
4	REMOVE CONCRETE SURFACING	SY	40	\$	\$
5	REMOVAL OF STRUCTURES AND OBSTRUCTIONS	LS	1	\$	\$
6	REMOVE VALVES	EA	8	\$	\$
7	REMOVE PIPE	LF	100	\$	\$
8	PORTLAND CEMENT CONC. PAVEMENT SAW CUTTING	LF	60	\$	\$
9	REMOVE & REINSTALL FENCE	LS	1	\$	\$
10	REMOVE & REINSTALL LADDER	LS	1	\$	\$
11	EXCAVATION AND EMBANKMENT	LS	1	\$	\$
12	6 INCH CONCRETE SURFACING	SY	40	\$	\$
<b>SUBTOTAL PART 1 - STREET IMPROVEMENTS</b>				<b>\$</b>	<b>\$</b>

No.	Item	Units	Qty	Unit Price	Total Price
<b>PART 2 - RESERVOIR IMPROVEMENTS</b>					
13	TEMPORARY WATERMAIN BYPASS	EA	1	\$	\$
14	CONNECT TO EXISTING WATERMAIN	EA	2		
15	4" FLEXTEND	EA	1	\$	\$
16	8" FLEXTEND	EA	2	\$	\$
17	12" FLEXTEND	EA	2	\$	\$
18	10' x 8' VAULT	EA	1	\$	\$
19	12" GATE VALVE	EA	4	\$	\$
20	8" GATE VALVE WITH ACTUATOR	EA	2	\$	\$
21	12" GATE VALVE WITH ACTUATOR	EA	2	\$	\$
22	12" CHECK VALVE	EA	2	\$	\$
23	HYDRANT ASSEMBLIES	EA	2	\$	\$
24	12 INCH HDPE PIPE	LF	20	\$	\$
25	8 INCH DUCTILE IRON PIPE	LF	10	\$	\$
26	12 INCH DUCTILE IRON PIPE	LF	80	\$	\$
27	SHAKE ALERT CONTROL	LS	1	\$	\$
28	ELECTRICAL SYSTEMS	LS	2	\$	\$
<b>SUBTOTAL PART 2 - RESERVOIR IMPROVEMENTS</b>				<b>\$</b>	<b>\$</b>

<b>CONSTRUCTION BID SUMMARY</b>	
<b>CONSTRUCTION BID PART 1 - SITE IMPROVEMENTS</b>	<b>\$</b>
<b>CONSTRUCTION BID PART 2 - RESERVOIR IMPROVEMENTS</b>	<b>\$</b>
<b>TOTAL-BID</b>	<b>\$</b>

The following documents are attached to and made a condition of this bid:

- A. The required Bid Security enclosed with the Bid Form
- B. The First-Tier Subcontractor Disclosure Form submitted in a separate envelope within two hours after the date and time of the bid opening.
- C. The Bidder Responsibility Information Form.

Respectfully Submitted,

Name of Firm \_\_\_\_\_

Address \_\_\_\_\_

Federal Employer I.D. No. \_\_\_\_\_

State Employer I.D. No. \_\_\_\_\_

State C.C.B. Registration No. \_\_\_\_\_

Telephone \_\_\_\_\_

Fax No. \_\_\_\_\_

By:

Name \_\_\_\_\_

(Signature)

Title \_\_\_\_\_

(Please Print)

If Corporation, Attest \_\_\_\_\_

(Secretary of Corporation)

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2023

**END OF SECTION**

**SECTION 00 41 10  
BIDDERS RESPONSIBILITY INFORMATION FORM**

FAILURE TO SUBMIT THIS FORM WITH BID PROPOSAL PACKET WILL RESULT IN A NON-RESPONSIVE BID

**INSTRUCTIONS**

1. The information provided in this form is part of The City of Cannon Beach inquiry concerning bidder responsibility. Please print clearly or type. If you need more space, use plain paper.
2. Answer all questions. Submission of a form with unanswered questions, incomplete or illegible answers may result in a determination that your bid is non-responsive.
3. Sign and submit the completed bidder responsibility form with bid proposal.

BIDDER NAME : \_\_\_\_\_ CCB #: \_\_\_\_\_

1. **EXPERIENCE:** List the number of years Bidder has been operating its business under its current license. If Bidder's business has been in continuous existence under a current active license and a previous license number, then identify the previous license number. List and briefly describe a minimum of 3 similar projects performed by Bidder in the past 5 years that best characterize Bidder's capabilities. Include relevant data such as the type of work involved and project dates and total contract value. Describe how Bidder meets this experience requirement (use separate sheet if additional space is needed):

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2. **LAWSUITS/JUDGMENTS:** Within the past 5 years, has Bidder had any lawsuits filed against it involving contract disputes? For the purposes of this request, "lawsuits" include requests for arbitration and "judgments" includes arbitration awards. **YES / NO** If "YES" indicate dates and ultimate resolution of suit (with regard to judgments, include jurisdiction and date of final judgment or dismissal):

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3. **BANKRUPTCY:** Within the past 36 months, has Bidder filed a bankruptcy action, filed for reorganization, made a general assignment of assets for the benefit of creditors, or had an action for insolvency instituted against it? **YES / NO** If "YES" supply filing dates, jurisdictions, type of action, ultimate resolution, and dates of judgment or dismissal, if applicable:

**SECTION 00 41 20  
BID BOND**

We, \_\_\_\_\_, as "Principal,"

(Name of Principal)

and \_\_\_\_\_, a \_\_\_\_\_ Corporation,

(Name of Surety)

authorized to transact Surety business in Oregon, as "Surety," hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns to pay unto the City of Cannon Beach ("Obligee") the sum of (\$\_\_\_\_\_)

\_\_\_\_\_ dollars.

WHEREAS, the condition of the obligation of this bond is that Principal has submitted its bid to an agency of the Obligee in response to Obligee's project identified as:

**CANNON BEACH WATER RESILIENCY PROJECT PHASE 1 - SEISMIC IMPROVEMENTS**, which bid is made a part of this bond by reference, and Principal is required to furnish bid security in an amount equal to five (5%) percent of the total amount of the bid pursuant to ORS 279C.365 (5) and the procurement document.

NOW, THEREFORE, if the bid submitted by Principal is accepted, and if a contract pursuant to the bid is awarded to Principal, and if Principal enters into and executes such contract within the time specified in the procurement document and executes and delivers to Obligee its good and sufficient performance and payment bonds required by Obligee within the time fixed by Obligee, then this obligation shall be void; otherwise, it shall remain in force and effect.

IN WITNESS WHEREOF, we have caused this instrument to be executed and sealed by our duly

authorized legal representatives this \_\_\_\_\_ day of \_\_\_\_\_, 2023.

PRINCIPAL: \_\_\_\_\_ SURETY: \_\_\_\_\_

By \_\_\_\_\_ BY ATTORNEY-IN-FACT:

Signature

\_\_\_\_\_  
Official Capacity

\_\_\_\_\_  
Name

Attest: \_\_\_\_\_

Corporation Secretary

\_\_\_\_\_  
Signature

Address

\_\_\_\_\_  
City

\_\_\_\_\_  
State

\_\_\_\_\_  
Zip

\_\_\_\_\_  
Phone

\_\_\_\_\_  
Fax

**END OF SECTION**



**SECTION 00 41 30  
BIDDER'S WARRANTY**

By the act of submitting a bid for the proposed contract, the bidder warrants that:

The bidder and all subcontractors he/she intends to use have carefully and thoroughly reviewed the drawings, specifications and other bid documents and have found them to be complete and free from ambiguities and sufficient for the purpose intended; further that,

The bidder and all workmen, employees, and subcontractors he/she intends to use are skilled and experienced in the type of construction represented by the contract documents bid upon; further that,

Neither the bidder nor any of his/her employees, agents, intended suppliers, or subcontractors have relied upon any verbal representations allegedly authorized or unauthorized from the owner, his/her employees or agents including architects, engineers or consultants, in assembling the bid figure; and further that,

The bid figure is based solely upon the bid documents and properly issued written addenda and not upon any other written representation.

DATED: \_\_\_\_\_, 20\_\_\_\_

NAME OF BIDDER: \_\_\_\_\_

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

**END OF SECTION**

**SECTION 00 41 40  
BIDDER'S CERTIFICATIONS**

THIS CERTIFICATION MUST BE SIGNED IN INK BY AN AUTHORIZED REPRESENTATIVE OF THE BIDDER; ANY ALTERATIONS OR ERASURES TO THIS FORM BID MUST BE INITIALED IN INK BY THE UNDERSIGNED AUTHORIZED REPRESENTATIVE.

THE UNDERSIGNED ACKNOWLEDGES, ATTESTS AND CERTIFIES INDIVIDUALLY AND ON BEHALF OF THE BIDDER THAT:

1. He/she is a duly authorized representative of the Bidder, has been authorized by Bidder to make all representations, attestations, and certifications contained in this Bid and all Bid Documents.
2. Bidder, acting through its authorized representatives, has read and understands all Bid instructions, Specifications, Plans, terms and conditions contained in the Bid Documents (including all addenda, if any, issued).
3. The Bid submitted is in response to the specific language contained in the Bidding Documents, and Bidder has made no assumptions based upon either (a) verbal or written statements not contained in the Bidding Documents, or (b) any previously-issued ITB, if any.
4. The City is not liable for any claims or be subject to any defenses asserted by Bidder based upon, resulting from, or related to, Bidders failure to comprehend all requirements of the Bidding Documents.
5. The City is not liable for any expenses incurred by Bidder in preparing and submitting its Offer or in participating in the Offer evaluation/selection process.
6. The Offer was prepared independently from all other Bidders, and without collusion, fraud, or other dishonesty.
7. Bidder is bound by and will comply with all requirements, Specifications, Plans, terms and conditions contained in this Bid and the Bid Documents (including all addenda, if any, issued).
8. Bidder will furnish the designated item(s) and/or service(s) in accordance with the Bid Specifications, Plans and requirements, and will comply in all respects with the terms of the resulting Contract upon award; and
9. Bidder represents and warrants that Bidder has the power and authority to enter into and perform the Contract and that the Contract, when executed and delivered, shall be a valid and binding obligation of Contractor enforceable in accordance with its terms.
10. Bidder certifies that Bidder is authorized to act on behalf of Contractor in this matter, and attests under penalty of perjury that:

Contractor has not and will not discriminate against minority, women or emerging small business enterprises in obtaining any required subcontracts, in accordance with 279A.110(4).

Contractor will not accept a Bid or Bids from sub-contractors to perform work as described in ORS 701.005 under the Contract unless the sub-contractors are registered with the Construction Contractor's Board in accordance with ORS 701.035 to 701.055 at the time they submit their Bid or Bids to the Bidder.

**SECTION 00 41 50  
FIRST TIER SUBCONTRACTOR DISCLOSURE FORM**

**(OAR 137-049-0360)**

BIDS WHICH ARE SUBMITTED BY BID CLOSING, BUT FOR WHICH A REQUIRED DISCLOSURE SUBMITTAL HAS NOT BEEN MADE BY THE SPECIFIED DISCLOSURE DEADLINE, ARE NOT RESPONSIVE AND SHALL NOT BE CONSIDERED FOR CONTRACT AWARD

AGENCY SUPPLIED INFORMATION:

PROJECT NAME: **CANNON BEACH WATER RESILIENCY PROJECT  
PHASE 1 - SEISMIC IMPROVEMENTS**

BID DATE: **NOVEMBER 15, 2023, TIME: 2:00 PM**

DISCLOSURE DEADLINE DATE: **NOVEMBER 15, 2023, TIME: 4:00 PM**

DELIVER FORM TO: CITY OF CANNON BEACH

RECIPIENT: JENNIFER BARRETT PHONE #: (503) 436-8052  
163 E Gower/PO Box 368, Cannon Beach, OR 97110

**INSTRUCTIONS:**

The contracting agency will insert "N/A" above if the contract value is not anticipated to exceed \$100,000. Otherwise, this form must be submitted either with the bid or within two (2) working hours after the advertised bid closing date and time; but no later than the DISCLOSURE DEADLINE stated above.

UNLESS OTHERWISE STATED IN THE SOLICITATION, THIS DOCUMENT SHALL NOT BE SUBMITTED BY FACSIMILE. IT IS THE RESPONSIBILITY OF BIDDERS TO SUBMIT THIS DISCLOSURE FORM AND ANY ADDITIONAL SHEETS, WITH THE BID NUMBER AND PROJECT NAME CLEARLY MARKED, AT THE LOCATION INDICATED BY THE SPECIFIED DISCLOSURE DEADLINE. SEE "INSTRUCTIONS TO BIDDERS".

List below the Name, Category of Work add Dollar Value for each first-tier subcontractor that would be furnishing labor, or labor and material, for which disclosure is required. Enter the word "NONE" if there are no first-tier subcontractors subject to disclosure.

ATTACH ADDITIONAL SHEETS IF NECESSARY.

**SECTION 00 41 60  
CERTIFICATE OF NON-COLLUSION**

**CITY OF CANNON BEACH, OREGON**

FOR PROJECT: **CANNON BEACH WATER RESILIENCY PROJECT  
PHASE 1 - SEISMIC IMPROVEMENTS**

BIDDERS FIRM NAME: \_\_\_\_\_

I, THE UNDERSIGNED, AS (CIRCLE ONE):

Sole Owner

A Partner

Officer of the Foregoing Corporation

Agent of the Above Bidder

BEING FIRST DULY SWORN ON OATH, DEPOSE AND SAY:

That the attached bid has been arrived at by the bidder, independently, and has been submitted without collusion with, and without any agreement, understanding or planned course of action with, any other contractor, bidder, or vendor on materials, supplies, equipment or services, described in the invitation to bid, designed to limit independent bidding or competition.

The contents of the bid herein presented and made have not been communicated by the bidder or their employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid and will not be communicated to any such person prior to the official opening of the bid.

I have fully informed myself regarding the accuracy of the foregoing statements, and the same are made by me based on my personal information.

I have read and understand the bid booklet and the specifications for the attached Bid.

SIGNATURE: \_\_\_\_\_

TITLE: \_\_\_\_\_

SUBSCRIBED AND SWORN BEFORE ME THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_

MY COMMISSION EXPIRES: \_\_\_\_\_

NOTARY PUBLIC FOR OREGON

**END OF SECTION**

**SECTION 00 41 70  
CONTRACTOR'S CERTIFICATION REGARDING DRUG TESTING PROGRAM**

(1) Pursuant to ORS 279c.505(2), contractor certifies by its signature on this document that it has a qualifying drug testing program in place for its employees that includes, at a minimum, the following:

- (a) a written employee drug testing policy,
- (b) required drug testing for all new subject employees or, alternatively, required testing of all subject employees every 12 months on a random selection basis, and
- (c) required testing of a subject employee when the contractor has reasonable cause to believe the subject employee is under the influence of drugs.

(2) A drug testing program that meets the above requirements will be deemed a "qualifying employee drug testing program." an employee is a "subject employee" only if that employee will be working on the project job site.

(3) Contractor agrees that by signing this certification it represents and warrants to the city that its qualifying employee drug testing program is in place and will continue in full force and effect for the duration of the contract. The city's performance obligation (which includes, without limitation, the city's obligation to make payment) shall be contingent on contractor's compliance with this representation and warranty.

(4) Contractor also agrees that, as a condition to city's performance obligation (which includes, without limitation, the city's obligation to make payment), contractor shall require each subcontractor providing labor for the project to:

- (a) demonstrate to the contractor that it has a qualifying employee drug testing program for the subcontractor's subject employees, and represent and warrant to the contractor that the qualifying employee drug testing program is in place at the time of subcontract execution and will continue in full force and effect for the duration of the subcontract; or
- (b) require that the subcontractor's subject employees participate in the contractor's qualifying employee drug testing program for the duration of the subcontract.

CONTRACTOR

FIRM NAME: \_\_\_\_\_

BY: \_\_\_\_\_

NAME: \_\_\_\_\_

(Corporate Officer, Title)

DATE: \_\_\_\_\_

**END OF SECTION**

**SECTION 00 41 80  
PUBLIC IMPROVEMENT CONTRACT**

BETWEEN

CITY OF CANNON BEACH, OREGON

AND

CONTRACTOR NAME \_\_\_\_\_

CONTRACT NO. \_\_\_\_\_

THIS PUBLIC IMPROVEMENT CONTRACT ("CONTRACT") IS MADE BY AND BETWEEN THE CITY OF CANNON BEACH, A MUNICIPAL CORPORATION OF THE STATE OF OREGON ("CITY"), AND \_\_\_\_\_ ("CONTRACTOR LEGAL NAME") TO PROVIDE CONSTRUCTION SERVICES ON THE FOLLOWING PROJECT.

PROJECT NAME: \_\_\_\_\_

("PROJECT"), SERVICES DESCRIPTION:

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THE PARTIES AGREE AS FOLLOWS:

**1. WORK.**

Contractor shall execute fully the Work described by the Contract Documents, unless specifically indicated in the Contract Documents to be the responsibility of others. "Work" means the construction and any related services required by or reasonably inferable from the Contract Documents, whether completed or partially completed, including (except as otherwise expressly stated in this Contract) all other labor, materials, equipment, tools, permits, fees, licenses, facilities, taxes, transportation, supervision, temporary constructions of every nature, and all other services, management, and facilities of every nature whatsoever necessary to fulfill Contractor's duties by executing and completing this Contract within the Contract Time. The Work may constitute the whole or a part of the Project.

**2. EFFECTIVE DATE AND TERMINATION DATE.**

The effective date of this Contract shall be the Contract Start Date identified in section 2.1. or the date on which each Party has signed this Contract, whichever is later. Unless earlier terminated as provided below, the termination date shall be the Contract End Date, subject to extension as provided in the Contract Documents.

**SECTION 00 72 00  
(EXHIBIT A)  
GENERAL CONDITIONS**

**1. GENERAL PROVISIONS.**

1.1. Design Professional. The "Design Professional" is Windsor Engineers and their subconsultant team.

1.2. Contract Documents. The "Contract Documents" are enumerated in Item 3. ("Enumeration of Contract Documents") of the Public Improvement Contract between City and Contractor ("Contract") and consist of the Contract, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, additions or deletions to, material changes in, or general interest explanations of a Solicitation Document ("Addenda") (other than Addenda relating to bidding requirements) issued prior to the bid, other documents listed in the Contract, and Modifications issued after execution of the Contract. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. Performance by Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

1.3. Contract Schedule. The "Contract Schedule" is the graphical representation of the practical plan for carrying out the Work and completing the Work within the Contract Time as set forth in the Contract Documents. The Contract Schedule provides a list of intended events and times to complete each event as set forth in the Contract Documents.

1.4. Drawings. The "Drawings" are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

1.5. Knowledge. The terms "knowledge," "recognize" and "discover" their respective derivatives and similar terms in the Contract Documents, when used in reference to the Contractor, means that which the Contractor knows or should know, recognizes or should recognize and discovers or should discover. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents means reasonably inferable by a contractor familiar with the Project and exercising the care, skill and diligence required of the Contractor by the Contract Documents.

1.6. Modification. A "Modification" is

1.6.1. a written amendment to this Contract signed by both parties;

1.6.2. a Change Order;

1.6.3. a Construction Change Directive; or

1.6.4. a written order for a minor change in the Work issued by the Design Professional.

1.7. Organization of Drawings and Specifications. "Organization of Drawings and Specifications" into divisions, sections, articles, or otherwise arranged will not control Contractor in dividing the Work among subcontractors or in establishing the extent of Work to be performed by any trade subcontractor.

1.8. Project. The "Project" is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by City and by separate Contractors.

1.9. Project Site. The "Project Site" is the property upon which the Project lies and City's property that surrounds the Project, extending to the City's property boundary.

1.10. Specifications. The "Specifications" are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards, and workmanship for the Work and performance of related services.

## **2. CITY'S RESPONSIBILITIES.**

2.1. Authorized Representative. City shall designate a person in writing to be the authorized representative with express authority, to the extent permitted by law, to bind and communicate on behalf of City with respect to all matters requiring City's approval or authorization ("City Representative"). The term "City" includes City Representative.

2.2 Contract Administration. City shall provide contract administrative services for the Project through City's authorized representative. The City Representative may engage and delegate authority to such additional staff and professional and technical consultants as City deems necessary to assist in performing its administrative tasks. Contractor shall direct all Project communications to City and in accordance with the Contract Documents, or as City directs in writing.

2.2.1. City may engage the Design Professional to assist City during construction of the Project to interpret technical contract provisions and to determine the amount, quality, acceptability, and fitness of the Work. Such Design Professional will be authorized to act on behalf of City only to the extent expressly provided in the Contract Documents or as City otherwise directs in writing.

2.2.2. City may engage a consulting construction manager to provide Project administrative services on City's behalf. Such construction manager will be authorized to act on behalf of City to the extent expressly provided in the Contract Documents or as City otherwise directs in writing.

2.2.3. City may retain certain project inspectors to monitor compliance with Drawings and Specifications for the Project, as well as applicable codes and ordinances. Such project inspectors will be authorized to act on behalf of City to the extent expressly provided in the Contract Documents or as City otherwise directs in writing.

2.3. Access to the Work. City and its designated representatives shall have free access to the Work at all times. Contractor shall not carry on Work except with the knowledge of City and its designated representatives. City may require special inspection or testing of any portion of the Work, whether it has been fabricated, installed, or fully completed. Inspection or observation of Work shall not relieve Contractor from any obligation to fulfill the Contract.

2.4. Right to Stop or Reject Work. City may reject Work that fails to conform to the Contract Documents, as determined by City. If Contractor fails to promptly correct such defective Work, City may issue a written order directing Contractor to stop the Work, or designated portion thereof, until the cause for such order is eliminated. The right of City to stop the Work shall not give rise to a duty on the part of City, or any of its representatives, to discover nonconforming Work or to exercise the right to stop the Work for the benefit of Contractor or any other person or entity.

2.5. Permits and Access. Except for permits and fees that are Contractor's responsibility under the Contract Documents, City shall secure and pay for all other necessary approvals, easements, assessments and charges required to complete the Work.

2.6. Subsurface Surveys. City shall make available to Contractor, and Contractor shall study, the results of such test borings and information that City has concerning subsurface conditions and site geology. Contractor shall inform City of any other site investigation, analysis, study, or test conducted by or for Contractor or its agents and shall make the results available to City upon City's request.

2.7. City's Rights. The rights stated in this section and elsewhere in the Contract Documents are cumulative and do not limit any rights City may have under the Contract Documents, at law or in equity. Without limiting the generality of the foregoing sentence, any right City has under the



Contract Documents to compel Contractor to fix defective Work, up to and including any warranty period the Contract Documents may establish, does not operate to shorten or otherwise limit statutes of limitations applicable to the Work.

### **3. CONTRACTOR'S RESPONSIBILITIES.**

#### **3.1. General Responsibilities.**

3.1.1. Authorized Representative. Contractor shall designate a person in writing to be the authorized representative with express authority to bind and communicate on behalf of Contractor with respect to all matters requiring Contractor's approval or authorization ("Contractor Representative"). The term "Contractor" means the Contractor or the Contractor Representative.

3.1.2. Materials, Equipment, and Services. The Contractor will provide all labor, materials, equipment, and services necessary to complete the Work, all of which will be provided in full accord with the Contract Documents.

3.1.3. Supervision and Coordination. Unless otherwise expressly provided in the Contract Documents, the Contractor will be solely responsible for the supervision and coordination of the Work, including the construction means, methods, techniques, sequences, and procedures utilized.

3.1.4. Project Correspondence. Contractor shall provide City with a copy of all written communications between Contractor and City's consultants at the same time as that communication is made to such consultants, including, without limitation, all requests for information, correspondence, submittals, notices, and change order proposals. Contractor shall confirm oral communications in writing.

3.1.5. Project Boundary. Contractor shall confine operations at the site to areas permitted by law, ordinances, permits, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

3.1.6. Taxes. Contractor shall pay all applicable taxes for the Work provided by Contractor that are legally applicable at the time the bid is submitted, whether or not yet effective or merely scheduled to go into effect.

3.1.7. Permits, Fees and Notices. Except as otherwise provided in the Contract Documents, Contractor shall secure and pay for all permits, licenses, and certificates that are the Contractor's responsibility under the Contract Documents and that are necessary for prosecution of Work before the date of the commencement of the Work or before the permits, licenses, and certificates are legally required to continue the Work without interruption. Contractor shall obtain and pay, when legally required, for all licenses, permits, inspections, and inspection certificates required by any authority having jurisdiction over any part of the Work included in the Contract. Contractor shall deliver all final permits, licenses, and certificates to City before demand is made for final payment.

3.1.8. Withholding of Retainage shall be in accordance with Oregon Administrative Rule 137-049-0820.

3.1.8.1 The amount of each progress payment shall be determined as provided in the General Conditions, less retainage of 5% pursuant to ORS 279C.550 to 279C.565, ORS 701.420 and 701.430, and less liquidated damages, if any.

3.1.8.2 Unless otherwise specified in the Contract Documents, Contractor elects to have the City deposit the retainage as accumulated in an interest-bearing account in a bank, savings bank, trust company, or savings association as outlined in ORS 279C.560(5), OAR 125-249-0820(3), and OAR 137-049-0820(3), from which earnings on such account shall accrue to the Contractor.

### 3.2. Worksite Conditions.

3.2.1. Benchmarks and Monuments. Contractor shall protect and preserve established benchmarks and monuments and shall not change locations of benchmarks and monuments without City's prior written approval. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of City and with City's approval.

3.2.2. Field Verification. Prior to the commencement of the Work, Contractor shall review the Project Site with City in detail and identify the area of the Work, staging areas, connections or interfacing with existing structures and operations, and restrictions on the Work site area. Contractor shall ensure that all forces on the Project Site are instructed about the acceptable working and staging areas and restrictions on use of the site. Contractor, with advance consent of City, shall erect such barriers and devices as are necessary to restrict access within the Work site to authorized areas and to prevent unauthorized access to non-Work areas.

3.2.3. Utility Locates. Contractor will be responsible to locate existing utilities and underground facilities that are indicated in the Contract Documents or that are known or reasonably should be known to exist in proximity to the Work. Contractor shall provide timely notice and locate requests with any affected utility or through contact with appropriate notification centers before commencing excavation or demolition Work that Contractor knows or reasonably should know is in proximity to such utilities or facilities. Contractor assumes the sole risk and will be responsible for all delay and expense arising out of Contractor's failure to do so. Contractor acknowledges that utility companies and other third parties owning or managing facilities that may need to be relocated are not City's agents and do not act for the City.

### 3.3. Responsibility for Performance.

3.3.1. Before beginning the Work, Contractor shall examine and compare the drawings and specifications with information furnished by City that are Contract Documents, relevant filed measurements made by the Contractor, and any visible conditions at the worksite affecting the Work.

3.3.2. Reporting Inconsistencies. Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations, but Contractor shall promptly report any nonconformity it discovers to City. Contractor will be liable to City for damages if it fails, in the exercise of normal diligence, to recognize any error, inconsistency, omission or difference between field conditions and the Contract Documents. Contractor shall promptly report any errors, inconsistencies, or omissions it discovers, as a request for information, in such a form as City or Design Professional may require. Contractor will not be entitled to any modification in Contract Total or Contract Time solely by the request for information. Contractor shall carefully study and compare all Contract Documents, including Drawings, Specifications, and other instructions and shall at once report, in writing to City any error, inconsistency, or omission that Contractor or its employees or subcontractors may discover. In the event of an inconsistency within or between parts of the Contract Documents, or between the Contract Documents and applicable law, and regardless of whether Contractor reports the inconsistency to the City, the Contractor must: (i) provide the better quality or greater quantity of Work; or (ii) comply with the more stringent requirement as applicable.

3.3.3. Unnecessary Inquiries. Contractor is liable for costs incurred by City for professional services for interpretations or decisions of matters where the information sought is equally available to the party making the request.

### 3.4. Construction Materials and Supplies.

3.4.1. Quantities of Materials. Contractor shall provide materials in sufficient quantities on hand at such times as to ensure uninterrupted progress of Work and shall store materials properly and protect materials as required.

3.4.2. Complete Assembly. For all materials and equipment specified or indicated in the Drawings, Contractor shall provide all labor, materials, equipment, and services necessary for complete assemblies and complete working systems, functioning as intended. Contractor shall furnish incidental items not indicated on Drawings, nor mentioned in the Specifications, that can be legitimately and reasonably inferred to belong to the Work described, or necessary in good practice to provide a complete assembly or system, as though itemized here in every detail. In all instances, Contractor shall install material and equipment in strict accordance with each manufacturer's most recent published recommendations and specifications. Contractor shall be responsible for appropriately sequencing the Work and for verification of suitability of prior work before subsequent construction activities.

3.4.3. Timely Ordering of Materials. Contractor shall coordinate submittal approvals and place orders for materials and/or equipment so that delivery of same will be made without delays to the Work. Contractor shall, upon City's reasonable request, provide documentary evidence that orders have been placed.

3.4.4. No Right to Lien. Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver the site to City, together with all improvements and appurtenances constructed or placed thereon by it, and free from any claims, liens, or charges. Because City's property is public property, Contractor and any person, firm, or corporation furnishing any materials or labor for any Work covered by this Contract, will not have any right to lien any portion of the Project Site or any improvement or appurtenance thereon.

3.4.5. Storage. Contractor and its subcontractors shall obtain City approval before delivering or storing materials or tools on City's premises. Upon approval, Contractor shall store materials and tools so that they do not hamper the operation of equipment or persons and do not present a fire or safety hazard.

### 3.5. Construction Personnel and Supervision.

3.5.1. Supervision. During progress of the Work, Contractor shall keep on the Project Site, and at all other locations where any Work related to this Contract is being performed, a competent project manager, construction superintendent and staff, who are employees of Contractor, to whom City does not object and at least one of whom is fluent in English, written and verbal. Contractor shall provide efficient supervision to the Work, using its best skill and attention. Before commencing the Work, Contractor shall give written notice to City of the name of its project manager and construction superintendent. Contractor is bound by all directions given to Contractor's project manager and/or construction superintendent as if such direction was given to Contractor.

3.5.2. Replacement of Supervision. Contractor shall not otherwise remove or replace the construction superintendent or project manager for any reason, including their need to work on other projects, or to take extended vacations, without submitting thirty (30) days' written notice to City. If Contractor's project manager, construction superintendent, or support staff member is no longer employed by Contractor, Contractor shall provide City with notice of the termination of the employment relationship and shall consult with City with respect to replacement personnel.

3.5.3. Discipline and Removal. Contractor shall at all times enforce strict discipline and good order among its subcontractors and employees and shall not employ or work any unfit person, or anyone not skilled in work assigned to that person. City may require Contractor to permanently remove unfit persons from Project Site. Contractor shall not

employ any person whom City may deem incompetent or unfit on the Project except with the prior written consent of City. City may require removal and replacement of any or all construction superintendents or project managers upon ten (10) days' notice to Contractor.

3.5.4. Acts or Omissions. Contractor is responsible to City for acts and omissions of Contractor's employees, subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of Contractor or any of its subcontractors.

3.5.5. Identification Badges. The Contractor and its subcontractors, and the employees and the agents of any of them shall comply with City's policies and requirements to obtain, display, and return identification badges at any time while they are present on City's property.

### 3.6 Contractor's Construction Master Schedule.

3.6.1. Schedule Required. Within no more than ten (10) days of being awarded the Contract, and before commencing the Work, Contractor shall prepare and submit to City for City's approval a construction master schedule for the Work. The construction schedule shall be in a detailed precedence-style critical path method (CPM) type format, which will include any interim dates that are critical in insuring the timely completion of the Work as provided in the Contract Documents. City shall provide approval or comment on the submitted schedule within seven (7) days. Contractor shall be responsible for amending construction schedule in response to City comments.

3.6.2. Logic. Schedule shall use retained logic during the development and updating of the schedule. Any function that would cause the retained logic of the logic network to be overridden is prohibited unless approved, in writing and in advance, by the Design Professional and City.

3.6.3. Schedule shall include: date of Notice to Proceed, date of Substantial Completion, and date of Final Completion in accordance with Contract Documents.

3.6.4. Schedule Maintenance. The schedule shall not exceed the Contract Time for the Work. Contractor shall revise and update the schedule at appropriate intervals, no greater than monthly, or as required by City or the conditions of the Work and Project. Should the Contractor fail to meet any scheduled date as shown on the current Construction Progress Schedule, the Contractor shall promptly notify the City, and if requested, be required at its own expense to submit within five (5) days of the request an updated Construction Progress Schedule. If the Contractor's progress indicates to the City that the Work will not be Substantially Completed within the Contract Time, the Design Professional and City may require the Contractor develop a Recovery Schedule that adequately demonstrates how the Contractor will, at its own expense, increase its work force and/or working hours to bring the actual completion dates of the activities into conformance with the Construction Progress Schedule and Substantial Completion within the Contract Time. Neither the City nor the Design Professional will, however, be obligated to review the substance or sequence of the Construction Progress Schedule or otherwise determine whether it is correct, appropriate or attainable.

3.6.5. Submittal Schedule. Contractor shall prepare and keep current, for City's review and acceptance, a schedule of submittals that is coordinated with the construction schedule and allows City and its consultants reasonable time to review submittals and to provide information necessary for procurement and installation of Work for which allowances are provided under the Contract Documents. City may require Contractor to include preparation of Contract submittals as a line item payment in the schedule of values.

3.6.6. Execution of Schedule. Contractor shall perform the Work in general accordance with the most recent schedules submitted to and accepted by City. Contractor shall

indicate in the schedule updates any Work that is not proceeding according to the schedule and shall provide a written plan of action to bring the Work into compliance with the schedule or to otherwise ensure that the Work will be completed within the Contract Time.

### 3.7. Documents and Records.

3.7.1. Record Documents. Contractor shall update at least weekly, at the Project Site, or at such other location as City may authorize in writing, one legible copy of all Contract Documents annotated with all changes ("Record Documents"), including but not limited to Addenda, RFIs, ASIs, and Change Orders. Contractor shall also maintain on site a complete record and copy of all approved submittals, shop drawings and product samples. Failure to update in a timely manner as required by this section may result in withholding payment by City. Contractor shall keep these documents in good order and available to City's consultants or representatives and all authorities having jurisdiction. Contractor shall coordinate with City's representatives and consultants and shall submit its verified report(s) according to Oregon law or as required by authorities having jurisdiction. The Contractor shall submit the completed and finalized project record to City in accordance with the contract documents prior to Final Acceptance.

3.7.2. Daily Job Reports. Contractor shall maintain at least one (1) set of reports on the Project prepared by Contractor's employee(s) present on site, and which includes following information: a brief description of all Work performed on that day; a summary of all pertinent events and/or occurrences on that day including records of all tests and inspections; a list of all subcontractor(s) working on that day; a list of each Contractor employee working on that day; the total hours worked for each employee; a complete list of all equipment on the Project that day, whether in use or not; the time Work commenced and ended; weather conditions; accidents or injuries; and Work progress made for that day ("Daily Job Reports"). Contractor shall keep the Daily Job Reports current and in good order and shall make current copies available to City upon request.

3.7.3. Maintenance of Records after Final Payment. Contractor shall make available at its office at all reasonable times the materials described in this paragraph for the examination, audit, or reproduction until six (6) years after final payment under this Contract: (a) all Daily Job Reports or other Project records of Contractor's project manager(s), construction superintendent(s), and/or project foreperson(s); (b) all certified payroll records and/or related documents including, without limitation, payroll, payment, timekeeping and tracking documents; (c) all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports, and other data of Contractor, any subcontractor, and/or supplier, including computations and projections related to bidding, negotiating, pricing, or performing the Work or Contract modification, in order to evaluate the accuracy, completeness, and currency of the cost, manpower, coordination, supervision, or pricing data at no additional cost to City. These documents may be duplicative and/or be in addition to any bid documents held in escrow by City.

3.7.4. Submittals. Contractor shall submit shop drawings, product data, samples and mock ups as required by the Contract Documents that have been verified and coordinated with the requirements of the Work and of the Contract Documents. Contractor shall not perform any portion of the Work until the submittals for that portion have been approved by City.

3.7.5. Professional Design Services. City will not require Contractor to perform professional services which constitute the practice of engineering, or surveying unless such services are specifically required by the Contract Documents as a part of the Work or unless Contractor must provide such services in order to carry out Contractor's responsibilities under the Contract. City shall specify performance and design criteria that such professional services must satisfy.

3.7.6. Ownership of Documents. All copies of Drawings, Specifications, and copies of other incidental engineering work, or copies of other Contract Documents furnished by City or generated by Contractor, including those in electronic form, are the property of City.

3.7.7. Copyright and License. Neither Contractor nor any subcontractor, or material or equipment supplier, will own or claim a copyright in the documents prepared by the City's consultants. City hereby grants Contractor, subcontractors, sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings and Specifications prepared for the Project in the execution of their Work under the Contract Documents.

3.7.8. Royalties, Licenses and Copyrights. Contractor shall obtain and pay, when required by law, all royalties and license fees necessary for prosecution of Work before the earlier of the date of the commencement of the Work or the date the license is legally required to continue the Work without interruption. Contractor shall defend suits or claims of infringement of patent, copyright, or other rights and shall hold City, City's consultants, and City's representatives harmless and indemnify them from loss on account of claims for infringement to the extent Contractor knew, or with reasonable diligence should have known, that the use of a specified design, process, or product would constitute infringement.

3.7.9. Intellectual Property. The review by City or Design Professional of any method of construction, invention, appliance, process, article, device, or material of any kind is limited to a review for adequacy for the Work and is not approval for use by Contractor in violation of any patent or other rights of any person or entity.

### 3.8. Tests and Inspections.

3.8.1. Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities.

3.8.2. Unless otherwise provided, Contractor shall arrange for such tests, inspections, and approvals, and shall bear the associated costs. Contractor shall notify City of scheduled tests and/or inspections and approvals, so that City or its designated representative may be present for such procedures, which presence shall be at City's expense.

3.8.3. Contractor shall not incorporate any material into the Work that has not satisfied all testing, inspection, or approval requirements of the Contract Documents.

3.8.4. Contractor shall secure and promptly deliver required certificates of testing, inspection or approval to City, unless otherwise provided by the Contract Documents.

3.8.5. If testing, inspection, or approval required by the Contract Documents, or otherwise required by City, reveal failure of the Work to comply with requirements of the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation of City's costs, shall be at Contractor's expense.

### 3.9. Work Under the Contract.

3.9.1. Defective Work. At City's sole option, Contractor shall repair or replace any and all Work, together with any other Work that may be displaced in doing so, that may prove defective in workmanship and/or materials within a one (1) year period from Substantial Completion of the Work without expense whatsoever to City. In the event Contractor fails to commence and diligently pursue such replacements or repairs within ten (10) days after being notified in writing, Contractor hereby acknowledges and agrees that City may correct such defects, without voiding any guarantee or warranty, at Contractor's expense. Payment shall become due upon City's demand, and shall be an obligation secured by Contractor's performance bond.

3.9.2. Correction of Work. If, in the opinion of City, defective Work creates an exigent or dangerous condition or requires immediate correction or attention to prevent injury to persons or property or to prevent interruption of City operations, City may, upon making a good faith attempt to notify Contractor, proceed to make some or all replacements or repairs as may be reasonably required in the circumstances. The costs of such work will be charged against Contractor and shall become due upon City's demand.

3.9.3. Manufacturer's Warranties. The above provisions do not in any way limit the guarantees on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish to City all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by City. Contractor shall obtain and preserve for the benefit of City, manufacturer's warranties on material, fixtures, and equipment incorporated into the Work. Contractor shall furnish City with all guarantee or warranty certificates as indicated in the Specifications or upon City's request.

3.9.4. Cutting and Patching. Contractor shall do all cutting, fitting, patching, and preparation of Work as required to make its several parts come together properly, to fit it to receive, or be received by work of other Contractors, and to coordinate tolerances to various pieces of work, showing upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and shall conform them as City may direct.

3.9.5. Alteration of Work by Contractor or Others. Contractor shall not endanger any Work performed by it or anyone else by cutting, excavating, or otherwise altering Work and shall not cut or alter Work of any other Contractor except with consent of City.

3.9.6. Cleaning up. Contractor shall keep the Project Site and surrounding area, including public rights of way, free from dust, mud, dirt, or accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, Contractor shall clean the site, streets, and sidewalks and shall remove from the Project waste materials, rubbish, Contractor's tools, construction equipment, machinery, and surplus materials.

3.9.7. Access to Work. Contractor shall provide City and its representatives access to the Work in preparation and progress wherever located.

### 3.10. Allowances.

3.10.1. Contractor shall include all allowances stated in the Contract Documents in the Contract Total. Unless the Contract Documents provide otherwise, Contractor shall include in the Contract Total, separate from allowances, amounts necessary to cover the cost of materials and equipment delivered at the site and all required taxes, less applicable trade discounts, Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance. City shall adjust the Contract Total through a Change Order whenever costs are more than allowances. City shall provide a Change Order amount that reflects the difference between the actual cost and the allowance.

### 3.11. Warranty.

3.11.1. Contractor warrants to City and Design Professional that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by Design Professional

or City, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.11.2. Contractor guarantees all work against defects in material or workmanship for a period of one (1) year from the date of substantial completion.

3.11.3. If, after 10 days' notice, Contractor fails to proceed to cure any breach of this warranty, City may have the defects corrected and Contractor and its surety shall be liable for all expenses incurred. In case of an emergency, where, in the opinion of City or Design Professional, delay would cause serious loss or damage, corrective work may be undertaken without advance notice to Contractor; but Contractor and its surety shall remain liable for all expenses incurred. The remedies stated in this subsection are not exclusive, but are cumulative of any other remedies City may have.

3.11.4. Contractor shall assign, and shall obtain from subcontractors and assign, all manufacturers' warranties to City and all guarantees and warranties of goods supplied under this Contract shall be deemed to run to the benefit of City. Contractor shall provide City with all manufacturers' warranty documentation and operations and maintenance manuals not later than the date of Final Acceptance of the Work by the City.

#### **4. SUBCONTRACTORS.**

4.1. Subcontractor Disclosure. Contractor shall provide City a list of all subcontractors and major suppliers with a name, address, telephone and fax numbers, Oregon license number(s), classification, and monetary value of each subcontract for labor, material, or equipment. If City objects, City shall promptly provide a written notice of objection. Contractor shall not contract with a proposed person or entity to which City reasonably objects or that is ineligible to receive a subcontract under ORS 279C.860, and shall procure a replacement subcontractor that is acceptable to City. City shall provide a Change Order before commencement of substitute subcontractor's Work for the increase or decrease in the Contract Total and Contract Time occasioned by such change, unless the subcontractor is ineligible under ORS 279C.860, and Contractor shall be fully responsible for performance of the substituted subcontractor under the Contract Documents. Contractor shall be solely responsible to determine whether any proposed subcontractor is eligible.

4.2. Pass-Through. Contractor shall require each subcontractor, by written agreement, to be bound to Contractor by terms of this Contract to the extent it applies to the Work performed by subcontractor. Contractor shall provide copies of subcontract agreements upon City's request.

4.3. No Waiver. City's consent or failure to object to any subcontractor does not relieve Contractor of any obligations under this Contract and is not a waiver of any provisions of this Contract. A waiver is not effective unless it is in writing and is signed by the City.

4.4. Substitution and Assignment. Contractor shall not, without City's written consent:

4.4.1. Substitute any person as a subcontractor in place of the subcontractor designated in the original bid.

4.4.2. Permit any Subcontract to be assigned or transferred, or allow any portion of the Work to be performed by anyone other than the subcontractor listed in the original bid; or

4.4.3. Sublet or subcontract any portion of the Work in excess of one-half of one percent (1/2 of 1%) of Contractor's total bid as to which his original bid did not designate a subcontractor.

4.5. Coordination of Work. Contractor shall coordinate the trades, subcontractors, sub-subcontractors and material or equipment suppliers working on the Project.

4.6. Subcontractor Dispute Resolution. Contractor shall settle any difference between Contractor and its subcontractor(s) or between subcontractors.

4.7. Assignment. Contractor shall include assignment provisions in each subcontract as indicated in the termination provisions set forth in these General Conditions.



4.7.1. Contingent Assignment of Subcontractors. Contractor shall assign to City each subcontract agreement for a portion of the Work provided that:

4.7.1.1. Assignment is effective only after termination of this Contract by City for cause or stoppage of the Work by City, and only for those subcontract agreements which City accepts in its sole discretion by notifying the subcontractor and Contractor in writing; and

4.7.1.2. Assignment is subject to the prior rights of the surety, if any, obligated under bond relating to this Contract.

4.7.2. Upon such assignment, if the Work has been suspended for more than thirty (30) days, City shall equitably adjust subcontractor's compensation for increases in cost resulting from the suspension.

4.8. Prompt Payment of Subcontractors. Contractor shall promptly pay subcontractors as required by the Contract.

## **5. CONSTRUCTION BY CITY**

5.1. Other Contractors. City may let other contractors perform work with its own forces, in connection with the Project. Contractor shall afford other contractors reasonable opportunity for introduction and storage of materials and execution of their work and shall properly coordinate and connect the Work with the work of other contractors. If Contractor claims that delay or additional cost is involved because of such action by City, Contractor shall make such claim in the manner provided in the Contract Documents.

5.1.1. Contractor shall protect the work of other contractors that it encounters while working on the Project.

5.1.2. If any part of Contractor's Work depends upon completion of the work of City or others for proper execution, Contractor shall inspect and promptly report to City any discrepancy or defective condition in such work. Contractor's failure to inspect and report will be deemed acceptance of all work of others as fit and proper for reception of Contractor's Work. Contractor is liable for damages for work of others that Contractor failed to inspect, except for defects that were not discoverable and may develop in City's or any other contractor's work after execution of Contractor's Work.

5.2. Mutual Responsibility. Contractor shall reimburse City for costs incurred by City which are payable to a separate contractor because of delays, improperly timed activities or defective construction of Contractor. City shall reimburse Contractor for costs incurred by Contractor because of delays, improperly timed activities, and damage to the Work or defective construction of a separate contractor.

5.3. City's Right to Clean Up. If a dispute arises among Contractor, separate contractors and City as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, City may clean up and the City shall allocate the cost among those responsible.

## **6. CHANGES IN THE WORK.**

6.1 Change Orders.

6.1.1. Change Order. A document prepared by the City Representative and signed by the City, the City Representative, the Design Professional, and the Contractor or assigned designee, stating their agreement upon all of the following: (1) a change in the Work; (2) the amount of the adjustment in the Contract Total, including all costs, overhead and profit, if any; and (3) the extent of the adjustment in the Contract Time, if any, issued after the effective date of the Contract.

6.1.2. A Proposed Change Order (PCO) is a document prepared by the Contractor to seek additional compensation and/or time from the City. The Contractor shall provide a written PCO narrative explaining its reasons for requesting additional compensation or

time. The written PCO narrative shall reference all related schedule activities and contract specification sections and drawings directly pertaining to the PCO, include all costs, overhead and profit.

6.1.3. Change Pricing. In the absence of applicable unit prices or other agreement, the changed work will be priced in accordance with the following provisions:

6.1.3.1. In no case shall the sum of the individual markups applied to a General Contractor's Modification exceed fifteen percent (15%), regardless of the number of Subcontractor tiers involved in performing the Work.

6.1.3.2. The total combined mark-up for a Subcontractor and his lower-tier Subcontractor shall not exceed ten percent (10%). Costs of tax and insurance shall not be marked up.

6.1.3.3. For work performed by a subcontractor, the subcontractor will receive 10% markup for direct costs. The General Contractor shall receive a five percent (5%) of the subcontractor's direct costs for processing.

6.1.3.4. For self-performed work by the General Contractor, the markup shall equal fifteen percent (15%) of the direct cost as defined herein.

6.1.3.5. Bonding may be increased a maximum of one percent (1%) provided the Contractor demonstrates to the City a requirement to increase bonding.

6.1.3.6. If the net value of a change results in a credit from the Contractor or subcontractor, the credit shall be the actual net cost, plus five percent (5%) for overhead and profit. When both additions and credits covering related work or substitutions are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase or decrease, if any, with respect to the change.

6.1.4. Equipment Costs:

6.1.4.1. The allowance for equipment costs (both rental as well as Contractor owned equipment) shall be based on actual and verified rental company rates. Hourly, daily, weekly, or monthly rates shall be used, whichever is lower. Hourly rates including operator shall not be used. Unless otherwise specified, manufacturer's ratings and manufacturer approved modifications shall be used to classify equipment for determination of applicable rental rates.

6.1.4.2. The actual time to be paid for equipment shall be the time that the equipment is in productive operation on the Work under Contract Modification. In computing the hourly rental of equipment, any time less than thirty (30) minutes shall be considered one half (1/2) hour. No payment will be made for time while equipment is inoperative due to breakdown, or for non-workdays. In addition, the rental time shall not include the time required to move the equipment to and from the Project Site. No mobilization or demobilization will be allowed for equipment already on site. If such equipment is not moved by its own power, then loading and transportation costs will be paid in lieu of rental time thereof. However, neither moving time nor loading and transportation costs will be paid if the equipment is used on the Project Site in any other way than upon the work directly related to the Contract Modification.

6.1.5. Small Tools. Individual pieces of equipment having a replacement value of two thousand dollars (\$2,000) or less shall be considered to be small tools or small equipment, and no payment will be made since the costs of these tools and equipment is included as part of the markup for overhead and profit defined herein.

6.1.6. Labor rates will not be recognized when in excess of the applicable prevailing wage rate pursuant to ORS 279C.800 to 279C.870 or wage established in any applicable collective bargaining agreement, whichever is higher. The costs for all supervision,

including general superintendents and foreman, shall be included in the markup defined herein. Working foreman will be considered a direct cost if the individual is on the Project Site only installing Work under Contract Modification with no other work being performed at the time. A breakdown of the payroll rates for each trade used for Contract Modifications shall be furnished to the City within thirty (30) calendar days of the Contract Notice to Proceed.

6.1.7. Premium Time Rate. Shall be the difference between the Overtime Hourly Rate and Straight Time Rate per specific trade and classification as more fully defined herein. City will pay taxes on the Premium Time Rate only. The Premium Time Rate shall be paid without overhead and profit calculated against the differential.

6.1.8. Material costs directly required for the performance of the Contract Modification. Such costs may include the cost of transportation. If a trade reduction by an actual supplier is available to the Contractor, it shall be credited to the City. If the materials are obtained from a supplier or source owned wholly by or in part by the Contractor, payment thereof will not exceed the current wholesale price for the materials. The term trade reduction includes the concept of cash discounting.

6.1.9. Agreement on Change Order. Agreement on any Change Order is a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Total and the construction schedule.

6.1.10. Additional Credits. Contractor shall credit all trade discounts, rebates, refunds, and returns from the sale of surplus material to City

6.1.11. Cost Accounting Records. Contractor shall provide all cost accounting records to City upon City's request.

6.2. Construction Change Directives. A Construction Change Directive is a written order signed by City, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Total or Contract Time, or both. City may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract, the Contract Total and Contract Time being adjusted accordingly. City and Contractor may use a Construction Change Directive in the absence of total agreement on the terms of a Change Order. Upon receipt of a Construction Change Directive, Contractor shall promptly proceed with the change in Work directed and shall advise City of Contractor's agreement or disagreement with the proposed method, if any, provided in the Construction Change Directive for adjustment in the Contract Total or Contract Time.

6.2.1. Force Account. When a definite price has not been agreed upon in advance and it is to be paid on a force account basis, City may establish a not-to-exceed budget. Contractor shall submit daily all direct costs necessarily incurred and paid for labor, material, equipment, permit fees, taxes, and increased costs of bonds and insurance related to the Work for approval by City. Contractor shall not exceed the budget unless City specifically authorizes the overrun in writing. City shall pay only for actual costs verified in the field by City on a daily basis. When City and Contractor reach agreement upon the adjustment for price and time, Contractor and City shall prepare and execute an appropriate Change Order.

6.2.2. Negotiating Changes. If City and Contractor are unable to agree upon change order terms, or if in the opinion of City the Work must proceed before an agreement can be negotiated, City may order Contractor to proceed with the changes, and Contractor shall comply. In such event, Contractor shall keep detailed daily records as to all labor employed in connection with the changes. Contractor's records will itemize costs for labor, materials, equipment rental, and transportation. Contractor shall submit the records for approval to the City. If Contractor fails to keep such records, all such Work will be deemed to have been performed at Contractor's own expense. City and Contractor shall

attempt to negotiate fair and reasonable adjustments to the Contract for changes in the Work. Contractor shall submit to City all evidence in support of Contractor's proposals.

6.2.3. Markup. No fee or other markup of any kind will be applicable to any premium portion of wages, taxes, or related benefits. In the event of addition or deletion of like items in a change order or change directive, the like item quantity will be summed and the unit prices or the percentage fee will be applied to the total.

6.2.4. Written Authorization Required. In no event shall Contractor proceed with changes in the Work without a written order from City to so proceed. City will be under no obligation to pay for unauthorized extra, additional, or changed Work performed by Contractor without a written Change Order, Construction Change Directive, or other written order to proceed duly authorized and executed by City.

6.2.5. Minor Changes. Contractor shall promptly carry out minor changes in the Work issued through written order of City's representative, through the authority granted to it by City, not involving adjustment in the Contract Total or extension of the Contract Time, and not inconsistent with the intent of the Contract Documents.

## **7. TIME.**

7.1. Time is of the Essence. Time limits stated in the Contract Documents are of the essence of the Contract. Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

7.2. No Work Without Insurance. Contractor shall not, except by written direction by City, prematurely commence operations on the site or elsewhere prior to the effective date of insurance to be furnished by City and Contractor. The date of commencement of the Work is not changed by the effective date of insurance.

7.3. Notice to Proceed. City shall issue a Notice to Proceed within a reasonable time following the date of execution of this Contract. To the maximum extent permitted by law, Contractor is not entitled to additional compensation as a result of a postponement of the issuance of Notice to Proceed. The Parties acknowledge the sole remedy for the Contractor in such circumstances is an extension of Contract Time to achieve Substantial Completion.

7.4. Working Hours. Contractor shall perform Work during regular working hours as permitted by City; 7:00 am to 5:00 pm during normal weekdays. Contractor shall, when required to achieve Substantial Completion within the Contract Time, Work outside of regular working hours such as evenings and/or weekends at no additional cost to City. Contractor shall perform all evening and/or weekend work only upon City's advance approval and in compliance with all applicable rules, regulations, laws, and local ordinances including, without limitation, all noise and light limitations.

7.5. Delays and Extensions of Time. Float and Slack.

7.5.1. Float or slack is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activity in the schedule. Any float time to activities not on the critical path shall belong to the Project, and may be used by the Project to optimize its construction process. Any float time between the end of the final construction activity and the final completion date shall belong to the City, and may be used by the City in determining if additional contract days are to be awarded for changes in the contract or for delays to the contract caused by the City. The Contractor will not be entitled to any adjustment in the Contract Time, the Construction Schedule, or the Contract Total, or to any additional payment of any sort by reason of the City's use of float time between the end of the final construction activity and the final completion date or by reason of the loss or use of any float time, including time between the Contractor's anticipated completion date and end of the Contract Time, whether or not the float time is described as such on the Construction Progress Schedule.

7.5.2. Adverse Weather. Contract Time is determined with consideration given to the average climate weather conditions prevailing in the County in which the Project is located during any given month as published by the National Oceanic and Atmospheric Administration (NOAA) and averaged over the past 10 years. Contractor may request a time extension for adverse weather if it causes delays that unreasonably increase the labor required to complete the scheduled tasks on the day affected by adverse weather not reasonably anticipated. Contractor shall not be allowed an increase in Contract Total for the delay. Contractor shall work additional days if necessary at no cost to City, irrespective of adverse weather, to maintain access and the Contract Schedule, and to protect the Work from the effects of Adverse Weather.

7.5.3. Extensions of Time. Extensions of Contract Time will be permitted for a delay only to the extent the delay: (1) is not caused or could not have been anticipated by the Contractor; (2) could not be limited or avoided by the Contractor's timely notice to the City of the delay or reasonable likelihood that a delay will occur; and (3) is of a duration not less than one day. Such occurrences may include industry-wide labor dispute, fire, unavoidable casualties, adverse weather conditions not reasonably anticipated, or other occurrences that City determines may justify delay. Any extension the City grants will be net of any delays caused by or due to the fault or negligence of Contractor, and net of any contingency or "float" allowance included in the Progress Schedule. Contractor will not be allowed an increase in Contract Total for an extension of Contract Time. The Contractor shall be deemed to have control over the supply of labor, materials, equipment, methods, techniques and over the Contractor's subcontractors and suppliers.

7.5.4. Requests for Extension. Contractor shall submit requests for extension of time in writing and shall include (a) the duration of the activity relating to changes in the Work and the resources, including manpower, equipment, and material, required to perform the activities within the stated duration; (b) specific logical ties to the Contract Schedule for the proposed change showing the activities that are affected by the change and/or delay; and (c) recovery schedule.

## **8.0 PROTECTION OF PERSONS, PROPERTY, AND THE ENVIRONMENT.**

8.1. Safety Program. Contractor shall initiate, maintain, and supervise all safety precautions and programs in connection with performance of the Contract. Contractor is solely and completely responsible for conditions of the Work site, including safety of all persons and property during performance of the Work, including the property of third-parties and real and personal property outside the Project area. This requirement will apply continuously and is not limited to normal working hours.

8.2. City's Policies. This Contract and all individual contracts and purchase orders incorporate by this reference City's safety policies current as of the date of commencement of Work, which have been or will be made available to Contractor.

8.3. Subcontractor Safety. Contractor shall review with all subcontractors the methods, materials, tools, and equipment to be used to verify their compliance with all safety standards and laws and Contractor shall comply with them, to ensure safe, hazard-free conditions for all persons visiting or working on the entire Project Site and City's adjoining facilities. Contractor shall implement and maintain a safety program that is specifically adapted for the Project and complies with all applicable requirements of Oregon OSHA. Contractor shall furnish a copy of the safety program to City before commencing Work.

8.4. SDS Sheets. Contractor shall provide Safety Data Sheets to City for all chemicals used on the Project Site as required by law.

8.5. Safety Coordinator. Contractor shall designate a responsible member of its organization on the Project, whose duty is to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. Contractor shall report the name and position of person so designated to City.

8.6. Correction of Unsafe Conditions. Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Contractor shall correct violations promptly upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health.

8.7. Personal Protection Equipment. Contractor's personnel and all workers shall wear personal protective equipment at all times. Contractor shall maintain supplies of protective equipment sufficient to properly equip all employees and visitors.

8.8. Safety Devices. Contractor shall take, and require subcontractors to take, all reasonably necessary precautions for safety of workers on the Project. Contractor shall furnish, erect, and properly maintain at all times, all necessary safety devices, safeguards, construction canopies, signs, nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of the Work.

8.9. Barricades and Signage. Contractor shall post necessary warning signs and barricades to ensure the safety of all occupants. Contractor shall not display any signs not required by law or the Contract Documents without City's prior written approval.

8.10. Labeling of Containers. Contractor shall ensure proper labeling of substances on the Project Site.

8.11. Storage. Contractor shall confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits, or directions of City, and shall not interfere with the Work or unreasonably encumber the Project Site or overload any structure with materials. Contractor shall enforce all instructions of City regarding signs, advertising, fires, and smoking, and require that all workers comply with all regulations while on Project Site

8.12. Protection of Work. Contractor shall protect the Work, including stored materials and equipment, from all damage or harm, including damage from heat, cold, rain, snow, wind, flooding, and dampness. Contractor shall provide and maintain temporary roofs, window and door coverings, enclosures, or other construction reasonably required to protect the Work at all times during the course of construction. Contractor shall take all additional steps reasonably necessary, or as directed by City, to protect the Project, the Site, and the Work from damage associated with anticipated extreme weather events. Contractor shall not be entitled to additional payment or time to the extent its costs or delays would have been avoided if Contractor had complied.

8.13. Protection of Existing Structures. Contractor shall protect existing structures, walks, curbs, pavements, roads, trees, landscaping, survey markers, monuments, or other devices marking property boundaries or corners, and/or improvements in working areas, utilities, and adjoining property (including, without limitation, protection from settlement or loss of lateral support). Contractor shall replace same at his expense with same kind, quality, and size of Work or item if temporary removal is necessary, or damage occurs due to the Work.

8.14. Water Quality. Contractor shall comply with all applicable water quality laws and regulations, including permitting, monitoring, and reporting of storm water discharge applicable to the Work, at no additional cost to City. Contractor shall indemnify and hold City harmless from loss, cost, or liability arising out of Contractor's violation of such laws or regulations.

8.15. Neighborhood Impacts. Contractor shall take all reasonable precautions to protect neighborhood property from damage or nuisance associated with the Work. Contractor shall promptly respond to complaints by neighbors or authorities concerning impacts to neighboring properties and public facilities and shall be solely responsible for cleaning, repair, or replacement of property soiled or damaged by Contractor's operations and settlement of claims or demands of neighbors associated with conduct of its personnel.

8.16. Housekeeping. Contractor shall maintain good housekeeping practices to reduce the risk of fire damage and shall make a fire extinguisher, fire blanket, and/or fire watch, as applicable, available at each location where cutting, braising, soldering, and/or welding is being performed or where there is an increased risk of fire.

8.17. Security and Site Access. Contractor shall ensure that all existing or operating systems, utilities, existing on-site services and access avenues are on and in operating condition before leaving the Project Site each day. If any system, utility, or access avenue is not operable, Contractor shall notify City before Contractor leaves the Project Site that day.

## **9. HAZARDOUS MATERIALS.**

9.1. With respect to Hazardous Materials to be used during the course of the Work, the Contractor will implement and enforce a program to inventory and properly store and secure all Hazardous Materials that may be used or present on the Project Site, maintain available for inspection at the Project Site all material safety data sheets, and comply with all regulations required by law for the storage, use, and disposal of Hazardous Materials. The program must provide for notification of all personnel of potential chemical hazards. Review of these hazards must be included in the Contractor's safety training program. The Contractor shall submit to the City a list of all Hazardous Materials to be brought by the Contractor or its Subcontractors onto the City's property, including the purpose for their use on the Project.

9.2. In the event of a release or discovery of a preexisting release of Hazardous Materials, or if it is foreseeable that injury or death to persons may occur because of any material or substance (including without limitation Hazardous Materials) encountered on the Project Site, the Contractor shall immediately (a) stop the Work or the portion of the Work affected; (b) notify the City orally and in writing; and (c) protect against exposure of persons to the Hazardous Materials. The Contractor shall provide all written warnings, notices, reports, or postings required at law or by contract for the existence, use, release, or discovery of Hazardous Materials.

9.3. With respect to any Hazardous Materials or other material or substance reported to the City under the above that was not introduced to the Project Site by the Contractor or its Subcontractors of any tier, the City shall obtain the services of a qualified environmental consultant to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify it to be rendered harmless. Unless otherwise required by the Contract Documents, the City shall furnish in writing to the Contractor and Design Professional the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Design Professional will promptly reply to the City in writing stating whether or not either has reasonable objection to the persons or entities proposed by the City. If either the Contractor or Design Professional has an objection to a person or entity proposed by the City, the City shall propose another to whom the Contractor and the Design Professional have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the City and Contractor. By Change Order, the Contract Time may, subject to agreement by the City and the Contractor, be extended appropriately and the Contract Total shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up, which adjustments shall be accomplished as provided in the Contract.

9.4. With respect to any Hazardous Materials or other material or substance reported to the City under the above that was introduced to the Project Site by the Contractor or its Subcontractors of any tier, the Contractor shall be responsible to carry out the duties of (a) proposing to the City and the Design Professional a qualified environmental consultant; (b) obtaining and paying for the services of the environmental consultant; and (c) verifying that the material is rendered harmless, as otherwise set forth in the above. The Contractor will not be entitled to an increase in the Contract Total if the Contractor or its Subcontractors of any tier are responsible for the condition requiring the testing of the material and the stoppage of the Work. Remediation work must be conducted by properly qualified contractors approved in advance by the City. Generally, the City may at its option contract directly with environmental consultants, and remediation contractors, regardless of whether the work will be performed at the Contractor's expense.

9.5. To the extent permitted by the Oregon Constitution and the Oregon Tort Claims Act, the City shall indemnify and hold harmless the Contractor, Subcontractors, Design Professional, Design

Professional's consultants and the agents and employees of the Contractor, Subcontractors, Design Professional, and Design Professional's consultants from and against claims, damages, losses and expenses, including without limitation attorney fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance was not introduced to the Project Site by the Contractor or its Subcontractors of any tier, presents the risk of bodily injury or death, and has not been rendered harmless. No indemnification provided by the City under this Section will be required to indemnify the Contractor, Subcontractors, or their employees or agents to the extent of liability for death or bodily injury to persons or damage to property caused in whole or in part by the Contractor's own negligence, but will require indemnity to the extent of the fault of the City or its agents or representatives.

9.6. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the City, the City's Representatives, and the employees of the City from and against claims, damages, losses, and expenses, including without limitation attorney fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance was introduced to the Project Site by the Contractor or its Subcontractors of any tier, presents the risk of bodily injury or death, and has not been rendered harmless. No indemnification provided by the Contractor under this Section will be required to indemnify the City or its agents or representatives to the extent of liability for death or bodily injury to persons or damage to property caused in whole or in part by the City's own negligence, but will require indemnity to the extent of the fault of the City or its agents or representatives.

9.7. Hazardous Materials are any substance defined or designated as being radioactive, infectious, hazardous, dangerous, or toxic by any federal, state, or local statute, regulation, or ordinance presently in effect or subsequently enacted. For purposes of Article 9, the term "introduce" means the physical placement or transportation of Hazardous Materials in or on the Project Site regardless of whether the Hazardous Material was specified, required, or otherwise addressed in the Contract Documents.

## **10. INSURANCE AND BONDS.**

10.1. Contractor's Insurance. Contractor shall procure, prior to commencement of Work, and maintain for the duration of this Contract, or such longer time as may be provided, insurance against claims for injuries to persons or damages to property that may arise from or in connection with the performance of the Work by Contractor, its agents, representatives, employees and subcontractors as set forth in the Contract Documents. Contractor's liabilities, including but not limited to Contractor's indemnity obligations, under this Contract, will not be deemed limited in any way to the insurance coverage required herein. Maintenance of insurance coverage is a material requirement of this Contract and Contractor's failure to maintain or renew coverage or to provide evidence of renewal during the term of this Contract, as required or when requested, may be treated as a material breach.

10.1.1. Workers' Compensation and Employers' Liability Insurance. Contractor and its subcontractors, if any, are subject to Oregon Workers' Compensation Law, which requires all employers that employ subject workers who work under this Contract in the State of Oregon to comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. Contractor shall ensure that each of its subcontractors, if any, complies with these requirements (ORS 279B.230(2)). Unless otherwise exempt, Contractor shall provide the City with certification of Workers' Compensation Insurance and shall maintain Employers' Liability Insurance with limits not less than \$1,000,000 for each accident, \$1,000,000 for disease each employee and \$1,000,000 each policy limit.

10.2. Performance Bond and Payment Bond. Contractor shall provide a performance bond and a payment bond as required by the Contract prior to start of Work.

## **11. UNCOVERING AND CORRECTION OF WORK.**

11.1. Uncovering of Work. If a portion of the Work is covered without Project Inspector and/or Design Professional approval or not in compliance with the Contract Documents, Contractor shall,



if required in writing by City, Project Inspector, or Design Professional, uncover the Work for observation and replace it at Contractor's expense without change in Contract Total or Contract Time.

11.2. Correction of Work. Contractor shall, at its own expense, promptly correct Work that is rejected by City, Design Professional, or any governmental authority or otherwise fails to conform to the requirements of the Contract Documents, regardless of when it is discovered and regardless of whether the Work is fabricated, installed or completed. Contractor shall pay for all additional testing, inspection, or other compensation including City and Design Professional's additional services required for the correction of Work.

11.3. Correction of Work after Substantial Completion. If, after Substantial Completion, any Work is not in accordance with the requirements of the Contract Documents, City shall provide Contractor with written notice to correct the Work promptly after discovery of the condition. Contractor shall correct the nonconforming Work within a reasonable time after receipt of notice.

## **12. RIGHTS AND REMEDIES.**

12.1. No Waiver. The duties and obligations imposed by the Contract Documents and rights and remedies available are in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law. No action or failure to act by any party shall constitute a waiver of a right or duty afforded the party under this Contract, nor does any act or omission constitute approval of or acquiescence in a breach, except as may be specifically agreed in writing.

12.2. Independent Contractor.

12.2.1. Contractor is engaged as an independent Contractor. Although City reserves the right: (a) to determine (and modify) the delivery schedule for the Work; and (b) to evaluate the quality of the completed performance, City cannot and will not control the means or manner of Contractor's performance, nor provide any tools or equipment for the performance of the Work, except as provided elsewhere in this Contract. Contractor shall determine the appropriate means and manner of performing the Work.

12.2.2. Contractor is wholly responsible for the manner in which it and its subcontractors perform the Work required of it by the Contract Documents. City may monitor Contractor's activities to determine compliance with the terms of this Contract.

12.2.3. Contractor shall pay all federal, state and local taxes applicable to compensation or payments paid to Contractor under this Contract and, unless Contractor is subject to backup withholding, City shall not withhold from such compensation or payments any amount(s) to cover Contractor's tax obligations.

12.2.4. Contractor is not an employee of the federal government or the State of Oregon.

12.2.5. Contractor is not a contributing member of the Public Employees Retirement System.

12.2.6. Neither Contractor, nor any of Contractor's subcontractors, agents or employees are "officers," "employees," or "agents" of City or any of City's employees or agents, as those terms are used in ORS 30.265. Contractor bears exclusive responsibility for the acts of its employees as they relate to the services to be provided during the course and scope of their employment. Contractor, its subcontractors, agents, and its employees are not entitled to any rights or privileges of City employees.

## **13. COMPLIANCE WITH LAWS.**

13.1. Contractor shall comply with all laws, codes, regulations, and applicable requirements imposed by governmental authorities having jurisdiction over the Work, including but not limited to, environmental, zoning, building code, public contracting, and other related laws.

13.2. Environmental Mitigation. Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the environmental protections laws of the State of Oregon.

13.3. Work Performed Illegally. Contractor will bear all costs arising from Work performed that it knew, or through exercise of reasonable care should have known, was contrary to any applicable laws, ordinance, rules, or regulations.

13.4. Prior Approvals. Contractor shall obtain approval of material, processes, or procedures by the Oregon state agencies or other body or agency where required by the Specifications or Drawings.

#### **14. CLAIMS AND DISPUTES.**

14.1. Claim. A Claim is a demand or assertion by a party seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time, or other relief with respect to the terms of the Contract. Claim includes other disputes and matters in question between City and Contractor arising out of or relating to the Contract. Parties will initiate Claims only by written notice. The party making the Claim is responsible for substantiating the Claim.

14.2. Time to Initiate Claim. The party making a Claim shall initiate the Claim within fourteen (14) days after the occurrence of the event giving rise to such Claim or within fourteen (14) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. The party making the Claim shall submit written notice to the other party that identifies the known bases for each Claim and the nature and amount of relief sought.

14.3. Written Notice of Claim. If Contractor claims that any instructions issued after the effective date of this Contract, by Drawings or otherwise, involve extra costs, Contractor will be entitled to reimbursement for such extra costs only to the extent Contractor so notifies City in writing before proceeding to execute the affected Work and within five (5) days after receipt of such instructions. Claims and demands for any other cause, whatsoever, by Contractor against City must be served in writing upon City within five (5) days from the occurrence of the cause giving rise to the claim. Timely compliance with the written claim requirements of this Contract is a condition precedent to Contractor's right to payment on account of any claim and failure to provide such written claim or demand or notice will constitute a waiver of such claim.

14.4. No Work Stoppage. Contractor shall proceed diligently with performance of this Contract and City shall continue to make payments in accordance with the Contract Documents pending final resolution of a Claim, except as otherwise agreed in writing or provided for in this Contract.

14.5. Differing Site Conditions. A party shall give notice to the other party promptly, and in no event later than five (5) days after first observation, before conditions encountered at the site are disturbed that are: (a) subsurface or otherwise concealed physical conditions that differ materially from those indicated on the Contract Documents; or (b) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents. The parties shall promptly investigate such conditions, and if they differ materially and cause an increase or decrease in the cost of or time required for performance of any part of the Work, City will propose an equitable adjustment in the Contract Total, Contract Time, or both. If City does not find that the conditions differ materially and cause an increase or decrease in the cost of or time required for performance of any part of the Work, City will notify Contractor in writing. If Contractor disputes City's determination, Contractor shall proceed with the Work and may initiate a Claim no later than twenty one (21) days after receiving notice of the decision.

14.6. Claim for Additional Cost. Contractor shall file a Claim for additional cost under this section if Contractor believes additional cost is involved for reasons including: (a) City's written interpretation of the Contract Documents; (b) City's order to stop Work where Contractor is not at fault; (c) written order for a minor change in Work issued by City's consultant or representative; (d) failure of payment by City; (e) termination of Contract by City; (f) City's suspension; or (g) other reasonable grounds.

14.7. Claim for Delay. If Contractor wishes to make a Claim for a delay, written notice shall be given within fourteen (14) calendar days of the occurrence of the event giving rise to the delay. Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary. Contractor will not be entitled to additional Contract Time for delays that do not affect the critical path of the Work.

14.8. Claim for Additional Time (Adverse Weather). If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction. Contractor shall not be entitled to additional compensation for delays caused by adverse weather conditions or any causes beyond City's control. If the Oregon Office of Emergency Management orders Contractor to halt the Work for reasons beyond Contractor's control and that were not reasonably anticipated, the Contract Time shall be equitably extended by Change Order, but only on condition that Contractor provides City with written notice of the delay in accordance with the notice requirements of this Contract.

14.9. Claim for Injury or Damage to Person or Property. If any person suffers physical injury or property damage arising from the Work, regardless of the cause, the party shall immediately give notice of such injury or damage, whether or not insured, to City and Contractor with sufficient detail to enable City and any other party affected to investigate the matter.

14.10. Acceptance of Claim. Upon timely receipt of a properly completed Claim and all documentation and/or evidence necessary to substantiate the Claim, City shall evaluate the Claim and provide Contractor with its written decision either accepting the Claim (in whole or in part) or rejecting the Claim (in whole or in part) within twenty (20) days. Should City reject the Claim in whole or in part, City shall generally explain the reasons for such rejection.

14.11. Mediation. Contractor and City agree that any dispute that may arise under the Contract will be submitted to a mediator agreed to by both parties as soon as such dispute arises, but in any event prior to commencement of arbitration or litigation. This provision shall be specifically enforceable in any arbitral or judicial proceeding through stay or abatement of the proceeding upon petition of a party. Mediation shall be conducted in Portland, Oregon, and the mediation fee and expenses shall be shared equally by the parties who agree to exercise their best efforts in good faith to resolve all disputes in mediation.

## **15. TERMINATION OR SUSPENSION BY CONTRACTOR.**

15.1. Termination by Contractor for Work Stoppage. Contractor may terminate this Contract if the Work is stopped for a period of thirty (30) consecutive days through no act or fault of Contractor, subcontractor, or sub subcontractor, or their agents or employees, or any other persons or entities performing portions of the Work under direct or indirect contract with Contractor, for any of the following reasons: (a) issuance of an order of a court or other public authority having jurisdiction which requires all Work to be stopped; (b) an act of government, such as a declaration of a national emergency which requires all Work to be stopped; (c) because the Design Professional has not issued a Certificate of Payment and has not notified Contractor of the reason for withholding certification, or because City has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or (d) City failed to furnish to Contractor reasonable evidence that financial arrangements have been made to fulfill City's obligations under this Contract.

15.2. Termination by Contractor for Work Interruption. Contractor may terminate this Contract if, through no act or fault of Contractor, subcontractor, or sub subcontractor, or their agents or employees, or any other persons or entities performing portions of the Work under direct or indirect contract with Contractor, repeated suspensions, delays or interruptions of the entire Work by City constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365 day period, whichever is less, or if Work is stopped for a period of sixty (60) consecutive days.

15.3. Compensation. Contractor may recover from City payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery including reasonable profit and overhead if it provides seven (7) days' written notice to Design Professional and City prior to termination for the reasons set forth above.

## **16. TERMINATION OR SUSPENSION BY CITY.**

16.1. Termination by City for Cause. City may terminate Contract and/or terminate Contractor's right to perform the Work of this Contract without prejudice to any other rights or remedies by providing seven (7) days' written notice to Contractor and Contractor's surety if Contractor:

16.1.1. refuses or fails to execute the Work or any separable part with sufficient diligence to ensure its completion within the time specified or any extension;

16.1.2. persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

16.1.3. fails to make payment to subcontractors in accordance with respective agreements;

16.1.4. persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction;

16.1.5. files a petition for relief as a debtor, or a petition is filed against Contractor without its consent, and the petition is not dismissed within sixty (60) days;

16.1.6. makes a general assignment for the benefit of its creditors, or a receiver is appointed on account of its insolvency; or

16.1.7. is otherwise guilty of a substantial breach of a provision of the Contract Documents or fails to observe the training, safety, and other precautions including City's policies and Contractor's own safety policies for the Project.

16.2. City's Right to Take Possession. Upon termination for cause, City may take possession of the site and of all materials, equipment, tools, and construction equipment and machinery on the site owned by Contractor, accept assignment of subcontracts, and finish the Work by whatever reasonable method City may deem expedient. Upon request, City shall provide Contractor a detailed accounting of the costs incurred in finishing the Work.

16.3. Compensation. Contractor will not be entitled to receive further payment until the Work is finished. If the unpaid balance of the Contract Total exceeds City's costs to finishing the Work, including compensation for City's consultants and representatives for services made necessary by Contractor's default, and other damages incurred by City which have not been expressly waived, City shall pay the excess to Contractor. If City's costs and damages exceed the unpaid balance, Contractor shall pay the difference to City.

16.4. Suspension for Convenience. City may, without cause, order Contractor in writing to suspend, delay, or interrupt the Work in whole or in part for such period of time as City may determine. City shall adjust Contract Total and Contract Time for increases in the cost (including profit) and time caused by the suspension, delay, or interruption so long as the performance would not have been suspended, delayed, or interrupted by another cause for which Contractor is responsible and City has not already made or denied another equitable adjustment under another provision of this Contract for the suspension, delay, or interruption.

16.5. Termination for Convenience. City may terminate all or part of this Contract for City's convenience at any time and without cause. Contractor shall, upon written notice of such termination, cease operations as directed by City, take actions necessary to protect and preserve the Work, and terminate all existing subcontracts and purchase orders that are not required to perform the Work up to the effective date of termination and the portion of Work not terminated, and enter into no further subcontracts or purchase orders for the portion of this Contract that was terminated. City shall pay Contractor for Work executed and costs reasonably incurred by reason

of such termination, along with reasonable overhead and profit on the Work completed. City will not pay profit or overhead allocable to Work which is not performed at the time of termination. If the City terminates Contractor for cause and a court or other tribunal finds that City did not have cause to terminate Contractor, then the court or other tribunal will deem the City's termination a termination for convenience under this section.

## **17. PAYMENTS AND COMPLETION.**

17.1. Contract Total. The Contract Total is stated in the Contract, and including authorized adjustments, is the total amount payable by City to Contractor for performance of Work under the Contract Documents.

17.2. Schedule of Values. Prior to submission of the first Application for Payment, Contractor shall submit a preliminary schedule of values for all of the Work, including quantities and prices of items aggregating the Contract Total and subdividing the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Contractor shall include, at a minimum: (a) overhead and profit; (b) supervision; (c) general conditions; (d) layout; (e) mobilization; (f) scheduling; (g) submittals; (h) bonds and insurance; (i) close-out documentation; (j) demolition; (k) installation; (l) rough-in; (m) finishes; (n) testing; and (o) punch list and acceptance ("Schedule of Values").

17.3. Applications for Payment. Contractor shall submit an itemized application for payment for operations completed in accordance with the Schedule of Values and reflecting applicable retainage ("Application for Payment"). Applications for Payment shall be prepared using forms provided by the City. Contractor shall submit data substantiating Contractor's right to payment where required, such as copies of requisitions from subcontractors and material suppliers, Construction Change Directives, Change Orders, and/or force account information. Contractor shall provide:

17.3.1. The amount paid to the date of the Application for Payment to Contractor, all its subcontractors, and all others furnishing labor, material, or equipment for this Contract;

17.3.2. The amount being requested by Contractor on its own behalf and separately stating the amount requested on behalf of each of the subcontractors and all others furnishing labor, material, or equipment for this Contract;

17.3.3. The balance that is due to each of such entities after payment is made;

17.3.4. Certification that the Record Documents are current;

17.3.5. Itemized breakdown of Work done for the purpose of requesting partial payment;

17.3.6 Updated construction schedule;

17.3.7. Additions and subtractions from the Contract Total and Contract Time;

17.3.8. Total of retainage held;

17.3.9. Material invoices, evidence of equipment purchases, rentals, and other support City may request;

17.3.10. Percentage complete of Contractor's Work by line item;

17.3.11. A Schedule of Values updated from the preceding Application for Payment; and

17.3.12. Contractors' Certified Payroll.

17.4. Waivers and Releases. Contractor shall submit conditional waivers and releases upon progress payment from Contractor and each subcontractor of any tier and supplier to be paid from current progress payment along with an unconditional waiver and release upon progress payment from Contractor and each subcontractor of any tier that received payment from the previous progress payment. Contractor shall certify as follows: "Contractor warrants title to all Work performed and materials purchased as of the date of the payment application; and Contractor warrants that all Work performed and materials purchased as of the date of the

payment application are free and clear of liens, claims, security interests, or encumbrances in favor of any persons or entities making a claim by reason of having provided labor, materials, or equipment relating to the Work, except those of which City has been informed.”

17.5. False Claims. Contractor is subject to the False Claims Act set forth under ORS Chapter 180 for information provided with any Application for Payment.

17.6. Certificates for Payment.

17.6.1 City shall review the Contractor's Application for Payment within a reasonable time after receipt not to exceed seven (7) days for the purpose of determining that it is properly submitted. City shall either return the Application for Payment to Contractor with a document setting forth the reasons why the Application for Payment is not proper, or shall issue a Certificate for Payment for the amounts properly due.

17.6.2 City's issuance of a Certificate for Payment is a representation by City, based upon City's evaluation of the Work and the data comprising the Application for Payment, that Contractor is entitled to payment in the amount certified because the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. City's approval of the certified Application for Payment is based on Contractor complying with all requirements for a fully complete and valid certified Application for Payment.

17.7. Decisions to Withhold Certification.

17.7.1 City shall notify Contractor in writing if any amounts are not due, and the reasons for withholding certification in whole or in part. If Contractor and City cannot agree on a revised amount, City shall promptly issue a Certificate for Payment for the amount for which City determines that Contractor is entitled to payment. City may withhold Certificate for Payment or nullify the whole or part of a Certificate for Payment previously issued, to such extent as may be reasonably necessary to protect City from loss for which Contractor is responsible, including loss resulting from acts and omissions because of defective Work not remedied, third party claims filed or reasonable evidence indicating probable filing of such claim unless security acceptable to City is provided by Contractor, failure of Contractor to make payments properly to subcontractors or for labor, materials, or equipment, reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Total, damage to City or another contractor, reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay, persistent failure to carry out the Work in accordance with the Contract Documents, or failure to maintain Record Documents.

17.7.2. Contractor shall not receive any interest on any retainage or amounts withheld due to the failure of Contractor to perform in accordance with the Contract Documents.

17.7.3. City may apply any withheld amount to pay outstanding claims or obligations on behalf of Contractor, without prior judicial determination of the claim or obligation. If any payment is made by City, that amount is deemed a payment made under this Contract by City to Contractor.

17.3.4. City shall promptly issue a Certificate for Payment for amounts previously withheld when the reasons for withholding certification are removed.

17.8. Progress Payments.

17.8.1. City shall make payment in the manner and within the time provided in the Contract Documents. City may withhold the portion of any progress payment for which certified payroll statements have not been received until such certified statements are submitted.

17.8.2. contractor shall promptly pay each subcontractor, upon receipt of payment from City, out of the amount City paid to Contractor on account of each subcontractor's portion

of the Work. Contractor shall, by written agreement, require each subcontractor to make payments to sub-subcontractors in a similar manner.

17.8.3. City may issue joint checks made payable to Contractor, subcontractor(s) and material or equipment suppliers. Joint check payees are responsible for the allocation and disbursement of funds included as part of any such joint check payment. Joint check payment does not create a contract, rights, or obligations between City and any subcontractor or material or equipment supplier.

17.8.4. Certificate for Payment, progress payment, or partial or entire use or occupancy of the Project does not constitute acceptance of Work not in accordance with the Contract Documents.

#### 17.9. Substantial Completion.

17.9.1. Substantial Completion. Substantial completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that City can occupy or utilize the Work for its intended purpose.

17.9.2. Punch List. When Contractor considers the Work or a designated portion of the Work to be substantially complete, Contractor shall prepare and submit to City a comprehensive list of items to be completed or corrected prior to final payment ("Punch List"). The Punch List does not alter Contractor's responsibility to complete the Work in accordance with the Contract Documents.

17.9.3. Certificate of Substantial Completion. Upon receipt of Contractor's Punch List, City shall make an inspection to determine whether the Work or designated portion thereof is substantially complete. If City determines that the Work is not substantially complete, City shall notify Contractor of any Work to be completed in accordance with the Contract Documents before the Work or designated portion can be certified as such, and Contractor shall complete all such items. Upon determining that the Work or designated portion thereof is substantially complete, City and Contractor shall execute a Certificate of Substantial Completion.

17.9.4. Commencement of Warranty. Contractor's general and special warranties shall be effective as of the date that the Work is deemed finally complete.

17.9.5. Close-Out Documentation. Contractor shall assemble for City's approval within thirty (30) days of Substantial Completion all close-out documentation as required by the Contract Documents, including the required number of copies of operating, maintenance, and warranty data from all manufacturers whose equipment is installed in the Work, and Record Documents of the Work.

#### 17.10. Final Completion.

17.10.1. The Work will be deemed finally complete when all conditions set out in the Contract Documents are satisfied and City accepts such Work. Final completion is achieved when all punchlist work is complete, all close-out documentation has been received, all final testing, equipment calibration and training have been completed, and the Contractor is entitled to Final Payment. Unless special circumstances exist that are defined at the time of Punch List creation, Contractor shall achieve Final Completion within 45 days of Substantial Completion.

17.10.2. Final Inspection. When Contractor considers all of the Punch List Work to be complete, Contractor shall notify City which shall inspect such Work.

17.10.3. Final Application for Payment. If City finds the Punch List Work complete and acceptable under the Contract Documents, City shall notify Contractor, who shall then submit its Final Application for Payment.

17.10.4. Payment of Retainage. City shall make payment of retainage applying to such Work or designated portion thereof after receiving all Close Out Documentation, an affidavit that bills for indebtedness connected with the Work for which City's property might be encumbered have been satisfied; a certificate to indicate that insurance required by the Contract Documents shall remain in force after final payment is in effect and will not be cancelled or expire until thirty (30) days' prior written notice is given to City and that Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents; the consent of surety to final payment; and valid waivers of all construction lien claims, bond claims, and other claims by Contractor and each subcontractor in a form acceptable to City.

17.10.5. Bond in Lieu of Waiver. If a subcontractor refuses to furnish a release or waiver required by City, Contractor may furnish a bond satisfactory to City to indemnify City against such lien. If such lien remains unsatisfied after payments are made, Contractor shall refund to City all money that City may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

17.10.6. Delay in Final Completion. City shall make payment of the balance due for any portion of the Work fully completed and accepted if final completion is materially delayed through no fault of Contractor or by issuance of Change Orders affecting final completion. In the event that final completion is not accomplished within thirty (30) days after the date of Substantial Completion due to any fault of Contractor, City may withhold from the final payment 150 percent of the reasonable cost to complete the unfinished Work and to attain final completion. In the event Contractor fails to complete the Work necessary to attain final completion after forty-five (45) days from Substantial Completion, City may, without waiving other remedies it may have, complete the Work and deduct the actual cost thereof from the funds withheld.

17.10.7. Contractor's Waiver of Claims. Contractor's acceptance of final payment constitutes a waiver of claims except those previously made in writing and identified by Contractor as unsettled at the time of final Application for Payment.

## **18. INDEMNITY AND LIABILITY.**

18.1. To the fullest extent permitted by Oregon law, Contractor shall indemnify, defend with legal counsel reasonably acceptable to City, and hold harmless City and its consultants and separate contractors, and their respective council members, board members, officers, representatives, agents, trustees, volunteers, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, damages, losses, and expenses, including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by Contractor, its subcontractors, vendors, or suppliers, including, without limitation, any such suit, claim, damage, loss, or expense attributable to, without limitation, bodily injury, sickness, disease, death, alleged patent violation or copyright infringement, or to injury to or destruction of tangible property (including damage to the Work itself) including the loss of use resulting therefrom, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or to any extent that would render these provisions void or unenforceable. This agreement and obligation of Contractor will not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist as to any party or person described herein. This indemnification, defense, and hold harmless obligation includes any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms.

18.2. Contractor shall fully indemnify, defend, and hold harmless City, and each person, entity, firm, or agency that owns or has any interest in adjacent property in any action arising out of any agreement between Contractor and adjacent property owners that is made for the purpose of entering upon the adjacent property to perform the Work. Contractor shall obtain City's approval of the form and content of the agreement prior to the commencement of any Work on or about the adjacent property.



18.3. Severability of Indemnity Provisions. Contractor shall give prompt notice to City in the event of any injury (including death), loss, or damage included herein. Without limitation of the provisions herein, if Contractor's agreement to indemnify, defend, and hold harmless the Indemnitees as provided herein against liability for damage arising out of bodily injury to persons or damage to property caused by or resulting from the negligence of any of the Indemnitees will to any extent be or be determined to be void or unenforceable, it is the intention of the parties that these circumstances will not otherwise affect the validity or enforceability of Contractor's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein, and in the case of any such suits, claims, damages, losses, or expenses caused in part by the default, negligence, or act or omission of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, and in part by any of the Indemnitees, Contractor shall be and remain fully liable on its agreements and obligations herein to the full extent permitted by law.

18.4. In any and all claims against any of the Indemnitees by any employee of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, Contractor's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts, unless it is limited by ORS 30.140.

18.5. Contractor's defense and indemnification obligations survive the completion of Work, including any warranty period and/or termination of this Contract.

## **19. SECURITY.**

19.1. Security. Contractor shall not use or disturb City's property, materials or documents except for the purpose of responding to City's request for proposal or invitation to bid or pursuant to completion of the Work under this Contract. Contractor shall treat all documents as confidential and shall not disclose such documents without approval from City. Any unauthorized disclosure of documents or removal of City property will be deemed a substantial breach of this Contract. Contractor shall bear sole responsibility for any liability including, but not limited to, attorneys' fees, resulting from any action or suit brought against City as a result of Contractor's willful or negligent release of information, documents, or property contained in or on City property. City hereby deems all information, documents, and property contained in or on City property privileged and confidential.

19.2. Employee Removal. At City's request, Contractor shall immediately remove any employee from all City properties in cases where City determines in its sole discretion that removal of that employee is in City's best interests.

## **20. MISCELLANEOUS PROVISIONS.**

20.1. Non-Appropriation; Adequate Funding. City shall, at Contractor's written request, prior to commencement of Work, provide Contractor with reasonable evidence that financial arrangements have been made to fulfill City's obligations under the Contract. If payment for Work under this Contract extends into City's next fiscal year, City's obligation to pay for such Work is subject to approval of future city council appropriations to fund this Contract. Continuation of this Contract at specified levels is specifically conditioned on adequate funding under City's budget adopted in June of each year. City may adjust the Work provided for in this Contract in accordance with funding levels adopted by the City Council.

20.2. Law and Venue. Any dispute under this Contract or related to this Contract is governed by all provisions of the Oregon Constitution and laws of Oregon governing, controlling, or affecting City, or the property, funds, operations, or powers of City, which are incorporated herein by reference. This Contract is deemed to include any provision that the law requires to be included. Any litigation arising out of this Contract shall be conducted in in the Circuit Court for Clatsop County, Oregon. The Contractor consents to the personal jurisdiction of this court.

20.3. Severability. If any term or provision of this Contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and provisions are not affected, and the rights and obligations of the parties are construed and enforced as if this Contract did not contain the particular term or provision held to be invalid.

20.4. No Waiver. The failure of City in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred is not a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion. No action or failure to act by City, Design Professional, or Construction Manager waives any right or duty afforded City under this Contract, nor does action or failure to act constitute an approval of or acquiescence in any breach, except as specifically agreed in writing.

20.5. Non-discrimination. Contractor shall comply with all applicable federal, state and local laws, rules and regulations regarding nondiscrimination in employment because of race, color, ancestry, national origin, religion, sex, marital status, age, medical condition, or disability.

20.6. No Third Party Beneficiaries. City and Contractor are the only parties to this Contract and are the only parties entitled to enforce its terms. Nothing in this Contract provides any benefit or right, directly or indirectly, to third persons unless they are individually identified by name in this Contract and expressly described as intended beneficiaries of this Contract. The Contract Documents shall not be construed to create a contractual relationship of any kind: (a) between Contractor and City's representatives or consultants, (b) between City and a subcontractor or a sub-subcontractor, (c) between City and a supplier; or (d) between any persons or entities other than City and Contractor.

20.7. Media Contacts. Contractor shall issue no news release, press release, or other statement to members of the news media or any other publication regarding this Contract or the Project within one (1) year of Project completion without City's prior written authorization. Contractor shall not post or publish any textual or visual representations of the Project without approval of City.

20.8. Successors in Interest. This Contract will bind, and inure to the benefit of, the parties, their successors, and approved assigns, if any.

20.8.1. Contractor shall not assign all or any part of this Contract including, without limitation, any services or money to become due under this Contract without the prior written consent of City. Assignment without City's prior written consent is null and void. Any assignment of money due or to become due under this Contract is subject to a prior lien for services rendered or material supplied for performance of Work called for under this Contract in favor of all persons, firms, or corporations rendering services or supplying material to the extent that claims are filed pursuant to Oregon law, and is also subject to deductions for liquidated damages or withholding of payments as determined by City in accordance with this Contract. Contractor shall not assign or transfer in any manner to a subcontractor or supplier the right to prosecute or maintain an action against City.

20.8.2. Contractor shall first notify City prior to any change in the name or legal nature of Contractor's entity. City shall determine if Contractor's intended change is permissible while performing this Contract.

20.9. Liquidated Damages.

20.9.1 Failure to complete the Project by the specified time will result in damages to the City. The parties to this contract agree that establishing the exact amount of damages the City will incur will be difficult. In order to compensate the City, the parties to this contract have estimated the amount the City would be damaged for every calendar day completion is delayed. Consequently, the Contractor agrees to pay the City the sum of \$200 per day, not as a penalty but as liquidated damages, for each day elapsed beyond the Substantial Completion date set forth in the bid document. The total liquidated damages shall be deducted from the final payment due the Contractor. The City may waive its right to claim part or all of the liquidated damages due under this provision, but such full or partial waiver shall not negate or abridge any other right of action the City

may have to enforce the provisions of this Contract. Contractor will not contest such sums as being other than a reasonable measure of delay damages in the event those damages become payable under these provisions.

20.10. Workers' Compensation.

20.10.1. All employers, including Contractor, that employ subject workers who work under this contract in the State of Oregon shall comply with ORS 656.017 and provide the required Workers' Compensation coverage, unless such employers are exempt under ORS 656.126. This shall include Employer's Liability Insurance with coverage limits of not less than \$1,000,000 for each accident. Contractors who perform the Work without the assistance or labor of any employee need not obtain such coverage if the Contractor certifies so in writing. Contractor shall ensure that each of its Subcontractors complies with these requirements. The Contractor shall require proof of such Workers' Compensation by receiving and keeping on file a certificate of insurance from each Subcontractor or anyone else directly employed by either the Contractor or its Subcontractors.

**END OF SECTION**

**SECTION 00 72 10**  
**(EXHIBIT B)**  
**INSURANCE REQUIREMENTS**

**1. ADDITIONAL INSURANCE**

Contractor shall maintain all insurances required of it by law. In addition, the Contractor shall maintain the following:

1.1 Required Coverage. Without waiver of any other requirement of the Contract Documents, the Contractor will provide, pay for, and maintain in full force and effect at all times during the performance of the Work until final acceptance of the Work or for such further duration as required, the following policies of insurance issued by a responsible carrier. All of the Contractor's insurance carriers shall be rated A VII or better by A.M. Best's rating service, unless otherwise approved by the City.

1.1.1 Workers' Compensation. Workers' compensation coverage sufficient to meet statutory liability limits.

1.1.2 Employer's Liability. The Contractor shall purchase and maintain employer's liability insurance in addition to its workers' compensation coverage with at least the minimum limits in section 1.2 below.

1.1.3 Commercial General Liability. The Contractor shall purchase and maintain commercial general liability ("CGL") insurance for off-site exposures on an occurrence basis, written on ISO Form CG 00 01 (12/04 or later) or an equivalent form approved in advance by the City. CGL coverage shall include all major coverage categories including bodily injury, property damage and products/completed operations coverage. The CGL insurance will also include the following: (1) separation of insureds; (2) incidental medical malpractice; and (3) per-project aggregate for premises operations.

1.1.4 Professional Liability/Errors and Omissions. To the extent that the Contractor accepts design or design/build responsibilities, the Contractor shall purchase and maintain professional liability/errors and omissions insurance or cause those Subcontractors providing design services do so.

1.1.5 Automobile Liability. The Contractor shall purchase and maintain automobile liability insurance with coverage for owned, hired, and non-owned vehicles on ISO form CA 00 01 or an equivalent form approved in advance by the City. The automobile liability insurance shall include pollution liability coverage resulting from vehicle overturn and collision.

1.2 Limits. The insurance required by this exhibit shall be written for at least the limits of liability specified in this Section or required by law, whichever is greater. See table on next page.

<b>WORKERS' COMPENSATION</b>	<b>STATUTORY LIMITS</b>
<b><u>EMPLOYER'S LIABILITY</u></b>	
Each Accident:	<b>\$1,000,000</b>
Each Bodily Injury Disease:	<b>\$1,000,000</b>
Aggregate Bodily Injury Disease:	<b>\$1,000,000</b>
<b><u>COMMERCIAL GENERAL LIABILITY</u></b>	
Each Occurrence:	<b>\$1,000,000</b>
General Aggregate:	<b>\$2,000,000</b>
Product/Completed Operations:	<b>\$2,000,000</b>
Personal & Advertising Injury:	<b>\$1,000,000</b>
Fire Damage Limit:	<b>\$100,000</b>
Medical Expense Limit:	<b>\$5,000</b>
Automobile Liability	<b>\$2,000,000</b>
Combined Single Limit:	<b>\$1,000</b>
<b><u>PROFESSIONAL LIABILITY/ERRORS &amp; OMISSIONS</u></b>	
Single Limit:	<b>\$1,000,000</b>
Aggregate:	<b>\$1,000,000</b>

1.3 Additional Insureds. The Contractor's third-party liability insurance policies shall include the City and its officers, employees, and agents as additional insureds. The policy endorsement must extend premises operations and products/completed operations to the additional insureds. The additional insured endorsement for the CGL insurance must be written on ISO Form CG 20 10 (11/85), a CG 20 37 (07/04) together with CG 20 33 (07/04), or the equivalent; but shall not use the following forms: CG 20 10 (10/93) or CG 20 10 (03/94).

1.4 Joint Venture. If the Contractor is a joint venture, the joint venture shall be a named insured for the liability insurance policies.

1.5 Primary Coverage. The Contractor's insurance shall be primary insurance coverage and may not seek contribution from any insurance or self-insurance carried by the City or the Architect including any property damage coverage carried by the City. Contractor's insurance shall apply separately to each insured against whom a claim is made or suit is brought. The Contractor's insurance shall not include any cross-suit exclusion or preclude an additional insured party from asserting a claim as a third party.

1.6 Contractor's Failure to Maintain Insurance. If the Contractor for any reason fails to maintain required insurance coverage, such failure shall be deemed a material breach of the Contract and the City, at its sole discretion, may suspend or terminate the Contract pursuant to Section 108.11 of the General Conditions. The City may, but has no obligation to, purchase such required insurance, and without further notice to the Contractor, the City may deduct from the Contract Total any premium costs advanced by the City for such insurance. Failure to maintain the insurance coverage required by this exhibit shall not waive the Contractor's obligations to the City.

1.7 Certificates of Insurance. Prior to commencement of the Work, and before bringing any equipment or construction equipment on to the Project Site, the Contractor shall provide Certificates of Insurance, to the City Representative, for the insurance policies required by this contract.

1.7.1 Additional Certificates. To the extent that the Contractor's insurance coverage's are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment. Information concerning reduction of coverage on account of revised limits or claims paid under the general aggregate, or both, shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.

1.7.2 Prohibition Until Certificates Received. The City shall have the right, but not the obligation, to prohibit the Contractor and its Subcontractors from entering the Project Site until the required certificates (or other competent evidence that insurance has been obtained in complete compliance with this exhibit) are received and approved by the OCIP Administrator and or City.

1.7.3 Deductibles/Self-Insured Retentions. Payment of deductibles or self-insured retentions is a Cost of the Work within the Guaranteed Maximum Price and does not justify a Change Order. Satisfaction of all self-insured retentions or deductibles will be the sole responsibility of the Contractor.

1.8 SUBCONTRACTORS INSURANCE. The Contractor shall cause each Subcontractor to purchase and maintain in full force and effect policies of insurance as specified in this exhibit, except for coverage limits, which will be agreed upon between the City and the Contractor. The Contractor will be responsible for the Subcontractors' coverage if the Subcontractors fail to purchase and maintain the required insurance. When requested by the City, the Contractor will furnish copies of certificates of insurance establishing coverage for each Subcontractor.

#### 1.9 LIMITATIONS ON COVERAGE.

1.9.1 No insurance provided by the Contractor under this exhibit will be required to indemnify the City, the Architect, the engineer, or their employees or agents to the extent of liability for death or bodily injury to persons or damage to property caused in whole or in part by their own negligence, but will require indemnity to the extent of the fault of the Contractor or its agents, representatives, or Subcontractors.

1.9.2 The obligations of the Contractor under this exhibit shall not extend to the liability of the Architect or its consultants for (1) the preparation or approval of maps, Drawings, opinions, reports, surveys, Change Orders, designs, or specifications, or (2) the giving or failure to give directions or instructions, to the extent that the directions, or failure to provide directions, are the cause of the injury or damage.

1.9.3 By requiring insurance, the City does not represent that coverage and limits will necessarily be adequate to protect the Contractor. Insurance in effect or procured by the Contractor will not reduce or limit the Contractor's contractual obligations to indemnify and defend the City for claims or suits that result from or are connected with the performance of the Contract.

## 2. PROPERTY INSURANCE.

2.1. Builder's Risk: (For new construction or building additions) During the term of this Contract, the Contractor shall maintain in force, at its own expense, Builder's Risk insurance on an all risk form, including earthquake and flood, for an amount equal to the full amount of the Contract. Any deductible shall not exceed \$50,000 for each loss, except the earthquake and flood deductible shall not exceed 2 percent of each loss or \$50,000, whichever is more. The policy will include as loss payees the City, the Contractor and its Subcontractors as their interests may appear.

2.2. Builder's Risk Installation Floater: (For other than new construction) The Contractor shall obtain, at the Contractor's expense, and keep in effect during the term of this Contract, a Builder's Risk Installation Floater for coverage of the Contractor's labor, materials and equipment to be used for completion of the Work performed under this Contract. The minimum amount of coverage to be carried shall be equal to the full amount of the Contract. This insurance shall include as loss payees the City, the Contractor and its Subcontractors as their interests may appear.

2.3 Such insurance shall be maintained until the City has declared final acceptance of the improvement.

2.4 Contractor must provide insurance for its own machinery, tools, equipment, or supplies that are not to become a part of the Project.

**END OF SECTION**

**SECTION 00 72 20  
(EXHIBIT C)  
BOLI PREVAILING WAGE RATES**

This is a contract for a public works project subject to the existing state prevailing rate of wage and, if applicable, the federal prevailing wage of rate required under the Davis-Bacon Act (40 U.S.C. 276a).

Every contract and subcontract must contain a provision that workers shall be paid not less than the specified minimum hourly rate of wage in accordance with ORS 279C.838 and 279C.840.

Prevailing rates of wage are available electronically via the Internet at the following address:

<https://www.oregon.gov/boli/WHD/PWR/Pages/PWR-Rate-Publications---2020.aspx>

The July 5, 2023 or current adopted Prevailing Wage Rates, and any addenda issued to Prevailing wage rates for Public Contracts in Oregon shall be used for this project. A copy of the Prevailing Wage Rates can be obtained from the Oregon Bureau of Labor and Industries located at:

800 NE Oregon Street, Suite 1045  
Portland, OR 97232  
or via their website at:

<https://www.oregon.gov/boli/employers/Pages/prevailing-wage-rates.aspx>

**END OF SECTION**



**SECTION 00 72 30**  
**OREGON STATUTORY PUBLIC WORKS BOND**

Surety bond #: \_\_\_\_\_ CCB # (if applicable): \_\_\_\_\_ We,

\_\_\_\_\_ as principal, and

\_\_\_\_\_ a corporation qualified and

authorized to do business in the State of Oregon, as surety, are held and firmly bound unto the State of Oregon for the use and benefit of the Oregon Bureau of Labor and Industries (BOLI) in the sum of thirty thousand dollars (\$30,000) lawful money of the United States of America to be paid as provided in ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, for which payment well and truly to be made, we bind ourselves, our heirs, personal representatives, successors and assigns, jointly and severally, firmly by this agreement.

WHEREAS, the above-named principal wishes to be eligible to work on public works project(s) subject to the provisions of ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, and is, therefore, required to obtain and file a statutory public works bond in the penal sum of \$30,000 with good and sufficient surety as required pursuant to the provisions of section 2, chapter 360, Oregon Laws 2005, conditioned as herein set forth.

NOW, THEREFORE, the conditions of the foregoing obligations are that if said principal with regard to all work done by the principal as a contractor or subcontractor on public works project(s), shall pay all claims ordered by BOLI against the principal to workers performing labor upon public works projects for unpaid wages determined to be due, in accordance with ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, and OAR Chapter 839, then this obligation shall be void; otherwise to remain in full force and effect.

This bond is for the exclusive purpose of payment of wage claims ordered by BOLI to workers performing labor upon public works projects in accordance with ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360.

This bond shall be one continuing obligation, and the liability of the surety for the aggregate of any and all claims, which may arise hereunder, shall in no event exceed the amount of the penalty of this bond.

This bond shall become effective on the date it is executed by both the principal and surety and shall continuously remain in effect until depleted by claims paid under ORS chapter 279C, as amended by Oregon Laws 2005, chapter 360, unless the surety sooner cancels the bond. This bond may be cancelled by the surety and the surety be relieved of further liability for work performed on contracts entered after cancellation by giving 30 days' written notice to the principal, the Construction Contractors Board, and BOLI. Cancellation shall not limit the responsibility of the surety for the payment of claims ordered by BOLI relating to work performed during the work period of a contract entered into before cancellation of this bond.

IN WITNESS WHEREOF, the principal and surety execute this agreement. The surety fully authorizes its representatives in the State of Oregon to enter into this obligation.

SIGNED, SEALED AND DATED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_

SURETY BY:

PRINCIPAL BY:

\_\_\_\_\_  
*COMPANY NAME*

\_\_\_\_\_  
*NAME*

\_\_\_\_\_  
*SIGNATURE*

\_\_\_\_\_  
*SIGNATURE*

\_\_\_\_\_  
*TITLE (E.G. ATTORNEY-IN-FACT)*

\_\_\_\_\_  
*TITLE*

\_\_\_\_\_  
*ADDRESS*

\_\_\_\_\_  
*CITY*

*STATE*

*ZIP*

SEND BOND TO:

CONSTRUCTION CONTRACTORS BOARD  
PO BOX 14140  
SALEM, OR 97309-5052  
TELEPHONE: 503-378-4621

**END OF SECTION**

STATUTORY PUBLIC WORKS BOND - I

**SECTION 00 72 40  
CERTIFICATION OF WORKERS' COMPENSATION COVERAGE**

The contractor, for the purposes of this contract, hereby certifies that it is currently providing Oregon Workers' Compensation coverage for all its employees and will maintain coverage throughout the course of the project through one of the following methods:

1. ☐ "CARRIER-INSURED EMPLOYER" (STATE ACCIDENT INSURANCE FUND CORP. OR OTHER AUTHORIZED INSURER)

INSURANCE COMPANY NAME \_\_\_\_\_

ID/POLICY NUMBER \_\_\_\_\_

2. ☐ "SELF-INSURED EMPLOYER" (CERTIFIED BY THE WORKERS' COMPENSATION DIVISION)

ID NUMBER AS ASSIGNED BY THE WORKER'S COMPENSATION DIVISION:

\_\_\_\_\_

3. ☐ I AM AN INDEPENDENT CONTRACTOR AND WILL PERFORM ALL WORK UNDER THIS CONTRACT WITHOUT THE ASSISTANCE OF OTHERS.

IN THE EVENT OF CANCELLATION OR CHANGE IN THE INFORMATION ABOVE, CONTRACTOR CERTIFIES THAT IT WILL IMMEDIATELY NOTIFY THE DEPARTMENT OF SAID CANCELLATION OR CHANGE AND WILL OBTAIN ALTERNATE COVERAGE.

DATED: \_\_\_\_\_, 20\_\_\_\_\_

\_\_\_\_\_  
CONTRACTORS SIGNATURE

**REMINDER: ADDITIONAL INFORMATION NEEDED**

HAS YOUR INSURANCE CARRIER FILED WITH OREGON WORKERS' COMPENSATION DIVISION A GUARANTY CONTRACT AS PROOF OF COVERAGE FOR YOUR EMPLOYEES WORKING IN OREGON? ☐ YES ☐ NO

FOR FILING INFORMATION, CONTACT THE WORKERS' COMPENSATION DIVISION AT LABOR AND INDUSTRIES BUILDING: SALEM, OR 97301; PHONE (503) 947-7810.

**END OF SECTION**

**SECTION 00 72 50**  
**GRANT TERMS AND CONDITIONS**

The project is funded through the Safe Drinking water revolving loan fund (SDWRLF). Iron and steel products are required to be made in USA.

Compliance letters from iron and steel suppliers must be provided for all products that are incorporated into the work.

**END OF SECTION**

**SECTION 00 72 60**

**EXHIBIT F**

**CERTIFICATION REGARDING LOBBYING**

(Awards to Contractors and Subcontractors in Excess of \$100,000)

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

Signed

Title

Date

**SECTION 00 73 00**  
**SUPPLEMENTARY CONDITIONS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. These Supplementary Conditions amend and supplement the General Conditions defined in Document 00 72 00 - General Conditions and other provisions of Contract Documents as indicated below. Provisions that are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions that are defined in the General Conditions have the meanings assigned to them in the General Conditions.

**1.02 MODIFICATIONS TO GENERAL CONDITIONS**

- A. The project is funded through the Safe Drinking Water Revolving Loan Fund (SDWRLF). Iron and steel products are required to be made in USA.
- B. Compliance letters from iron and steel suppliers must be provided for all products that are incorporated into the work.
- C. Applicable to this project are the Construction Contract Clauses and Requirements. These Clauses are part of the Contract and the Contractor shall comply with these clauses-Section 00 73 00-10.
- D. Applicable to this project are the DBE Six Good Faith Efforts. These criteria are part of the Contract and the Contractor shall comply with these requirements for DBE inclusion into the Contract-Section 00 73 00-20.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

## **SUPPLEMENTARY CONDITIONS ATTACHMENT**

### **Construction Contract Requirements for Recipients of Safe Drinking Water financing**

**SAM Registration is required for all entities that enter into direct contracts with the recipients of Safe Drinking Water Revolving Loan funds. SAM Registration Link:**

<https://www.sam.gov/SAM/>

NOTE: The SAM registration expires annually and must be kept active until the SDWRLF project is closed.

**Language to be included verbatim in construction contracts according to any accompanying instructions.**

### **Clauses Required in all Contracts**

**1. Termination for Cause and for Convenience & Breach of Contract** (language to be included in all construction contracts and subcontracts in excess of \$10,000:)

“Contractor shall address termination for cause and for convenience, including the manner by which it will be effected and the basis for settlement. In addition, contractor shall address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.”

**2. Equal Employment Opportunity** (language to be included in all construction contracts and subcontracts in excess of \$10,000:)

“Contractor shall comply with Executive Order 11246 of September 24, 1965, entitled “Equal Employment Opportunity,” as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR chapter 60).”

**3. Procurement of Recovered Materials** (language to be included in all construction contracts and subcontracts in excess of \$10,000:)

“Contractor must comply with section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act, including procurement of recovered materials in a manner designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR part 247.”

**4. Whistleblower** (language to be included in all construction contracts and subcontracts)

“Contractor receiving SDWRLF funds shall under or through this contract to, post notice of the rights and remedies provided to whistleblowers under No Fear Act Pub. L. 107-174. 29 CFR § 1614.703 (d).”

**5. Source of Funds** (language to be included in all construction contracts and subcontracts)

“Work under this contract is funded by the federal Safe Drinking Water Revolving Loan Fund through Business Oregon and a partnership of Local and/or Private Funds. “

**6. Suspension and Debarment** (language to be included in all construction contracts and subcontracts)

“Contractor certifies that it is not debarred or suspended or is otherwise excluded from or ineligible for participation in federal assistance programs under Executive Order 12549, “Debarment and Suspension”, and shall not contract or permit any subcontract at any level with any party similarly excluded or ineligible. A list of excluded parties is available in the System for Award Management (SAM) at [www.sam.gov](http://www.sam.gov)<http://www.epls.gov/>, under “search records”.”

**7. Copeland “Anti-Kickback” Act** (language to be included in all construction contracts and subcontracts)

“Contractor shall comply with the Copeland “Anti-Kickback” Act (18 U.S.C. 847) as supplemented in Department of Labor regulations (29 CFR part 3).”

**8. Intellectual Property** (language to be included in all construction contracts and subcontracts:)

“Contractor hereby grants to the U.S. E.P.A. a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, for federal government purposes, any intellectual property developed under this contract. Contractor shall secure from third parties the same license in the name of the U.S. E.P.A. regarding any intellectual property developed by third parties as subcontractors under this contract, or developed under contract with the Contractor specifically to fulfill Contractor’s obligations related to this contract.”

**9. Inspections; Information** (language to be included in all construction contracts and subcontracts:)

“Contractor shall permit, and cause its subcontractors to allow *[the City of Cannon Beach]*, the State of Oregon, the federal government and any party designated by them to:

- Examine, visit and inspect, at any and all reasonable times, the property, if any, constituting the Project.
- Inspect and make copies of any accounts, books and records, including, without limitation, its records regarding receipts, disbursement, contracts, and any other matters relating to the Project, and to its financial standing, and shall supply such reports and information as reasonably requested.
- Interview any officer or employee of the Contractor, or its subcontractors, regarding the Project.

Contractor shall retain all records related to the Project for three years after final payments are made and any pending matters are closed.



**10. Disadvantaged Business Enterprises** (language to be included in all construction contracts and subcontracts:)

Recipient will implement the good faith efforts for solicitation and contracting with Disadvantaged Business Enterprises (“DBE”) described in Section 4.1 of the Safe Drinking Water Handbook. This applies to all solicitation and contracting for construction, equipment, supplies, engineering or other services that constitute the Project financed by this Contract. Recipient will maintain documentation in a Project file on Disadvantaged Business Enterprises. Recipient will maintain documentation in a Project file and submit required forms, as described in Section 4.1 of the Safe Drinking Water Handbook. Recipient will ensure that all prime contractors and subcontractors implement the good faith efforts for solicitation and contracting, and comply with all DBE procurement forms, statements, and reporting requirements. Recipient will ensure that each procurement contract (prime plus all subcontractor contracts) includes the following term and condition:

“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. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.”

Recipient will ensure that all prime contractors and subcontractors implement the good faith efforts for solicitation and contracting, and comply with all DBE procurement forms, statements, and reporting requirements.

(Include the following forms, found in the Business Oregon Preconstruction Packet:)

- *DBE Six Good Faith Efforts and Form*

**11. Prohibition on Certain Telecommunication and Video Surveillance Services or Equipment**

(language to be included in all construction contracts and subcontracts:)

“As required by [2 CFR 200.216](#), federal grant or loan recipients and subrecipients are prohibited from obligating or expending loan or grant funds to procure or obtain; extend or renew a contract to procure or obtain; or enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that use covered telecommunications equipment, video surveillance services or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in [Public Law 115-232](#), section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

Prohibitions extend to the use of Federal funds by recipients and subrecipients to enter into a contract with an entity that “uses any equipment, system, or service that uses covered telecommunications equipment or services” as a substantial or essential component of any system, or as critical technology as part of any system. Certain equipment, systems, or

services, including equipment, systems, or services produced or provided by entities subject to the prohibition are recorded in the [System for Award Management](#) exclusion list.”

## **12. American Iron and Steel**

(language to be included in all construction contracts and subcontracts:)

The Contractor acknowledges to and for the benefit of the *[the City of Cannon Beach]* (“Purchaser”) and the State of Oregon (the “State”) that it understands the goods and services under this Agreement are being funded with monies made available by the Drinking Water State Revolving Fund that have statutory requirements commonly known as “American Iron and Steel,” that requires all of the iron and steel products used in the project to be produced in the United States (“American Iron and Steel Requirement”) including iron and steel products provided by the Contractor pursuant to this Agreement. The Contractor hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Contractor has reviewed and understands the American Iron and Steel Requirement, (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 Requirement, unless a waiver of the requirement 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 Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Contractor shall permit the Purchaser or State to recover as damages against the Contractor any loss, expense, or cost (including without limitation attorney’s fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Contractor has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Contractor agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

## **13. Federal Labor Standards**

(language to be included in all construction contracts and subcontracts.)

**NOTE:** Oregon Bureau of Labor and Industries (BOLI) prevailing wage requirements apply to public entities for projects over \$50,000 and private entities for projects that utilize more than \$750,000 of public funds.

### **Prevailing Wage Requirements.**

“Construction projects assisted in whole or in part with the Safe Drinking Water Revolving Loan Fund Program (SDWRLF) must be carried out in compliance with Federal Davis Bacon and Related Acts and the Oregon Bureau of Labor and Industries (BOLI) requirements. Contractor shall pay each worker employed in the performance of this contract not less than the higher of the wage rate for the type of work being performed as set forth in either the Oregon Prevailing Wage “Prevailing Wage Rate for Public Works Contracts in Oregon” (if applicable) or the applicable federal Davis-Bacon Wage Decision. Contractor shall download a U.S. Department of Labor Employee Fair Compensation Notice and post it at the work site along with a list of locally prevailing wage rates. Contractor shall prepare and submit weekly Certified Payroll

Reports on forms to be supplied by Business Oregon. Contractor shall permit access to construction site in order to conduct on-site interviews with workers during working hours.”

(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.

Sub recipients may obtain wage determinations from the U.S. Department of Labor's web site, [www.dol.gov](http://www.dol.gov).

(ii)(A) The sub recipient(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 sub recipient(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 sub recipient (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) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the sub recipient(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 sub recipient(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 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 sub recipient, that is, the entity that receives the sub-grant 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 sub recipient 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 Web site 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 sub recipient(s) for transmission to the State or EPA if requested by 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 sub recipient(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 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. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize 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 in accordance with 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. In the event 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 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 sub recipient(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.

## **Additional Clauses for Contracts greater than 100,000**

**Construction contracts and subcontracts greater than 100,000 must include all clauses listed above in addition to the clauses listed below.**

### **14. Federal Labor Standards**

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

(a) Contract Work Hours and Safety Standards Act. The sub recipient 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 forty 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 forty 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 forty 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 sub recipient, 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 moneys 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 Sub recipient 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 Sub recipient 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 sub recipient 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 sub recipient 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 sub recipient 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. Sub recipients 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.

Sub recipients shall immediately conduct interviews in response to an alleged violation of the prevailing wage requirements. All interviews shall be conducted in confidence."

(c) The sub recipient 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 sub recipient 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 sub recipient 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. Sub recipients 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 sub recipient shall verify evidence of fringe benefit plans and payments there under by contractors and subcontractors who claim credit for fringe benefit contributions.

(d) The sub recipient shall periodically review contractors and subcontractor's 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) Sub recipients 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/whd/america2.htm>.

## **SUPPLEMENTARY CONDITIONS ATTACHMENT**

### **DBE Six Good-Faith Efforts**

Any public water system receiving an award from the Safe Drinking Water Revolving Loan Fund and the Drinking Water Source Protection Fund must ensure good-faith implementation of the six good-faith efforts comprising the federal “Fair Share Program,” for the solicitation of all contractors providing construction, equipment, supplies, engineering or other services that constitute the project financed by the award.

Documentation demonstrating that these six good faith efforts have been taken must be included and maintained in the water system’s project files. Likewise, once a **contractor** has been selected by the water system, that contractor must adhere to the following six good-faith efforts in soliciting its subcontractors:

1. Ensure Disadvantaged Business Enterprises (DBEs) are made aware of contracting opportunities to the fullest extent practicable through outreach and recruitment activities. For Indian Tribal, state and local government recipients, this will include placing DBEs on solicitation lists and soliciting them whenever they are potential sources. (Note: The acronym DBE used throughout this document is a global term for Minority Business Enterprises (MBEs) and Women’s Business Enterprises (WBEs).
2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.
3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs. For Indian 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 DBEs in the competitive process.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Utilize the services of the Small Business Administration (SBA) and the Minority Business Development Agency of the Department of Commerce.
6. If the prime contractor awards subcontracts, require the prime contractor to take these six good-faith efforts in subcontracting with Disadvantaged Business Enterprises for any subcontract that they let.

#### **Locating Disadvantaged Business Enterprises for Outreach**

Applicable MBE / WBEs are certified by the Office of Minority, Women and Emerging Small Business (OMWESB), Small Business Administration, or by a federal agency.

The following sites may be of assistance for locating Minority or Women-Owned Business (MBE / WBE) firms and others may exist too:

- Office of Minority, Women and Emerging Small Business (OMWESB) Directory of Certified Firms at <http://www.oregon4biz.com/How-We-Can-Help/OMWESB/>
- Federal System for Award Management at <https://www.sam.gov>
- Minority Business Development Agency, US Dept. of Commerce at [www.commerce.gov/os/ogc/minority-business-development-agency](http://www.commerce.gov/os/ogc/minority-business-development-agency)
- EPA’s Office of Small Business Programs at [www.epa.gov/osbp/](http://www.epa.gov/osbp/)

- Oregon Office of Economic & Business Equity at <https://dasapp.oregon.gov/statephonebook/display.asp?agency=12100&division=12103>
- U.S. Department of Transportation at [www.dot.gov/osdbu/disadvantaged-business-enterprise](http://www.dot.gov/osdbu/disadvantaged-business-enterprise)

### **Prevention of Unfair Practices**

Finally, there are a number of provisions designed to prevent unfair practices that may adversely affect DBEs that are now required of the prime contractor for every SDWRLF funded project:

- A SDWRLF loan recipient must require its prime contractor to pay its subcontractor for satisfactory performance no more than 30 days from the prime contractor's receipt of payment.
- A SDWRLF loan recipient must be notified in writing by its prime contractor prior to any termination of a DBE subcontractor for convenience by the prime contractor.
- If a DBE subcontractor fails to complete work under the subcontract for any reason, the SDWRLF loan recipient must require the prime contractor to employ the Six Good-Faith Efforts if soliciting a replacement subcontractor.
- A SDWRLF loan recipient must require its prime contractor to employ the Six Good Faith Efforts even if the prime contractor has achieved its fair share objectives.

**15. Environmental and Natural Resource Laws** (include the following language in all construction contracts and subcontracts in excess of \$100,000:)

“Contractor shall comply with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h)), section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15).

**16. Prohibition on the Use of Federal Funds for Lobbying (Certification Regarding Lobbying form** follows, for any contracts in excess of \$100,000).

## **SECTION 01 10 00 SUMMARY**

### **PART 1 GENERAL**

#### **1.01 PROJECT**

- A. Project Name: **Cannon Beach Water Resiliency Project Phase 1 - Seismic Improvements**
- B. Owner's Name: City of Cannon Beach
- C. Engineer's Name: Windsor Engineers.
- D. Additional Project contact information is specified in Section 00 01 02 - Project Information.
- E. Summary Project Description: The project consists of the construction of or improvements to reservoir tanks, valves, and water main pipe as it relates to seismic resiliency improvements.

#### **1.02 CONTRACT DESCRIPTION**

- A. Contract Type: A single prime contract based on a Contractor Provided Bid as described in Document 00 41 80 – Example Public Improvement Contract Form

#### **1.03 OWNER OCCUPANCY**

- A. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

#### **1.04 CONTRACTOR USE OF SITE AND PREMISES**

- A. Provide access to and from site as required by law and by Owner:
  - 1. Do not obstruct roadways, sidewalks, or other public ways without permit.

#### **1.05 WORK SEQUENCE**

- A. There are three sites within this project. The north reservoir and south reservoir will require scheduling and coordination with the Owner. Cannon Beach relies heavily on tourist activity so these locations will be restricted from construction work occurring within 3 days prior or following a holiday. No work that would result in loss of water service shall occur after noon on Fridays during the summer tourist season (Memorial Day weekend through Labor Day weekend). Ideally work would be isolated to one site at a time with all the work being completed before starting at the next location. The city will allow site grading and electrical work being performed at multiple sites as long as it doesn't prolong water availability to the city and tourist activities.
- B. The following tasks must be performed at the South Reservoir separately and coordinated with the city and adjacent property owners:
  - 1. Installation of the temporary watermain bypass at the south reservoir
  - 2. Water reservoir tank shutdown / new connections
    - a. Work shall be coordinated with the City and shall be performed Monday - Thursday.
    - b. City will drain the tank prior to temporary watermain bypass connection.
    - c. Coordinate with the city and provide 48 hours notice prior to the shutdown.
    - d. Prechlorinate the bypass installation prior to construction work
    - e. Temporary water main bypass shall be installed by February 23.
    - f. Removal of the temporary watermain bypass and connection of the new seismic valve system shall be performed in an eight-hour time frame listed above.
- C. Order of work shall be performed in the following sequence.  
It is preferred that the north reservoir improvements occur before the south reservoir work with the exception of the temporary bypass installation.
- D. North Reservoir shutdown will be required to make the connections. The contractor shall determine and schedule shutdown(s) to complete the work; however, all work shall be performed during night shutdown hours (10 pm to 6 am)

## **1.06 SPECIFICATION SECTIONS APPLICABLE TO CONTRACT**

- A. Unless otherwise noted, provisions of the sections listed below apply to every contract. Specific items of work listed under individual contract descriptions constitute exceptions.
- B. Section 01 20 00 - Price and Payment Procedures.
- C. Section 01 22 00 - Unit Prices.
- D. Section 01 32 16 - Construction Progress Schedule.
- E. Section 01 40 00 - Quality Requirements.
- F. Section 01 41 00 – Regulatory Requirements
- G. Section 01 50 00 - Temporary Facilities and Controls.
- H. Section 01 51 00 – Temporary Utilities
- I. Section 01 55 00 – Vehicular Access and Parking
- J. Section 01 57 13 - Temporary Erosion and Sediment Control
- K. Section 01 58 13 - Temporary Project Signage.

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

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

**END OF SECTION**

**SECTION 01 20 00  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.

**1.02 SCHEDULE OF VALUES**

- A. Use Schedule of Values Form
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Owner for approval.
- C. Forms filled out by hand will not be accepted.

**1.03 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Contract.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Owner for approval.
- C. Forms filled out by hand will not be accepted.
- D. Execute certification by signature of authorized officer.
- E. Submit one electronic Application for Payment.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 22 00  
UNIT PRICES**

**PART 1 GENERAL**

**1.01 COSTS INCLUDED**

- A. Unit Prices shown on the Bid Form shall include full compensation for all required submittals, labor, materials, tools, equipment, plant, transportation, services and other incidentals; erection or installation of an item of the Work, testing and inspection overhead and profit required to provide a complete and operable installation. For Lump Sum items, the contractor may be required to provide a breakdown-schedule of values for each lump sum bid item.
- B. Mobilization (Item 1)
  - 1. Payment. The payment for mobilization consists of the costs associated with mobilization to perform the work and includes equipment, material and labor move-in costs, costs for bonds, insurance, costs for the training and use of project management software and miscellaneous start-up costs. The cost of demobilization shall be incidental to other items of work listed in the Bid Schedule.
  - 2. Measurement. The bid item for Mobilization shall be measured lump sum. The amounts paid for mobilization in the Contract progress payment will be calculated and based on the percent of the original Contract Amount that is earned from other Contract items, not including advances on Materials, and as follows:
    - a) When 5 percent is earned, either 50 percent of the amount for mobilization or 5 percent of the original Contract Amount, whichever is the least.
    - b) When 10 percent is earned, either 100 percent of mobilization or 10 percent of the original Contract Amount, whichever is the least.
    - c) When all Work is completed, amount of mobilization exceeding 10 percent of the original Contract Amount.
    - d) This schedule of mobilization progress payments will not limit or preclude progress payments otherwise provided by the Contract.
    - e) Payment will be included in payment made for the appropriate items under which this Work is required.
- C. Temporary Signs (Item 2)
  - 1. Payment. The payment under this item for temporary signs includes all labor, equipment, and material necessary for the work except for any specific portions which are identified to be paid for under separate items. Temporary Signs shall include but not be limited to: obtaining Owner provided temporary project sign, furnishing a backboard and support posts and frame system, provide installation and maintenance, and all other items or work specified in the technical specification and required by the Contract Documents relating to this item. Payment includes removal and delivery to the Owner and clean up of the installation site.
  - 2. Measurement. Payment shall be made per the lump-sum (LS) bid price.

D. Erosion Control (Bid Item 3)

1. Payment. The payment for Erosion Control includes all labor, equipment, and material necessary for erosion control including placing, removing, and maintaining erosion control features as shown on the Drawings and in compliance with the current local Erosion Control Ordinance, updates to the SWPPP, maintenance and repair to the BMPs, other site stabilization material, equipment and installation, watering, mowing, weed removal, and establishment of vegetation. Temporary and permanent seed mix to be the same. Mulching type straw for temporary and mulching type hydromulch for permanent applications.
2. Measurement. Payment shall be made per each bid price with separate item for each of the Reservoir sites.

E. Remove Concrete Surfacing (Bid Item 4)

1. Payment. The payment for work constructed under this item includes but is not limited to all labor, equipment, and material necessary to provide removal of existing concrete pavement at the North and South Reservoirs as shown on the plans. Payment will include removal, disposal off site, protection of the work and work area, and other items necessary in order to provide a complete removal.
2. Measurement. Payment shall be per the square yard (SY) bid price based on the amount determined by the Owner/Engineer. Additional damaged sections shall be removed, recut and replaced at the Contractors sole expense.

F. Removal of Structures and Obstructions (Bid Item 5)

1. Payment. The payment under this item for Removal of Structures and Obstructions includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid under separate items. Structure Removal includes the removal of the existing valve vault at the South Reservoir (Tolovana) and any other items encountered during site work at all three reservoir locations. Work includes the legal disposal offsite of any materials removed.
2. Measurement. Payment shall be made per the lump-sum (LS) bid price.

G. Remove Valves (Bid Item 6)

1. Payment. The payment under this item for Remove Valves includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid for under separate items. Remove Valves includes the removal of the existing valves located at the North and South Reservoirs and any other valves encountered during site work at all three reservoir locations and directed to be removed. Work includes the legal disposal offsite of any materials removed.
2. Measurement. Payment shall be made per Each (EA) bid price.

H. Remove Pipe (Bid Item 7)

1. Payment. The payment under this item for Remove Pipe includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid for under separate items. Remove Pipe includes the removal of the existing pipe located at the North and South Reservoirs and any other valves encountered during site work at all three

reservoir locations and directed to be removed. Work includes the legal disposal offsite of any materials removed.

2. Measurement. Payment shall be made per Lineal Foot (LF) bid price and shall be measured in the field.

I. Portland Cement Concrete Pavement Sawcutting (Bid Item 8)

1. Payment. The payment under this item for Sawcutting includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid for under separate items. Concrete sawcutting includes the sawcutting for the removal of the existing concrete slabs located at the North and South Reservoirs. Work includes the legal disposal offsite of any materials removed.
2. Measurement. Payment shall be made per Lineal Foot (LF) bid price as measured in the field. Additional sawcutting required due to damage by the Contractor shall be solely borne by the Contractor.

J. Remove and Reinstall Fence (Bid Item 9)

1. Payment. The payment under this item for Remove and Reinstall Fence includes all compensation for labor, equipment and material necessary for the work. Remove and Reinstall Fence includes the removal of the existing fence and gate if necessary to accommodate the work located at the North Reservoir. If fencing is not removed no payment will be made for this bid item.
2. Measurement. Payment shall be made per Lump Sum (LS) bid price.

K. Remove and Reinstall Ladder (Bid Item 10)

1. Payment. The payment under this item for Remove and Reinstall Ladder includes all compensation for labor, equipment and material necessary for the work. Remove and Reinstall Ladder includes the removal of the existing ladder, safe storage of all pieces and connectors and reinstallation at the North Reservoir. The resulting installation will result in a safe installation for the intended use. If Ladder Removal is not required no payment will be made for this bid item.
2. Measurement. Payment shall be made per Lump Sum (LS) bid price.

L. Excavation and Embankment (Bid Item 11)

1. Payment. The payment under this item for Excavation and Embankment includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid for under separate items. Excavation and Embankment includes the stripping and removal and offsite disposal of the sod, stockpiling and protection (covering) of topsoil for topping of completed embankments or excavations, grading and compaction as required for work at each of the reservoirs. Dust and moisture control shall be included in this item. Surplus material may be placed at the main reservoir site if approved by the Owner. Work includes the legal disposal offsite of any materials removed.
2. Measurement. Payment shall be made per Lump Sum (LS) bid price as shown in the plans.

M. 6 Inch Concrete Surfacing (Bid Item 12)

1. Payment. The payment under this item for 6 Inch Concrete Surfacing includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid for under separate items. 6 inch Concrete bid item includes the fine grading of the area to be replaced, compaction of the subgrade, installation of 4 inches of Aggregate Base rock including grading, conditioning and compaction, forming and the placement, finishing and curing of Class 3300 concrete. Work will include submittal of joint plan, finishing and curing as required. Work includes the legal disposal offsite of any remaining materials and final cleanup of the site. This work will be at both the North and South Reservoir sites.
2. Measurement. Payment shall be made per Square Yard (SY) bid price as measured by the Engineer in the field.

N. Temporary Water Main Bypass (Bid Item 13)

1. Payment. The payment under this item for Temporary Water Main Bypass includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid under separate items. Temporary Bypass includes excavation and backfill (if buried), supply, installation, restraint, pressure testing and disinfection, tie-in connection and removal of the bypass at the South Reservoir (Tolovana) upon final project completion. Work includes the legal disposal offsite of any materials removed.
2. u. Payment shall be made per Each (EA) bid price.

O. Connect to Existing Water Main (Bid Item 14)

1. Payment. The payment under this item for Connection to the Existing Water Main includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid for under separate items. Connection to the Existing Water Main includes all new connections required at each Reservoir (North and South Reservoirs). Work includes excavation, subgrade preparation, cleaning of pipes, disinfection of the connections and testing for leakage at each connection that is made, backfill and compaction.
2. Measurement. Payment shall be made per Each (EA) bid price.

P. 4" Flexextend (Bid Item 15), 8" Flexextend (Bid Item 16) and 12" Flexextend (Bid Item 17)

1. Payment. The payment under these items for Flexextends includes all compensation for labor, equipment and material necessary for the work except for any specific portions which are identified to be paid for under separate items. "Flexextend" includes the purchase, delivery and installation of the Flexextend units located at the North and South Reservoirs including preparation of subgrade, bedding, adjustment, backfilling, compaction, gaskets, bolts, washers, nuts, restrained connections at the reservoir, disinfection and testing of each unit for watertightness and placement of tracer wire.
2. Measurement. Payment shall be made per Each (EA) bid price.

Q. 10' x 8' Vault (Bid Item 18)

1. Payment. The payment for work constructed under this bid item includes furnishing and installing of the vault, excavation, dewatering, bedding, backfill and its compaction as shown on the plans, details and standard details. This item also includes penetrations and flexible couplings, installation of tracer wire and temporary surface restoration. Payment will include all items described elsewhere in the contract documents (as described in the technical specifications) and double H 20 traffic rated lid, access ladder, fall protection and the design and installation of pipe supports.
2. Measurement. Measurement for 10' x 8' Vault will be on a per each (EA) basis for each completed installation.

R. 12" Gate Valve (Bid Item 19)

1. Payment. The payment for work constructed under this bid item includes furnishing and installing of the valve, pipe bedding, trenching, trench backfill and its compaction as shown on the plans, details and standard details. This item also includes dewatering, disinfection, testing, installation of tracer wire and temporary surface restoration. Payment will include all gaskets, bolts, washers, nuts, coatings, operators (as described in the technical specifications) and access boxes, cleaning, disinfection and leak testing as required.
2. Measurement. Measurement for service connections will be on a per each (EA) basis for each completed installation.

S. 8" Gate Valve with Actuator (Bid Item 20) and 12" Gate Valve with Actuator (Bid Item 21)

1. Payment. The payment for work constructed under this bid item includes furnishing and installing of the valve, actuator, power and communication connections and operating functions as shown in the contract documents. This item also includes coatings, disinfection, testing, installation of tracer wire and any other necessary components. Payment will include all gaskets, bolts, washers, nuts, coatings, operators (as described in the technical specifications), connectors, cleaning, disinfection and leak testing as required. The contractor shall provide replacement makeup spools for each actuated valve; costs will be included in this bid item.
2. Measurement. Measurement for Valves with actuators will be on a per each (EA) basis for each completed installation.

T. 12" Check Valve (Bid Item 22)

1. Payment. The payment for work constructed under this bid item includes furnishing and installing of the valve, disinfection, testing, and installation of tracer wire. Payment will include all gaskets, bolts, washers, nuts, coatings, operators (as described in the technical specifications), cleaning, disinfection and leak testing as required.
2. Measurement. Measurement for service connections will be on a per each (EA) basis for each completed installation.

U. Hydrant Assembly (Bid Item 23)

1. Payment. The payment for work constructed under this item includes clearing, excavation and disposal of waste material, trench bracing, dewatering, furnishing and installing the assembly and bedding, native or granular backfill and its compaction, and surface restoration. Each hydrant assembly shall include furnishing and installing fittings with joint restraint, gate valve, valve box/lid, riser, thrust blocks, and hydrant as specified in the technical specifications or shown on the Drawings and standard details titled "Fire Hydrant Assembly". Thrust blocks shall be as per the technical specifications or shown on the Drawings and standard detail titled "Standard Thrust Block". Payment will be made per each assembly listed in the bid schedule.
2. Measurement. Payment shall be per each (EA) assembly, complete, in-place.

V. 12" HDPE Pipe (Bid Item 24)

1. Payment. The payment for work constructed under this bid item includes clearing, potholing existing utility crossings, excavation and disposal of waste material, dewatering, furnishing and installing pipe and bedding, all required joint restraints or welding, native or granular backfill and its compaction as required, cleaning, disinfecting and testing installed water main pipe, support and restoration of utilities, tracer wire, restrained connections, and all other items of work associated with the water main pipe specified in the technical specifications or shown on the Drawings unless specifically listed as a payment item herein. Payment shall be for the various combinations of pipe size, installation type, backfill requirements, and field conditions.
2. Measurement. The quantities for payment shall be by the lineal foot (LF) based on the length of the water main pipe measured in place after completion and acceptance of the work. Measurement shall be the slope-distance along the finish ground surface along the pipe centerline measured to the nearest foot through the centerline of fittings, flexible couplings, vaults or points designated on the contract drawings unless otherwise specified in other bid items.

W. 8" Ductile Iron Pipe (Bid Item 25) and 12" Ductile Iron Pipe (Bid Item 26)

1. Payment. The payment for work constructed under this bid item includes clearing, potholing existing utility crossings if necessary, excavation and disposal of waste material, dewatering, furnishing and installing pipe and bedding, all required joint restraints, native, granular backfill and its compaction as required, restoration, cleaning, disinfecting and testing installed water main pipe, support and restoration of utilities, trace wire, and all other items of work associated with the water main pipe specified in the technical specifications or shown on the Drawings unless specifically listed as a payment item herein. Payment shall be for the various combinations of pipe size, installation type, backfill requirements, and field conditions.
2. Measurement. The quantities for payment shall be by the lineal foot (LF) and be the length of the water main pipe measured in place after completion and acceptance of the work. Measurement shall be the slope-distance along the finish surface along the pipe centerline measured to the nearest foot through the centerline of fittings, flexible couplings, vaults or points designated on the contract drawings unless otherwise specified in other bid items.

X. Shake Alert (Bid Item 27)

1. Payment. The payment for work constructed under this item includes provision of communication with the new actuated valves and control panels, custom panels for other devices, installation and connection for new monitoring switches, configuration of the SCADA system as discussed in the Technical documents, programming and integration with the city system, provision and installation of new ShakeAlert system and integration with existing city systems, complete documentation and operations manuals, testing and commissioning of the system as described in the contract documents. Price shall include the purchase of 3 years of licensing and software maintenance.
2. Measurement. Payment shall be Lump Sum (LS).

Y. Electrical Systems (Bid Item 28)

1. Payment. The payment for work constructed under this item includes excavation, installation of new conduits, conductors, panels, power and controls to the new actuated valves and control panels, backfilling of trenches, custom panels for other devices, installation and connection for new monitoring technology, configuration as discussed in the Technical documents, integration with the city system, complete documentation and operations manuals, testing and commissioning of the system as described in the contract documents.
2. Measurement. Payment shall be Lump Sum (LS).

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Construction progress schedule.
- D. Submittals for review, information, and project closeout.
- E. Number of copies of submittals.
- F. Requests for Interpretation (RFI) procedures.
- G. Submittal procedures.

**1.02 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of the individual Sections for Project Closeout Requirements and for coordination of execution of administrative tasks with timing of construction activities.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE**

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via ProjectSight to the Engineer.
  - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  - 2. It is Contractor's responsibility to submit documents in allowable format.
  - 3. Users need: refer to 01 30 50 for computer and software requirements.
  - 4. Paper document transmittals will not be reviewed;
  - 5. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

**3.02 PRECONSTRUCTION MEETING**

- A. Attendance Required:
  - 1. Owner.
  - 2. Engineer.
  - 3. Contractor.
  - 4. Major subcontractors.
- B. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.(City to provide)
  - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
  - 5. Designation of personnel representing the parties to Contract.
    - a. Sign in sheet with contact information from all parties will be sent out after meeting.
  - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 7. Scheduling.
- C. Engineer will record minutes and distribute copies within two days after meeting to participants, with copies to Engineer, Owner, participants, and those affected by decisions made.



### **3.03 CONSTRUCTION PROGRESS SCHEDULE**

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

### **3.04 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
- B. Submit to Engineer for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in the individual specification sections.

### **3.05 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.
  - 8. Record documentation
- B. Submit for Engineer's knowledge as contract administrator or for Owner.

### **3.06 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of the individual sections:
  - 1. Project record documents.
  - 2. Operation and maintenance data.
  - 3. Warranties.
  - 4. Bonds.
  - 5. Other types as indicated.
  - 6. Final documents.
- D. Submit for Owner's benefit during and after project completion.

### **3.07 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Engineer
  - 1. After review, produce duplicates.
  - 2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.08 SUBMITTAL PROCEDURES**

- A. General Requirements:
  - 1. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  - 2. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Engineer.
  - 3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  - 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.

### **3.09 SUBMITTAL REVIEW**

- A. Submittals for Review: Engineer will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.
- C. Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Engineer's and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Approved", or language with same legal meaning.
    - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
  - 2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.
      - 2) Non-responsive resubmittals may be rejected.
    - b. "Rejected-See Note".
      - 1) Submit item complying with requirements of Contract Documents.
- E. Engineer's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Reviewed-For Record Only" - to notify the Contractor that the submittal has been received for record only.

**END OF SECTION**

**SECTION 01 30 50**  
**WEB BASED CONSTRUCTION MANAGEMENT**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. The use of a web-based construction management (WBCM) system is a requirement of this contract.

**PART 2 PRODUCTS**

**3.01 WEB BASED CONSTRUCTION MANAGEMENT**

- A. ProjectSight, go to [www.projectsight.trimble.com](http://www.projectsight.trimble.com)

**PART 3 EXECUTION**

**4.01 PROJECTSIGHT™**

- A. The Owner and Contractor shall utilize an Owner-provided web-based construction management system, ProjectSight™, for electronic submittal of all data and documents throughout the duration of the Contract. The Owner furnished WBCM will be made available to all Contractors' Project personnel, subcontractor personnel, suppliers, consultants, and the Designer of Record. The joint use of this system is to facilitate electronic exchange of information, automation of key processes, and overall management of the Contract. The WBCM shall be the primary means of Project information submission and management. When required by the Owners representative, paper documents will also be provided. In the event of discrepancy between the electronic version and paper documents the paper documents will govern.
- B. User Access Limitations:
  - 1. The Owner's Representative will control the Contractor's access to the WBCM by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system, determine assigned function-based authorizations (determines what can be seen), and user privileges (determines what they can do). Subcontractors and suppliers will be given access to the WBCM through the Contractor. Entry of information exchanged and transferred between the Contractor and its subcontractors and suppliers on the WBCM shall be the responsibility of the Contractor.
  - 2. Joint Ownership of Data: Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the WBCM) by the Owner's Representative and the Contractor will be jointly owned.
- C. Automated System Notification and Audit Log Tracking: Review comments made (or lack thereof) by the Owner on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.
- D. Submittals: See Section 01 33 00, Submittal Procedures.
- E. Computer Requirements: The Contractor shall use computer hardware and software that meets the requirements of the Owner furnished WBCM as recommended by the WBCM supplier to access and utilize the WBCM. As recommendations are modified by the WBCM supplier, the Contractor will upgrade their system(s) to meet the recommendations or better. Upgrading of

the Contractor's computer systems will not be justification for a cost or time modification to the Contract.

- F. Contractor Responsibility: The Contractor shall be responsible for the validity of their information placed in the WBCM and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including but not limited to Internet browsers, email programs, CAD drawing applications, and Portable Document Format (PDF) document distribution program. The Contractor shall utilize the existing forms in the WBCM to the maximum extent possible. If a form does not exist in the WBCM, the Contractor must include a form of their own or provided by the Owner's Representative as an attachment to a submittal. PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of the WBCM (outside what is provided by the Owner) and the other programs indicated above as needed.
- G. User Access Administration: Provide a list of Contractor's key WBCM personnel for the Owner's Representative acceptance. Contractor is responsible for adding and removing users from the system. The Owner's Representative reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and subcontractors to the WBCM.
- H. Connectivity Problems: The WBCM is a web-based environment and therefore subject to the inherent speed and connectivity problems of the Internet. The Contractor is responsible for its own connectivity to the Internet. The WBCM response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc., and current traffic on the Internet. The Owner will not be liable for any delays associated from the usage of the WBCM including, but not limited to slow response time, downtime periods, connectivity problems, or loss of information. The Contractor will ensure that connectivity to the WBCM (whether at the home office or jobsite) is adequate. The minimum bandwidth requirements for using the system is 128 kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. Under no circumstances shall the usage, of the WBCM be grounds for a time extension or cost adjustment to the Contract.
- I. Training:
  - 1. The Project Owner has arranged for the following training to be provided to the Contractor:
    - a. Up to two WBCM training sessions will be offered for Contractor and Subcontractor personnel to be coordinated at a time arranged by Contractor with Owner's Representative within 21 days of Notice to Proceed. Contractor participation in training is strongly encouraged and shall be considered incidental to the Work.

**END OF SECTION**

**SECTION 01 32 16  
CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

**1.02 SUBMITTALS**

- A. Within 10 days after date of Contract Execution, submit preliminary schedule.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
- C. Submit updated schedule with each Application for Payment.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRELIMINARY SCHEDULE**

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

**3.02 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- C. Provide legend for symbols and abbreviations used.

**3.03 BAR CHARTS**

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

**3.04 DISTRIBUTION OF SCHEDULE**

- A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Engineer, Owner, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

**END OF SECTION**

**SECTION 01 40 00  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Control of installation.
- F. Defect Assessment.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Engineer, in quantities specified for Product Data.
  - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

**1.03 QUALITY ASSURANCE**

- A. Contractor's Quality Control (CQC) Plan:
  - 1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
    - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
      - 1) Include qualifications (in resume form), duties, responsibilities of each person assigned to CQC function.
    - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
      - 1) Communications.
      - 2) Inspection and testing procedures and scheduling.
      - 3) Control of noncomplying work.
      - 4) Project materials certification.
    - c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.
    - d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.

**1.04 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
  - 1. Laboratory: Authorized to operate in the State in which the Project is located.

**PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

### **3.02 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  - 1. Provide qualified personnel at the site. Cooperate with Engineer and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
  - 5. Perform additional tests and inspections required by Engineer.
  - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 2. Cooperate with laboratory personnel and provide access to the Work and to manufacturers' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Engineer.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### **3.03 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.

**END OF SECTION**



**SECTION 01 41 00  
REGULATORY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SUMMARY OF REFERENCE STANDARDS**

- A. Regulatory requirements applicable to this project are the following:
  - 1. Asbestos handling requirements
- B. 29 CFR 1910 - Occupational Safety and Health Standards Current Edition.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 40 00 - Quality Requirements.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Dewatering
- B. Temporary utilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Security requirements.
- E. Vehicular access and parking.
- F. Waste removal facilities and services.
- G. Project identification sign.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 51 00 - Temporary Utilities.
- B. Section 01 55 00 - Vehicular Access and Parking.
- C. Section 01 58 13 - Temporary Project Signage.

**1.03 DEWATERING**

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.

**1.04 TEMPORARY UTILITIES - SEE SECTION 01 51 00**

- A. Provide and pay for all electrical power, lighting, water, and piping and fittings required for construction purposes.

**1.05 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.06 FENCING**

- A. Construction: Contractor's option. to be approved by the engineer.
- B. Provide fence around the construction site adequate to prevent the public from entering the work area, if needed equip with vehicular and pedestrian gates with locks.
- C. Should provide safety to the public during and without construction activity happening.

**1.07 VEHICULAR ACCESS AND PARKING - SEE SECTION 01 55 00**

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Existing on-site roads may be used for construction traffic.
- F. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

### **1.08 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

### **1.09 PROJECT SIGNS - SEE SECTION 01 58 13**

### **1.10 PROJECT IDENTIFICATION**

- A. Provide project identification sign of design and construction indicated on drawings or shown in the contract documents.
- B. Erect on site and can be relocated at each location actively being worked on.
- C. No other signs are allowed without Owner permission except those required by law.

### **1.11 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.

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

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

**END OF SECTION**

**SECTION 01 51 00  
TEMPORARY UTILITIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary Utilities: Provision of water.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 50 00 - Temporary Facilities and Controls:
  - 1. Temporary sanitary facilities required by law.

**1.03 TEMPORARY WATER BYPASS**

- A. The contractor is responsible for the design of the temporary water bypass.
- B. Temporary bypass design shall be approved by the engineer prior to any work being done.
- C. The cost of a temporary water bypass shall be per each.
  - 1. Items include but are not limited to temporary water bypass include; coordination with the owner, engineer, and neighbors, design by a registered engineer, revision to the design to obtain the owner's approval, all pipe, restraints, valves and fittings, proper chlorination and removal of the system once work is completed and site restoration.

**1.04 TEMPORARY BYPASS SUBMITTAL**

- A. The Contractor shall provide a submittal of the planned bypass including restraints, sizing and connection details for approval by the Engineer.

**PART 2 PRODUCTS**

- A. Products shall be approved by the engineer.

**PART 3 EXECUTION**

- A. Contractor shall review the site and develop a work plan.
- B. Contractor shall get approval of the work plan by the owner. Contractor shall revise plan as needed to get owner's approval.
- C. Contractor shall provide the owner 48 hours notice prior to setting up the temporary bypass to allow for Owner draining of the reservoir.
- D. Bypass shall be built as much as possible prior to water shutdown to limit the time the water system is shutdown.
- E. The Contractor shall chlorinate the line the line prior to installation.
- F. The Contractor shall visibly inspect the installation for watertightness following construction.

**END OF SECTION**

**SECTION 01 55 00  
VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Access roads.
- B. Parking.
- C. Existing pavements and parking areas.
- D. Permanent pavements and parking facilities.
- E. Construction parking controls.
- F. Haul routes.
- G.
- H. Maintenance.
- I. Removal, repair.
- J. Mud from site vehicles.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: For access to site, work sequence, and occupancy.
- B. Section 01 58 13 - Temporary Project Signage: Informational Signs.
- C. Section 31 22 00 - Grading: Specifications for earthwork and paving bases.

**PART 2 PRODUCTS**

**2.01 MATERIALS (NOT USED)**

**2.02 SIGNS, SIGNALS, AND DEVICES**

- A. Traffic Cones and Drums, Lights: As approved by ODOT and the City of Cannon Beach.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

**3.02 ACCESS ROADS**

- A. Use of existing on-site streets and driveways for construction traffic is permitted as approved by the owner.
- B. Tracked vehicles are not allowed on paved areas.
- C. Construct new temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.
- D. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.
- E. Location as indicated.
- F. Provide unimpeded access for emergency vehicles. Maintain 20-foot width driveways with turning space between and around combustible materials.
- G. Provide and maintain access to fire hydrants free of obstructions.

**3.03 PARKING**

- A. Contractor is responsible for arranging temporary parking areas to accommodate use of construction personnel prior to the work starting.

- B. When site space is not adequate, contractor shall coordinate with the owner to provide additional off-site parking.

#### **3.04 PERMANENT PAVEMENTS AND PARKING FACILITIES**

- A. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

#### **3.05 CONSTRUCTION PARKING CONTROL**

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

#### **3.06 HAUL ROUTES**

- A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
- B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

#### **3.07 MAINTENANCE**

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

#### **3.08 REMOVAL, REPAIR**

- A. Repair existing facilities damaged by use, to original condition.
- B. Remove equipment and devices when no longer required.
- C. Repair damage caused by installation.

#### **3.09 MUD FROM SITE VEHICLES**

- A. Provide means of removing mud from vehicle wheels before entering streets.

**END OF SECTION**

**SECTION 01 57 13**  
**TEMPORARY EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of roadways, waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.
- E. Final Erosion and Sediment control of all work areas.

**1.02 REFERENCE STANDARDS**

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus 2021.
- B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity 2022.
- C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2015.
- D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.
- E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile 2021a.
- F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2017 (Reapproved 2021).

**1.03 RELATED SECTIONS**

- A. Section 32 92 19 - Seeding

**1.04 PERFORMANCE REQUIREMENTS**

- A. Also comply with all more stringent requirements of State of Oregon Erosion and Sedimentation Control Manual.
- B. Follow the provided Erosion Control Plan and submit periodic inspection reports.
- C. Timing: Put preventive measures in place before disturbance of surface cover.
- D. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
  - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
  - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur.
- E. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
  - 1. Control movement of sediment and soil from temporary stockpiles of soil.
  - 2. Prevent development of ruts due to equipment and vehicular traffic.
  - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- F. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
  - 1. Prevent windblown soil from leaving the project site.

2. Prevent tracking of mud onto public roads outside site.
  3. Prevent mud and sediment from flowing onto sidewalks and pavements.
  4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- G. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including but not limited to rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- H. Open Water: Prevent standing water that could become stagnant.
- I. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

## **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Erosion Control Plan:
1. Submit modifications to the plan (if any) including:
    - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
    - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
    - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
    - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
    - e. Other information required by law.
    - f. Format required by law is acceptable, provided any additional information specified is also included.
  2. Obtain the approval of the Plan by authorities having jurisdiction.
- C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Erosion control material shall meet ODOT's Oregon Standard Specifications for Construction 2021 Section 00280 and ODOT Erosion Control Manual. If no standards exist, the following shall apply.
- B. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
  2. Permeability: 0.05 sec<sup>-1</sup>, minimum, when tested in accordance with ASTM D4491/D4491M.
  3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
  4. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
  5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
  6. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.



7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
  - C. Sediment Fence Posts: Shall meet ODOT's Oregon Standard Specifications for Construction 2021 and Erosion Control Manual,
    1. Untreated wood posts (wood stain is acceptable)
  - D. Inlet protection: Furnish inlet protection materials meeting the following requirements:
    1. Type 2:
      - a. Wire Mesh - 19-gauge steel-wire mesh with 3/8 by 3/8-inch openings.
      - b. Geotextile - Type 1 geotextile meeting the requirements of Oregon Standard Specifications for Construction 2021 Section 02320. Aggregate - Open-graded Aggregate meeting the requirements of Oregon Standard Specifications for Construction 2021 Section 02630.11.
    2. Type 3: Prefabricated Filter Inserts - Prefabricated filter inserts manufactured specifically for collecting sediment in drainage inlets and from the Oregon Standard Specifications for Construction 2021 or the Oregon Erosion Control Manual QPL requirements. Include handles and fasteners sufficient to keep the insert from falling into the inlet during maintenance and removal of the insert from the inlet.
    3. Type 7:
      - a. Filter sock material, compost, and stakes meeting the requirements of Oregon Standard Specifications for Construction 2021 Section 00280.15(f).
      - b. Sand bags conforming to Oregon Standard Specifications for Construction 2021 Section 00280.15(a).
- Type 10: Curb Inlet Sediment Dam - Provide one (or more) of the following curb inlet sediment barrier from products, or as approved:
- a. Ertec - Curb Inlet Protection
  - b. ACF - Econo Curb
  - c. GEI Works - Taurus Curb Inlet Filter
  - d. GEI Works - Ultra-Curb Inlet Guard
  - e. Ultratech - Ultra-Curb Guard Plus

## **PART 3 EXECUTION**

### **3.01 EROSION AND SEDIMENT CONTROL MANAGER (ESCM)**

- A. Designate and provide an ESCM who possesses a valid Oregon Standard Specifications for Construction 2021 ESCM certificate or who has successfully completed an erosion control training that is acceptable to the Engineer.
- B. The ESCM duties include but not limited to:
  1. Manage and ensure proper implementation of the ESCP.
  2. Accompany the Engineer during field review of the ESCP prior to construction activities.
  3. Monitor rainfall on and in the vicinity of the Project Site.
  4. Monitor water quality in receiving streams in the vicinity of the Project Site.
  5. Inspect ESC on active construction sites weekly for effective functioning.
  6. Inspect ESC on inactive sites every 2 weeks for effective functioning.
  7. Inspect ESC on all active and inactive sites at least daily during rainy periods when 1/2 inch or more of rain has fallen within a 24-hour period for effective functioning.
  8. Ensure that ESC are regularly cleaned and maintained.
  9. Mobilize crews to make immediate repairs to ESC or install additional ESC during working and non-working hours when ESC is not effectively functioning.
  10. Record actions taken to clean up significant amounts of sediment.
  11. Report potential permit violations to the Agency in a timely manner.
  12. Regularly update the approved ESC Monitoring form.
  13. Update the ESCP monthly and within 24 hours after changes or major ESC modifications are implemented.

14. Prepare a contingency plan in preparation for emergencies and the rainy season.
15. Accompany the Engineer on inspections and, if required, on inspections by representatives of regulating agencies.

### **3.02 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### **3.03 PREPARATION**

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

### **3.04 INSTALLATION**

- A. Sediment Fences:
  1. Store and handle fabric in accordance with ASTM D4873/D4873M.
  2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
  3. Install with top of fabric at nominal height and embedment as specified.
  4. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.
  5. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.

### **3.05 MAINTENANCE**

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Sediment Fences:
  1. Promptly replace fabric that deteriorates unless need for fence has passed.
  2. Remove silt deposits that exceed one-third of the height of the fence.
  3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Clean out temporary sediment control structures weekly and relocate soil on site.
- E. Place sediment in appropriate locations on site; do not remove from site.
  1. Soil Exposure Limitations: Statewide (Entire Year) - Within 7 days of exposure, stabilize all areas within 100 feet of waterways, Wetlands, or other sensitive areas using methods that do not rely solely upon germination to control erosion. West of the Cascades (Entire Year) - Stabilize all other areas within 14 days of exposure. Temporary Stabilization - Temporarily stabilize exposed Soils:
- F. Every 14 days or more frequently as needed or directed.
  1. Upon approval, active work areas scheduled for re-disturbance may be left unstabilized for 14-Day periods if erosion is not occurring or imminent.
  2. A minimum of 1 Day before expected rain events.
  3. At the end of each Day during wet periods.
  4. As an emergency measure when rain is falling on unprotected areas.

5. When wind or vehicle traffic is visibly causing more than minor dust.
6. At finish grade when working outside the permanent seeding dates.

### **3.06 CLEAN UP**

- A. Remove temporary measures after permanent measures have been installed within 30 days of the notification of acceptance of permanent stabilization, unless permitted to remain by Owner.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

### **3.07 PERMANENT STABILIZATION**

- A. Permanently stabilize exposed Soil surfaces at finished grade. Perform permanent stabilization at each completed excavation and embankment area except for areas that are scheduled to be redisturbed.
- B. If seeded areas are not sufficiently stabilized by an established stand of vegetation according to Oregon Standard Specifications for Construction 2021 Section 01030.60, or if the Soil surface is not sufficiently protected with temporary stabilization ESC by October 1 of each year, do the following:
  1. Use ESC necessary to redirect water flows away from disturbed areas.
  2. Re-grade disturbed areas to finish grade.
  3. Apply permanent seeding at the original specified rate.
  4. Apply permanent mulching or matting.

### **MONITORING AND RESPONSIBILITY**

The contractor is responsible for monitoring and complying with the requirements of the plan. Compliance with all aspects of this plan, required reporting and compliance with state and federal laws is the responsibility of the contractor. Any financial impact arising from the failure of the contractor to perform their duties and responsibilities rests fully with the contractor. Any resulting financial impacts to the owner will be assessed against the contractor.

### **END OF SECTION**

**SECTION 01 58 13  
TEMPORARY PROJECT SIGNAGE**

**PART 1 GENERAL**

**1.01 Project Sign**

- A. The Contractor shall install a STATE provided funding sign for the project. Location shall be determined by the Owner. The sign shall be maintained in good condition throughout the construction period. The Contractor shall remove the sign prior to final completion and project acceptance. Information on the sign requirements can be found at:  
[https://www.epa.gov/sites/default/files/2015-01/documents/signage\\_required\\_tc.pdf](https://www.epa.gov/sites/default/files/2015-01/documents/signage_required_tc.pdf)

**PART 2 PRODUCTS**

- A. To be provided by the State of Oregon
  - 1. There are two posters Business Oregon provided two posters, one 11x17 and an 8.5x11. These could be placed on a job site bulletin board.
- B. Invest in America sign is 48"x72"
  - 1. <https://www.whitehouse.gov/wp-content/uploads/2023/02/Investing-in-America-Brand-Guide.pdf>
  - 2. <https://www.epa.gov/invest/investing-america-signage>

**PART 3 EXECUTION**

**3.01 Installation**

- A. Install sign surface plumb and level, on pressure treated posts sufficient to withstand coastal weather impacts for one year. Anchor securely.

**END OF SECTION**

## **SECTION 02 00 00 MOBILIZATION**

### **PART 1 GENERAL**

#### **1.01 SCOPE**

1. This Work consists of operations and preparatory Work necessary to become ready to perform the Work or an item of Work.

#### **1.02 RELATED REQUIREMENTS**

1. Section 01 22 00 – Unit Prices
2. Section 01 30 50 – Web Based Construction Management Software

#### **1.03 DESCRIPTION**

Mobilization includes, but is not limited to, the following:

1. Performed in accordance with the Oregon Standard Specifications for Construction 2021 Section 00210, 2021 or current edition. Mobilization costs shall include home office support, mobilizing and demobilizing from the site, general supervision, bonds, insurance and other items not covered in the following bid items. Payment shall be as described in the Payment section (00210.90).
- 2 Obtaining and maintaining access to the Web Based Construct Management (WBCM) software

### **PART 2 PRODUCTS**

NA

### **PART 3 EXECUTION**

NA

### **PART 4 MEASUREMENT AND PAYMENT**

1. No separate measurement of quantities will be made for Work performed under this Section.
2. Payment for mobilization will be made at the Contract lump sum amount for the item "Mobilization".
3. The amounts paid for mobilization in the Contract progress payment will be calculated and based on the percent of the original Contract Amount that is earned from other Contract items, not including advances on Materials, and as follows:
  1. When 5 percent is earned, either 50 percent of the amount for mobilization or 5 percent of the original Contract Amount, whichever is the least.
  2. When 10 percent is earned, either 100 percent of mobilization or 10 percent of the original Contract Amount, whichever is the least.
  3. When all Work is completed, amount of mobilization exceeding 10 percent of the original Contract Amount.
  4. This schedule of mobilization progress payments will not limit or preclude progress payments otherwise provided by the Contract.
  5. Payment will be included in payment made for the appropriate items under which this Work is required.
4. No separate or additional payment will be made for any costs associated with obtaining and maintaining access to the Web Based Construct Management (WBCM) software.

**END OF SECTION**

## **SECTION 02 41 00 DEMOLITION**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.
- C. Abandonment and removal of existing utilities and utility structures.
- D. Sawcutting of existing surfaces.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 57 13 - Temporary Erosion and Sediment Control.
- D. Section 31 22 00 - Grading
- E. Section 31 23 16 - Excavation & Borrow

#### **1.03 DEFINITIONS**

- A. Demolition: Dismantle, raze, destroy or wreck any structure or part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.
- C. Remove and Reinstall: Detach or dismantle items from existing construction in a manner to prevent damage. Clean and prepare for reuse and reinstall where indicated.
- D. Existing: Designation for existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

#### **1.04 REFERENCE STANDARDS**

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS - NA**

### **PART 3 EXECUTION**

#### **3.01 DEMOLITION**

- A. Remove paving and curbs required to accomplish new work.
- B. Remove other items indicated, for salvage, salvage and reinstall, and removal.
- C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 23 16.
- D. Sawcutting of concrete shall be performed with a concrete cutting saw designed for that work. Cutting shall be performed at right angles and square corners. The Contractor shall score the concrete a minimum of 1.5" deep for removal.

### 3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Use of explosives is not permitted.
  - 3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 4. Provide, erect, and maintain temporary barriers and security devices.
  - 5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 7. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
  - 8. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
  - 9. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements to remain in place and are not removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.
- D. Hazardous Materials:
  - 1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
  - 2. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.
- E. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

### 3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
  - 1. Pacific Power and Light – Work on the main reservoir – Contact Information: Marilyn Brockey, [Marilyn.Brockey@pacificorp.com](mailto:Marilyn.Brockey@pacificorp.com)
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 2 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, equipment, supports, and foundations of disconnected and abandoned utilities.

### **3.04 SELECTIVE DEMOLITION FOR ALTERATIONS**

- A. Existing construction and utilities indicated on drawings are based on field observation and existing record documents only.
  - 1. Verify construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Engineer before disturbing existing installation.
  - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Remove existing work as indicated and required to accomplish new work.
  - 1. Remove items indicated on drawings.
- C. Services including, but not limited to, Storm Sewer, Sanitary, Watermain, , Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
  - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
  - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  - 3. Remove abandoned pipe, conduits, and equipment. Remove back to source of supply where possible, otherwise cap stub
- D. Protect existing work to remain.
  - 1. Prevent movement of structure. Provide shoring and bracing as required.
  - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
  - 4. Patch to match new work.

### **3.05 DEBRIS AND WASTE REMOVAL**

- A. Remove debris and trash from site.
- B. Remove materials not to be reused on site.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

### **3.06 REPAIR AND CORRECTION**

- A. If additional concrete is damaged the concrete shall be re-cut as described in Section 3.01. All costs for recutting and additional concrete shall be borne by the contractor.

**END OF SECTION**



**SECTION 03 41 00**  
**STRUCTURAL PRECAST CONCRETE**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Precast concrete for structures
- B. Cast-in-place concrete that is replaced at the Contractor's option with structural precast concrete

**1.02 RELATED TECHNICAL SPECIFICATIONS SECTIONS**

- A. Electrical boxes as specified in Section 26 05 33.16 Boxes for Electrical Systems
- B. Precast concrete structures for utilities are specified in Section 33 05 16 - Utility Structures.
- C. Portland-cement concrete is specified in Section 32 13 13 - Portland Cement Concrete.

**1.03 MEASUREMENT AND PAYMENT**

Separate measurement or payment will be made for Work required under the Unit Price Section 01 20 00. All costs in connection with the Work specified in this Technical Specifications Section will be considered to be included with the related item of Work in the Price Schedule or incidental to other Work.

**1.04 REFERENCES**

**A. American Concrete Institute (ACI)**

- |                 |   |
|-----------------|---|
| 1. ACI 117      | Specifications for Tolerances for Concrete Construction and Materials |
| 2. ACI 301      | Specifications for Structural Concrete                                |
| 3. ACI 318/318R | Building code Requirements for Concrete and Commentary                |

**B. ASTM International (ASTM):**

- |                    |  |
|--------------------|--|
| 1. ASTM A123       | Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products                              |
| 2. ASTM A153/A153M | Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware  |
| 3. ASTM C31/C31M   | Standard Practice for Making and Curing Concrete Test Specimens in the Field                                 |
| 4. ASTM C39/C39M   | Test Method for Compressive Strength of Cylindrical Concrete Specimens                                       |
| 5. ASTM C877       | Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections               |
| 6. ASTM C1433      | Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers |

**C. Precast/Prestressed Concrete Institute (PCI):**

- |                |  |
|----------------|--|
| 1. PCI MNL 116 | Manual for Quality Control for Plants and Production of Structural Precast Concrete Products |
| 2. PCI MNL 135 | Tolerances for Precast and Prestressed Concrete Construction                                 |

**D. State of Oregon, Department of Transportation**

- |                   |   |
|-------------------|---|
| 1. Manholes       | Shall conform to Section 00470 and Section 02450 of the State of Oregon Standard Specifications for Construction, current edition |
| 2. Precast Vaults | Shall be Rogue Valley Precast, Columbia Precast, Oldcastle, Utility Vault or approved equal                                       |

## **1.05 SUBMITTALS**

- A. Shop Drawings and Calculations: Submit Shop Drawings showing the following:
1. Detailed drawings of units, members, and components, showing dimensions and sections of each.
  2. Shop Drawings shall show complete details and substantiating calculations of the method and materials the Contractor proposes to use, including quantities, dimensions, and locations of sleeves, anchors, brackets, inserts, reglets, reinforcing steel, lift devices, accessories, and methods of securing same in forms.
  3. Casting, consolidating, and finishing procedures.
  4. Shop Drawings and calculations shall be stamped and wet signed by a structural engineer registered in the State of Oregon.
- B. Mix Designs:
1. Mix designs shall be submitted for each class of concrete on the job and shall show names and brands of all materials, proportions, slump, strength, gradation of coarse and fine aggregates, admixtures, amount of water, and the like. The proposed location where the mix will be used on job, (i.e. specific vaults, culvert concrete, and the like) shall be clearly indicated at the top of all proposed mix design sheets.
  2. Each mix design submittal, for concrete designated by strength, shall be accompanied by certified test data or trial batch test reports in accordance with the requirements of these Technical Specifications.
- C. Product Data: Submit manufacturer's product data of manufactured products and accessories. Include manufacturer's detailed drawings and dimensions when applicable.
- D. Samples: No samples required
- E. Supplier
1. Approved suppliers shall be Rogue Valley Precast, Oldcastle Concrete Products, Utility Vault or approved equal
  2. Provide the name of the precasting firm, the concrete plants to be used, and any concrete testing firm to be used;
- F. Certificates:
1. Submit evidence of current plant certification under the PCI Plant Certification Program, the Caltrans Precast Fabrication Qualification Audit Program, or approval by the International Code Council (ICC).
- G. Laboratory Test Reports:
1. Laboratory test reports for concrete mix designs shall clearly identify each material or mix number of each mix tested to verify the correlation between the tested mix designs and the proposed mix designs.

## **1.06 QUALITY ASSURANCE**

- A. Qualifications of Fabricator: Fabricator of precast concrete products shall be an active and approved participant in the PCI Plant Certification Program, the Precast Fabrication Qualification Audit Program, or an International Code Council (ICC) approved precast fabricator.

- B. Tolerances: Fabricate and erect precast concrete members within the tolerances recommended in PCI MNL-116 and PCI MNL-135.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Transport, handle, and store units in a manner that will prevent damage to the members.
- B. If storage of precast units at the site is necessary, store units in a manner that will prevent cracking, distortion, staining, or other damage. Support members at their normal support points.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Reinforcing Steel: Comply with applicable requirements of Technical Specifications Section 03 20 00 - Concrete Reinforcing.
- B. Portland Cement Concrete:
1. Comply with applicable requirements of Section 32 13 13 - Portland Cement Concrete. Provide class of concrete.
- C. Anchors, Lift Devices, and Accessories:
1. Provide concrete inserts, reglets, anchors, brackets, and fasteners as indicated or required for fabrication and installation work. All items shall be galvanized in accordance with ASTM A153/A153M or ASTM A123/A123M, as applicable. Contractor shall select the lift devices, and shall be responsible for their performance and for any damage resulting from the use of faulty or inferior devices. Lift devices shall not be visible on exposed faces of precast members.

### **2.02 FABRICATION**

- A. Requirements and Standards:
1. Manufacture precast concrete units in accordance with PCI MNL-116, and applicable requirements of ACI 318/318R, Chapter 16.
  2. Forms shall be accurately constructed to produce members to dimension, shape, configuration, and profile indicated. When not otherwise indicated, construct forms to produce smooth concrete.
  3. Concrete reinforcement, lifting reinforcement, and concrete inserts and anchorage devices shall be placed and secured against movement as required.
  4. Concrete shall be placed and consolidated to shape, configuration, and dimensions indicated.
  5. Members shall be moist cured in accordance with curing requirements specified in PCI MNL-116. Minimum curing period for combined initial curing and secondary curing shall be seven Days or until the specified strength of concrete is attained.
  6. For those items not exposed to public view, provide "smooth form finish".
  7. Markings: Provide permanent markings in precast units to identify pick-up points and orientation in the structure, conforming with the markings indicated on Shop Drawings. Imprint the date of casting on each precast unit where it will not show in the finished structure.

## **PART 3 - EXECUTION**

### **3.01 EXAMINATION**

- A. Examine all parts of the supporting structure and the conditions under which the precast concrete units are to be erected and installed. Verify the locations of anchors to pre-determine the accuracy of the installation of each member.

### **3.02 ERECTION/INSTALLATION**

- A. Transport and erect precast concrete units in accordance with PCI MNL-116 and as specified herein.
- B. Erect precast concrete units and accurately install in place with mechanical hoisting equipment more than adequate for the loads.
- C. Maintain precast concrete unit in upright position at all times. Handle unit only by indicated lifting devices or cushioned pads, and in a manner that will not overstress or damage the unit.
- D. Erect precast concrete units in accordance with indicated erection tolerances and the requirements of ACI 117. Comply with erection sequences indicated. Position units to avoid eccentric application of forces, and make complete and uniform contact with bearing surfaces.
- E. At completion, units shall be plumb, level, and square, true to line, with angles and edges parallel with related building lines.
- F. Precast reinforced concrete box culvert structures shall be in place and plumb prior to pouring associated appurtenant structures. Dowel extensions shall be cast into the structures as a means of anchorage as detailed on the Construction Drawings.
- G. Precast structures shall not be backfilled until the installation has been inspected and approved. Structures backfilled prior to approval shall be uncovered and re-backfilled at the Contractor's expense.

**END OF SECTION**

## SECTION 25 05 48

### SEISMIC EVENT DETECTION AND ALARM SYSTEM

#### PART 1 – GENERAL

##### 1.01 SUMMARY

- A. This contract includes the provision and implementation of equipment to trigger the automatic activation of isolation valves on select reservoirs and at select locations within the distribution system. The valves will be automatically activated by the USGS. ShakeAlert® Earthquake Early Warning system. The ShakeAlert system is the overall system. The ShakeAlarm consists of the individual hardware components for the installation.
- B. The isolation valves for the reservoirs and the distribution network are to be closed or throttled following a seismic event of significant size that has been Alerted by the ShakeAlert® System. The Alert signal originates at the USGS servers and is passed through a Cloud-Based communication system to a ShakeAlarm© controller that resides at Cannon Beach which is in turn connected to the Cannon Beach Water SCADA system. Following the detection of a damaging earthquake the ShakeAlarm© controller sends a signal to the SCADA system and the SCADA system performs the tasks necessary to send the alarm signal to the reservoir and distribution system RTU/PLC equipment to close or throttle the valves.
- C. The work required is generally shown on the plans and described below:
  - 1. The USGS ShakeAlert® system is in-service now.
  - 2. The Cloud-based communication connection and the ShakeAlarm© controller are to be provided in this contract.
  - 3. The SCADA equipment at the Cannon Beach office where the ShakeAlarm© controller is to be located is in-service now. Some programming will need to occur in the SCADA Master to accept the alarm signal from the ShakeAlarm© controller and that work is required in this contract. In addition, some wiring will need to occur to connect the ShakeAlarm© controller to the SCADA Master. That work is required in this contract.
  - 4. The PLC/RTU equipment at the reservoirs where the automatic valves are located is in-service now. Some programming will need to occur in the PLC/RTU system to accept the alarm signal from the SCADA master and that work is required in this contract. In addition, some wiring will need to occur to connect the PLC/RTU controller to the automatic valve. That work is required in this contract.
  - 5. The PLC/RTU equipment in the distribution system where the automatic valves are located must be provided in this contract. In addition, some programming will need to occur in the PLC/RTU system to accept the alarm signal from the SCADA master and that work is required in this contract. In addition, some wiring will need to occur to connect the PLC/RTU controller to the automatic valve. That work is required in this contract.
  - 6. The reservoir and distribution system automatic valves are required in this contract.

## 1.02 SUBMITTALS

Provide the following information:

- A. Bill of Materials
- B. Statement of Compliance with the Plans and Specifications
- C. System Block Diagram
- D. Manufacturer's Cutsheets and Drawings for the ShakeAlarm® controller panel, Cloud-based Network connections, Seismic sensor, USGS License to Operate and other pertinent documentation
- E. Scaled drawing of ShakeAlarm© controller and mounting details
- F. Scaled drawing of the seismic sensor and mounting details
- G. User manual and installation instructions
- H. Training materials to be used with the Owner's personnel.
- I. As-Built redlines and fully drafted final documentation (following installation and startup).

## PART 2 – PRODUCTS

### 2.02 GENERAL

- A. All materials incorporated into the project shall be for the purpose described in this Specification and meet the requirements of the various applicable sections of the Plans and Specifications.

### 2.03 QUALIFICATIONS

- A. The supplier of the ShakeAlarm© system shall have as its primary business activity the manufacturing and servicing of Earthquake Early Warning systems. In addition, the supplier shall hold a current License to Operate from the USGS for commercial applications of the ShakeAlert® Earthquake Early Warning system.
- B. Manufacturer shall have other Washington and Oregon installations where the Owner can reference the system and its performance and service levels.
- C. The supplier shall be Varius Inc. using the ShakeAlarm© system, no equal. (425-269 8479, dan.ervin@variusinc.com).

### 2.04 PRODUCTS

- A. License to Operate
  - 1. The supplier shall hold a current License to Operate from the USGS for access to the west-coast ShakeAlert® Earthquake Early Warning system.

## B. ShakeAlarm® Controller

1. The Contractor shall provide one ShakeAlarm© controller that takes input from the USGS ShakeAlert® servers (at the University of Washington, Caltech and Cal-Berkeley) using an internet-connected Cloud-based application, through a firewall and connects to the existing Water SCADA system using an air-gapped alarm connection. The ShakeAlarm© controller shall be capable of analyzing the USGS alert signal, filtering alerts that will not result in damaging shaking, filtering potential false alarms, and closing one of two air-gapped dry contact relays that connect to the master SCADA system.
2. The ShakeAlarm© controller shall include a triaxial seismic sensor suitable for detecting strong-motion seismic waves indicative of earthquake P and S waves.
3. The ShakeAlarm® controller shall be mounted on a panel that is suitable for wall mounting adjacent to the SCADA Master and includes connections for the internet, SCADA alarms, an on-site seismic sensor, and 120vac power.
4. The ShakeAlarm© controller shall have as a standard feature sufficient waveform processing capability to detect seismic P waves and to discriminate P-waves from background noise and environmental vibrations. This capability shall be used to isolate seismic P-waves, both spectrally and temporally, with the intent to provide a real-time false alarm filter on the ShakeAlert® alert signal.
5. The ShakeAlarm© controller panel shall have system Test and alarm Reset buttons.
6. The ShakeAlarm© controller shall be continuously monitored for uptime and data integrity. Any faults or communication loss shall be noticed and communicated to the Owner within 15 minutes.

## C. Seismic Sensor

1. An on-site, independent seismic sensor shall be provided that serves as a confirming signal to the ShakeAlert® alert signal. The sensor shall be a Model AS-0566-01 Triaxial MEMS Accelerometer manufactured by TerraScience Systems. The unit shall connect via cable to the ShakeAlarm® controller. The unit shall be “grounded” as shown on the plans.

## PART 3 – EXECUTION

### 3.01 GENERAL

#### A. Delivery

1. Manufacturer shall coordinate with the Owner, System Integrator, and Electricians for the proper care of components during transportation and preparation for installation.

#### B. Installation

1. The ShakeAlarm© controller shall be wall mounted using brackets supplied by Varius. Mounting shall be performed by the Contractor.

2. The Seismic Sensor shall be installed on a building structural component as recommended by the Manufacturer and the mount shall constitute a “mechanical ground”.
3. The Contractor shall prepare a mounting location for the ShakeAlarm© controller and provide for power and communication connections within 6’ of the mounting location. Varius will provide a mounting panel that measures approximately 18” tall by 24” wide. The Contractor will mount this panel to a wall within 8’ of the SCADA master within 72” of a standard 120VAC wall outlet and a standard RJ45 internet connection, and within 25’ of the building’s concrete foundation.
4. The Contractor shall prepare a mounting location for the seismic sensor within 25’ of the ShakeAlarm® controller location. Varius will deliver an aluminum plate that must be bolted to the concrete foundation. The sensor will connect to this aluminum plate.
5. When the mounting location is ready and the board is mounted, Varius will deliver, install, and connect the ShakeAlarm© controller. Following installation, Varius will perform site testing and diagnostics to ensure the unit is online and operational.
6. The Contractor is responsible for ensuring that the Owner has established the following internet firewall settings prior to installation of the ShakeAlarm© controller.

Required firewall active settings:

Service	Address	Port	Direction
Network Check	google.com (8.8.8.8)	--	Inbound/Outbound
WJE SSH Tunnel	remote.weir-jones.com	22	Outbound
Dashboard	dashboard.weir-jones.com	7443	Outbound
Health Monitor	remote.weir-jones.com	40085	Outbound
Email	smtp.office365.com	587	Outbound

7. The Contractor is responsible for providing cable from the SCADA Master to the ShakeAlarm© controller for alarm activation. The cable shall include two pair (four wires total) of #16 AWG, twisted, shielded signal cable. The first pair of cables shall connect to the N.O. Open terminals of Relay 1 and the second pair of cables shall connect to the N.O. Open terminals of Relay 2 on the ShakeAlarm© controller.

### 3.02 TESTING AND COMMISSIONING

- A. The Contractor is expected to provide the following programming/logic (in the SCADA system and independent of the ShakeAlarm© controller) in order to initiate automatic valve operation following an alarm condition:
- B. Any interface or programming necessary to connect to the ShakeAlarm© controller and initiate program subroutines following relay activation in the ShakeAlarm© controller. Both N.O. and N.C. connections are available for each relay and the Contractor may use either configuration. (Connections are 12 VDC or 120 VAC, 5 amps max)
  1. Alarm initiation, control initiation, and reset subroutine time delays to prevent nuisance tripping and filter-out anomalous relay activation or noise in the connection network.



2. Discrimination of the field actions to be taken based on the actual operating conditions in the system (for example, determining whether a valve is open or closed before initiating valve shutdown sequences, determining the position of a valve before initiating valve re-positioning, etc.)
  3. Providing feedback to operators regarding system status, alarm activation, alarm condition, actions taken, reset, etc.
  4. Control Logic and programming to initiate a system test following activation of BOTH relays on the ShakeAlarm® controller (with appropriate time delays to prevent nuisance tripping and to discriminate between a “RESET” and an alarm). The actual test actions and sequence will be defined by the user.
  5. Control logic to reset the system after an alarm has cleared and return system control to normal operation. The “RESET” is initiated from the ShakeAlarm® controller by unlatching the control relays.
- C. Following installation, Varius shall simulate alarm conditions and verify that the appropriate valve actions have been completed. Varius will also test the efficacy and the stability of the Cloud and USGS connection and provide a report to the Owner.
- D. Following a successful test and startup Varius will place the ShakeAlarm® controller in service and provide a letter to the Owner indicating the ShakeAlarm® controller is online and operational. Varius will provide operational training directly to the Owner’s staff.

#### **END OF SECTION**

**SECTION 26 05 19**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Wiring connectors.
- C. Electrical tape.
- D. Wire pulling lubricant.
- E. Cable ties.

**1.02 REFERENCE STANDARDS**

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- J. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- K. UL 267 - Outline of Investigation for Wire-Pulling Compounds Most Recent Edition, Including All Revisions.
- L. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- M. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- N. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

**PART 2 PRODUCTS**

**2.01 CONDUCTOR AND CABLE APPLICATIONS**

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

## **2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductor Material:
  - 1. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
  - 2. Tinned Copper Conductors: Comply with ASTM B33.
- H. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
  - 3. Color Code:
    - a. 240/120 V, 1 Phase, 3 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.
    - c. For control circuits, comply with manufacturer's recommended color code.

## **2.03 SINGLE CONDUCTOR BUILDING WIRE**

- A. Manufacturers:
  - 1. Copper Building Wire:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
    - b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
    - c. General Cable Technologies Corporation: [www.generalcable.com/#sle](http://www.generalcable.com/#sle).
    - d. Service Wire Co: [www.servicewire.com/#sle](http://www.servicewire.com/#sle).
    - e. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
  - 1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid.
    - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
  - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

## **2.04 WIRING CONNECTORS**

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

## **2.05 ACCESSORIES**

- A. Electrical Tape:
  - 1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- B. Wire Pulling Lubricant:
  - 1. Listed and labeled as complying with UL 267.
  - 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
  - 3. Suitable for use at installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### **3.03 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Installation in Raceway:
  - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  - 2. Pull all conductors and cables together into raceway at same time.
  - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
  - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- D. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- E. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- F. Install conductors with a minimum of 12 inches of slack at each outlet.
- G. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- H. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- I. Make wiring connections using specified wiring connectors.
  - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.

2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  3. Do not remove conductor strands to facilitate insertion into connector.
  4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
- J. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- K. Insulate ends of spare conductors using vinyl insulating electrical tape.
- L. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

**END OF SECTION**

**SECTION 26 05 26**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground rod electrodes.
- E. Ground access wells.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2022.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

**PART 2 PRODUCTS**

**2.01 GROUNDING AND BONDING REQUIREMENTS**

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
  - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.
  - 2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

F. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
  - a. Provide continuous grounding electrode conductors without splice or joint.
  - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
  - a. Provide connection to underground metal water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
  - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
  - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Ground Rod Electrode(s):
  - a. Provide two electrodes unless otherwise indicated or required.
  - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
  - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
  - d. Provide ground access well for each electrode.
4. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

G. Service-Supplied System Grounding:

1. For each service disconnect, provide grounding electrode conductor to connect neutral (grounded) service conductor to grounding electrode system. Unless otherwise indicated, make connection at neutral (grounded) bus in service disconnect enclosure.
2. For each service disconnect, provide main bonding jumper to connect neutral (grounded) bus to equipment ground bus where not factory-installed. Do not make any other connections between neutral (grounded) conductors and ground on load side of service disconnect.

H. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

## 2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
  - 1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.
      - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
  - 1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  - 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
  - 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Rod Electrodes:
  - 1. Comply with NEMA GR 1.
  - 2. Material: Copper-bonded (copper-clad) steel.
  - 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.
- E. Ground Access Wells:
  - 1. Description: Open bottom round or rectangular well with access cover for testing and inspection; suitable for the expected load at the installed location.
  - 2. Size: As required to provide adequate access for testing and inspection, but not less than minimum size requirements specified.
  - 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 10 inches.
  - 4. Cover: Factory-identified by permanent means with word "GROUND".

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.
  - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
  - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 26 05 53.

### **END OF SECTION**



**SECTION 26 05 29  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

**1.02 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.

**PART 2 PRODUCTS**

**2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
  - 1. Comply with the following. Where requirements differ, comply with most stringent.
    - a. NFPA 70.
    - b. Requirements of authorities having jurisdiction.
  - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
  - 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
  - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - 5. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
    - a. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    - b. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - c. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.

**END OF SECTION**

**SECTION 26 05 33.13  
CONDUIT FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Stainless steel rigid metal conduit (RMC).
- C. PVC-coated galvanized steel rigid metal conduit (RMC).
- D. Rigid polyvinyl chloride (PVC) conduit.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

**1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- K. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- M. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel Current Edition, Including All Revisions.
- N. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.
- O. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- P. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

**PART 2 PRODUCTS**

**2.01 CONDUIT APPLICATIONS**

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.

- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC), PVC-coated galvanized steel rigid metal conduit (RMC), or rigid PVC conduit.
  - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), PVC-coated galvanized steel rigid metal conduit, or rigid PVC conduit.
  - 3. Where rigid polyvinyl chloride (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) or stainless steel rigid metal conduit (RMC) where emerging from underground.

## **2.02 CONDUIT - GENERAL REQUIREMENTS**

- A. Comply with NFPA 70.
- B. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for purpose intended.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## **2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
  - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
  - 2. Material: Use steel or malleable iron.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

## **2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.
- B. Fittings:
  - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
  - 2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
  - 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

## **2.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.
- C. PVC-Coated Boxes and Fittings:
  - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
  - 2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
  - 3. Material: Use steel or malleable iron.
  - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

## **2.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT**

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- B. Fittings:
  - 1. Manufacturer: Same as manufacturer of conduit to be connected.
  - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.
- F. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- G. Conduit Support:
  - 1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 05 29.
  - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Connections and Terminations:
  - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  - 3. Use suitable adapters where required to transition from one type of conduit to another.
  - 4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  - 5. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
  - 6. Secure joints and connections to provide mechanical strength and electrical continuity.
- I. Penetrations:
  - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  - 4. Conceal bends for conduit risers emerging above ground.
  - 5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  - 6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
- J. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
  3. Where conduits are subject to earth movement by settlement or frost.
- K. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
    - a. Where conduits enter building from outside.
    - b. Where service conduits enter building from underground distribution system.
    - c. Where conduits enter building from underground.
    - d. Where conduits may transport moisture to contact live parts.
  2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
    - a. Where conduits pass from outdoors into conditioned interior spaces.
    - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- L. Provide grounding and bonding; see Section 26 05 26.

**END OF SECTION**

**SECTION 26 05 33.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Underground boxes/enclosures.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. SCTE 77 - Specifications for Underground Enclosure Integrity 2017.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

**PART 2 PRODUCTS**

**2.01 BOXES**

- A. General Requirements:
  - 1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  - 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  - 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  - 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
  - 1. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  - 2. Use suitable concrete type boxes where flush-mounted in concrete.
  - 3. Use raised covers suitable for the type of wall construction and device configuration where required.
  - 4. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
  - 1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  - 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
  - 3. Junction and Pull Boxes Larger Than 100 cubic inches:
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
- D. Underground Boxes/Enclosures:
  - 1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
  - 2. Size: As indicated on drawings.
  - 3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
  - 4. Applications:
    - a. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
  - 5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Box Supports:
  - 1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
  - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- F. Install boxes plumb and level.
- G. Flush-Mounted Boxes:
  - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
  - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

- H. Install boxes as required to preserve insulation integrity.
- I. Underground Boxes/Enclosures:
  - 1. Install enclosure on gravel base, minimum 6 inches deep.
  - 2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
- J. Close unused box openings.
- K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- L. Provide grounding and bonding in accordance with Section 26 05 26.

**END OF SECTION**



**SECTION 26 05 48**  
**VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Vibration isolation requirements.
- B. Seismic control requirements.

**1.02 DEFINITIONS**

- A. Electrical Component: Where referenced in this section in regards to seismic controls, applies to any portion of the electrical system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., conduit, cable tray).
- B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

**1.03 REFERENCE STANDARDS**

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.
- C. FEMA 413 - Installing Seismic Restraints for Electrical Equipment 2004.
- D. FEMA E-74 - Reducing the Risks of Nonstructural Earthquake Damage 2012.
- E. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Design Documents: Prepare and submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, details, and calculations.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
  - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
  - 2. Seismic Controls: Include seismic load capacities.

**1.05 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with applicable building code.

**PART 2 PRODUCTS**

**2.01 VIBRATION ISOLATION REQUIREMENTS**

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing electrical equipment and/or electrical connections to vibration-isolated equipment.
- B. General Requirements:

1. Select vibration isolators to provide required static deflection.
  2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
  3. Select seismic type vibration isolators to comply with seismic design requirements, including conditions of equipment seismic certification where applicable.
- C. Conduit Isolation:
1. Use flexible conduit or cable for electrical connections to vibration-isolated equipment, including equipment installed under other sections or by others.

## **2.02 SEISMIC CONTROL REQUIREMENTS**

- A. Design and provide electrical component restraints, supports, and attachments suitable for seismic loads determined in accordance with applicable codes, as well as gravity and operating loads and other structural design considerations of the installed location. Consider wind loads for outdoor electrical components.
- B. Seismic Design Criteria: ICC (IBC).
- C. Seismic Restraints:
1. Provide seismic restraints for electrical components except where exempt according to applicable codes and specified seismic design criteria, as approved by authorities having jurisdiction.
  2. Comply with applicable general recommendations of the following, where not in conflict with applicable codes, seismic design criteria, or other specified requirements:
    - a. ASHRAE (HVACA).
    - b. FEMA 413.
    - c. FEMA E-74.
    - d. SMACNA (SRM).
  3. Seismic restraint capacities to be verified by a Nationally Recognized Testing Laboratory (NRTL) or certified by an independent third-party registered professional engineer acceptable to authorities having jurisdiction.
- D. Seismic Attachments:
1. Attachments to be bolted, welded, or otherwise positively fastened without consideration of frictional resistance produced by the effects of gravity.
  2. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) or qualified evaluation service acceptable to authorities having jurisdiction for compliance with applicable building code, and qualified for seismic applications; concrete anchors to be qualified for installation in both cracked and uncracked concrete.
  3. Do not use power-actuated fasteners.
  4. Do not use friction clips (devices that rely on mechanically applied friction to resist loads). Beam clamps may be used for supporting sustained loads where provided with restraining straps.
  5. Comply with anchor minimum embedment, minimum spacing, minimum member thickness, and minimum edge distance requirements.
  6. Concrete Housekeeping Pads:
    - a. Increase size of pad as required to comply with anchor requirements.
    - b. Provide pad reinforcement and doweling to ensure integrity of pad and connection and to provide adequate load path from pad to supporting structure.
- E. Seismic Interactions:
1. Include provisions to prevent seismic impact between electrical components and other structural or nonstructural components.
  2. Include provisions such that failure of a component, either essential or nonessential, does not cause the failure of an essential component.
- F. Seismic Relative Displacement Provisions:
1. Use suitable fittings or flexible connections to accommodate:

- a. Relative displacements at connections between components, including distributed systems (e.g., conduit, cable tray); do not exceed load limits for equipment utility connections.
- b. Relative displacements between component supports attached to dissimilar parts of structure that may move differently during an earthquake.
- c. Design displacements at seismic separations.
- d. Anticipated drifts between floors.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install products in accordance with applicable requirements of NECA 1 (general workmanship).
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Secure fasteners according to manufacturer's recommended torque settings.
- E. Install flexible conduit and cable connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- F. Vibration Isolation Systems:
  - 1. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
  - 2. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
  - 3. Adjust isolators to be free of isolation short circuits during normal operation.
  - 4. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.
- G. Seismic Controls:
  - 1. Provide specified snubbing element air gap; remove any factory-installed spacers, debris or other obstructions.
  - 2. Use only specified components, anchorage, and hardware evaluated by seismic design. Comply with conditions of seismic certification where applicable.
  - 3. Where mounting hole diameter exceeds bolt diameter by more than 0.125 inch, use epoxy grout, elastomeric grommet, or welded washer to reduce clearance to 0.125 inch or less.
  - 4. Equipment with Sheet Metal Housings:
    - a. Use Belleville washers to distribute stress over a larger surface area of the sheet metal connection interface as approved by manufacturer.
    - b. Attach additional steel as approved by manufacturer where required to transfer loads to structure.
    - c. Where mounting surface is irregular, do not shim housing; reinforce housing with additional steel as approved by manufacturer.
  - 5. Concrete Housekeeping Pads:
    - a. Size in accordance with seismic design to meet anchor requirements.
    - b. Install pad reinforcement and doweling in accordance with seismic design to ensure integrity of pad and associated connection to slab.

### **END OF SECTION**

**SECTION 26 05 53**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Warning signs and labels.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

**1.03 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

**PART 2 PRODUCTS**

**2.01 IDENTIFICATION REQUIREMENTS**

- A. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Panelboards:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.
      - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
      - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
    - b. Enclosed switches, circuit breakers, and motor controllers:
      - 1) Identify voltage and phase.
      - 2) Identify power source and circuit number. Include location when not within sight of equipment.
      - 3) Identify load(s) served. Include location when not within sight of equipment.
    - c. Electricity Meters:
      - 1) Identify load(s) metered.
  - 2. Service Equipment:
    - a. Use identification nameplate to identify each service disconnecting means.
    - b. For buildings or structures supplied by more than one service, or any combination of branch circuits, feeders, and services, use identification nameplate or means of identification acceptable to authority having jurisdiction at each service disconnecting means to identify all other services, feeders, and branch circuits supplying that building or structure. Verify format and descriptions with authority having jurisdiction.
  - 3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.

- a. Service equipment.
  - b. Industrial control panels.
- B. Identification for Conductors and Cables:
  - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
  - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
  - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    - a. At each source and load connection.
    - b. Within boxes when more than one circuit is present.
    - c. Within equipment enclosures when conductors and cables enter or leave the enclosure.

## **2.02 IDENTIFICATION NAMEPLATES AND LABELS**

- A. Identification Nameplates:
  - 1. Materials:
    - a. Indoor Clean, Dry Locations: Use plastic nameplates.
    - b. Outdoor Locations: Use stainless steel nameplates suitable for exterior use.
  - 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
  - 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
  - 4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
  - 1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
  - 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

## **2.03 WIRE AND CABLE MARKERS**

- A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- C. Legend: Power source and circuit number or other designation indicated.
- D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- E. Minimum Text Height: 1/8 inch.
- F. Color: Black text on white background unless otherwise indicated.

## **2.04 WARNING SIGNS AND LABELS**

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
  - 1. Materials:
  - 2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
  - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
  1. Surface-Mounted Equipment: Enclosure front.
  2. Flush-Mounted Equipment: Inside of equipment door.
  3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
  4. Elevated Equipment: Legible from the floor or working platform.
  5. Branch Devices: Adjacent to device.
  6. Interior Components: Legible from the point of access.
  7. Conductors and Cables: Legible from the point of access.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Mark all handwritten text, where permitted, to be neat and legible.

### **END OF SECTION**

**SECTION 26 21 00**  
**LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical service requirements.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

**1.03 DEFINITIONS**

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

**1.04 REFERENCE STANDARDS**

- A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)) 2023.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.05 ADMINISTRATIVE REQUIREMENTS**

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
  - 1. Verify the following with Utility Company representative:
    - a. Utility Company requirements, including division of responsibility.
    - b. Exact location and details of utility point of connection.
    - c. Utility easement requirements.
    - d. Utility Company charges associated with providing service.
  - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
  - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 4. Notify Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- E. Scheduling:
  - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

**1.06 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Utility Company letter of availability for providing electrical service to project.
- C. Drawings prepared by Utility Company.

**1.07 QUALITY ASSURANCE**

- A. Comply with the following:
  - 1. IEEE C2 (National Electrical Safety Code).

2. NFPA 70 (National Electrical Code).
3. The requirements of the Utility Company.
4. The requirements of the local authorities having jurisdiction.

## **PART 2 PRODUCTS**

### **2.01 ELECTRICAL SERVICE REQUIREMENTS**

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: As indicated on drawings.
- D. Division of Responsibility: As indicated on drawings.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Verify and mark locations of existing underground utilities.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required trenching and backfilling per utility requirements.
- E. Provide required support and attachment components in accordance with Section 26 05 29.
- F. Provide grounding and bonding for service entrance equipment in accordance with Section 26 05 26.
- G. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 05 53.

**END OF SECTION**



## **SECTION 26 24 16 PANELBOARDS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Overcurrent protective devices for panelboards.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.
- C. Section 26 27 13 - Electricity Metering: For interface with equipment specified in this section.

#### **1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 67 - Panelboards Current Edition, Including All Revisions.
- J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

### **PART 2 PRODUCTS**

#### **2.01 PANELBOARDS - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature:
- C. Short Circuit Current Rating:
  - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  - 2. Boxes: Stainless steel unless otherwise indicated.
    - a. Provide wiring gutters sized to accommodate the conductors to be installed.
  - 3. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

## **2.02 OVERCURRENT PROTECTIVE DEVICES**

- A. Molded Case Circuit Breakers:
  - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
  - 2. Interrupting Capacity:
    - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
    - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
  - 3. Conductor Terminations:
    - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
  - 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 26 05 29.
- F. Install panelboards plumb.
- G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- H. Provide grounding and bonding in accordance with Section 26 05 26.
- I. Install all field-installed branch devices, components, and accessories.
- J. Provide filler plates to cover unused spaces in panelboards.

### **END OF SECTION**

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## **SECTION 26 27 13 ELECTRICITY METERING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Equipment for electrical utility metering.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

#### **1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for electricity metering systems and associated components and accessories. Include ratings, configurations, standard wiring diagrams, dimensions, service condition requirements, and installed features.

#### **1.05 QUALITY ASSURANCE**

- A. Utility metering equipment: conform to all requirements of the serving electrical utility.
- B. Comply with requirements of NFPA 70.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Electricity Meters:
  - 1. Same as manufacturer of electrical distribution equipment used for this project.
    - a. ABB/GE: [www.geindustrial.com/#sle](http://www.geindustrial.com/#sle).
    - b. Eaton Corporation: [www.eaton.com/#sle](http://www.eaton.com/#sle).
    - c. Schneider Electric; Square D Products: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
    - d. Siemens Industry, Inc: [www.usa.siemens.com/#sle](http://www.usa.siemens.com/#sle).
- B. Source Limitations: Furnish electricity meters produced by a single manufacturer and obtained from a single supplier.

#### **2.02 EQUIPMENT FOR ELECTRICAL UTILITY METERING**

- A. Meter bases: provide meter socket bases as indicated, configuration to comply with all requirements of the serving electrical utility.
- B. Current transformer cabinets and enclosures: comply with all requirements of the serving electrical utility.
- C. Meter Main equipment:
  - 1. NEMA enclosure type: NEMA 3R with stainless steel enclosure.
  - 2. Factory assembled, tin-plated aluminum or copper bus bars.
  - 3. 200 amp rated meter sockets, comply with all requirements of the serving electrical utility.
  - 4. Main circuit breaker, service rated.
  - 5. Distribution section with minimum (6) breaker spaces.

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### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Provide required support and attachment components in accordance with Section 26 05 29.
- D. Provide grounding and bonding in accordance with Section 26 05 26.

**END OF SECTION**

**SECTION 26 28 16.13  
ENCLOSED CIRCUIT BREAKERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Enclosed circuit breakers.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- G. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- H. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.

**PART 2 PRODUCTS**

**2.01 ENCLOSED CIRCUIT BREAKERS**

- A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet.
  - 2. Ambient Temperature: Between 23 degrees F and 104 degrees F.
- D. Short Circuit Current Rating:
  - 1. Provide enclosed circuit breakers with listed short circuit current rating not less than the available fault current at the installed location indicated on the drawings.
- E. Enclosed Circuit Breakers Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.
- F. Conductor Terminations: Suitable for use with the conductors to be installed.
- G. Provide thermal magnetic circuit breakers unless otherwise indicated.
- H. Provide electronic trip circuit breakers where indicated.

- I. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
- J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 4X, stainless steel.
- K. Provide externally operable handle with means for locking in the OFF position.

## **2.02 MOLDED CASE CIRCUIT BREAKERS**

- A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
- B. Interrupting Capacity:
  - 1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
    - a. 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
  - 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- C. Conductor Terminations:
  - 1. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
- D. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
- E. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 26 05 29.
- E. Install enclosed circuit breakers plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 05 26.

**END OF SECTION**

## **SECTION 31 22 00 GRADING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Removal and stockpile of topsoil.
- B. Rough grading the site for site structures.
- C. Finish grading.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 31 23 16 – Excavation & Borrow.
- B. Section 32 11 23 - Aggregate Base Course.
- C. Section 32 92 19 - Seeding: Finish ground cover.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Topsoil: See Section 31 23 16.
- B. Other Borrow Materials: See Section 31 23 16, 32 11 23.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that survey benchmark and intended elevations for the Work are as indicated.

#### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- F. Protect site features to remain, including but not limited to benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.
- G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.
- H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

#### **3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- G. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of surface water control.

### **3.04 SOIL REMOVAL**

- A. Stockpile topsoil to be re-used on site; remove remainder from site.
- B. Stockpile subsoil to be re-used on site; remove remainder from site.
- C. Stockpile gravel to be re-used on site; remove remainder from site.
- D. Stockpiles: Use areas designated on site or directed by the Owner; pile height not to exceed 8 feet; protect from erosion.

### **3.05 FINISH GRADING**

- A. Before Finish Grading:
  - 1. Verify trench backfilling has been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.
- C. Where topsoil is to be placed, scarify surface to depth of 6 inches.
- D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.
- E. Place topsoil in areas where seeding is indicated.
- F. Place topsoil to nominal depth of 6 inches.
- G. Place topsoil during dry weather.
- H. Remove roots, weeds, rocks, and foreign material while spreading.
- I. Near plants spread topsoil manually to prevent damage.
- J. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- K. Lightly compact placed topsoil.
- L. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

### **3.06 REPAIR AND RESTORATION**

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.
- B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

### **3.07 FINAL SITE RESTORATION AND CLEANING**

- A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.
- B. Leave site clean and raked, ready to receive seeding.

**END OF SECTION**



**SECTION 31 23 16  
EXCAVATION & BORROW**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Excavating for paving, concrete sidewalk or slabs, site, and structures.
- B. Trenching for utilities.
- C. Temporary excavation support and protection systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 57 13 - Temporary Erosion and Sediment Control:
- B. Section 02 41 00 Demolition
- C. Section 31 22 00 - Grading: Grading.

**1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Bedding and Base material:
  - 1. See Section 32 11 23 for bedding and backfill or base materials at excavations.
  - 2. Fill material necessary for the grading at the main reservoir shall be coordinated with the Owner. If off-site borrow is required, material shall be non-permeable non-erosive material. Submit material samples for review and approval.
- B. Material for bases for manholes and vaults shall be aggregate base course as described in Section 32 11 23.
- C. Berm Material.
  - 1. Graded material smaller than 3" in maximum dimension.
  - 2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
  - 3. Acidity range (pH) of 5.5 to 7.5.
  - 4. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.
  - 5. Complying with ASTM D2487 Group Symbol OH.

**2.02 SOURCE QUALITY CONTROL**

- A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site. Approval and approved test results for use in the required installation (within the last 6 months) by ODOT can be substituted for sampling and testing.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey benchmark and intended elevations for the work are as indicated.
- B. If unsuitable materials are encountered notify the Owner and Engineer immediately. Upon direction by the Owner/Engineer remove unsuitable material as directed and replace with Aggregate Base Course Class B material. Compact the backfill material as described in other sections of these Specifications.

### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 22 00 for topsoil removal and stockpiling
- C. Locate, identify, and protect utilities that remain and protect from damage.
- D. Notify utility company to remove and relocate utilities.
- E. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- F. Protect plants, lawns, rock outcroppings, and other features to remain.
- G. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Engineer.
- H. Excavate for installations to the lines shown on the plans. Do not over excavate unless directed by the Owner/Engineer. Any over excavation performed shall be backfilled and compacted using aggregate base course. Any costs incurred for backfilling on over excavation shall be borne by the Contractor.
- I. Topsoil should be removed, stockpiled and reused at the individual sites to promote final erosion control, seeding and mulching as described in other sections.

### **3.03 TEMPORARY EXCAVATION SUPPORT AND PROTECTION**

- A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.
  - 1. Depending upon excavation depth, time that excavation is open, soil classification, configuration and slope of excavation sidewalls, design and provide an excavation support and protection system that meets the requirements of 29 CFR 1926, Subpart P:
    - a. Sloping and benching systems.
    - b. Support systems, shield systems, and other protective systems.
- B. Excavation support and protection systems not required to remain in place may be removed subject to approval of Owner or Owner's Representative.
  - 1. Remove temporary shoring and bracing in a manner to avoid harmful disturbance to underlying soils and damage to buildings, structures, pavements, facilities and utilities.

### **3.04 EXCAVATING**

- A. Excavate to accommodate new structures and construction operations.
  - 1. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
  - 2. Cut utility trenches wide enough to allow inspection and compaction of installed utilities.
- B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Provide temporary means and methods, as required, to remove all water from excavations until directed by Engineer. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control at the Contractors expense.

### **3.05 SUBGRADE PREPARATION**

- A. Prepare the subgrade for excavations, providing compaction and an unyielding base to install improvements.

### **3.06 PLACEMENT, COMPACTION & BACKFILLING**

- A. Backfill to contours and elevations indicated using unfrozen materials.
- B. Employ a placement method that does not disturb or damage other work.
- C. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- G. Correct areas that are over-excavated.
  - Other areas: Use Aggregate Base Course, to backfill to the required elevation, compacted to minimum 95 percent of maximum dry density.
- H. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, and similar construction: 95 percent of maximum dry density.
- I. Reshape and re-compact fills subjected to vehicular traffic.

### **3.07 REPAIR**

- A. Correct areas that are over-excavated and load-bearing surfaces that are disturbed

### **3.08 FINAL SITE CONDITION**

- A. Stockpile excavated material to be re-used in area designated on site or as directed by the Owner.
- B. Remove excavated material that is unsuitable for re-use from site.
- C. Remove excess excavated material from site.

### **3.09 PROTECTION**

- A. Divert surface flow from rains or water discharges from the excavation.
- B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.
- D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- E. Keep excavations free of standing water and completely free of water during concrete placement.
- F. Install Erosion and Sediment Controls as described elsewhere in these specifications.

**END OF SECTION**

**SECTION 32 11 23**  
**AGGREGATE BASE COURSES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aggregate base course Class B crushed rock – 1" - 0 or ¾" - 0.
- B. Paving aggregates – Aggregate Surfacing - 1" - 0 dense graded aggregate.

**1.02 RELATED REQUIREMENTS**

- A. Section 32 13 13 – Portland Cement Concrete

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. Payment for Aggregate Base Courses are included in the unit prices for other items.

**1.04 REFERENCE STANDARDS**

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses 2017 (Reapproved 2021).
- B. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop 2022, with Errata .
- C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2019.
- D. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method 2015, with Editorial Revision (2016).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2017, with Editorial Revision (2020).
- G. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils 2017, with Editorial Revision (2018).
- H. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017a, with Editorial Revision (2021).

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Samples: Submit sample test results from approved State of Oregon approved pits for each type of aggregate. Sample results shall be less than 6 months old.
- C. Materials Sources: Submit name of imported materials source.
- D. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
- E. Compaction Density Test Reports (if performed by contractor).

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. Aggregate Storage, General:
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Coarse Aggregate: Coarse aggregate, complying with Oregon Standard Specifications for Construction.

### **2.02 SOURCE QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for general requirements for testing and analysis of aggregate materials.
- B. Where aggregate materials are specified using ASTM D2487 classification, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place aggregate on soft, muddy, or frozen surfaces.

### **3.02 INSTALLATION**

- A. Place aggregate in maximum 6 inch layers and compact to specified density.
- B. Level and contour surfaces to elevations and gradients indicated.
- C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.
- D. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for general requirements for field inspection and testing.
- B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
- C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

### **3.04 CLEANING**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

**END OF SECTION**

**SECTION 32 13 13**  
**PORTLAND CEMENT CONCRETE**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. This Work consists of constructing Portland cement concrete sidewalks, slabs and other surfaces in accordance with details shown in the Plans and these Specifications and in conformity to lines and grades shown in the Plans or as established by the Engineer. This will include the six-inch concrete surfacing.

**1.02 PRICE AND PAYMENT PROCEDURES**

- A. See Section 01 22 00 - Unit Prices, for unit price requirements.

**1.03 SUBMITTALS**

- B. Contractor shall provide the following submittals:
  - 1. ODOT approved mix design that is no greater than 6 months old.
  - 2. Contractor shall provide a layout plan for placement of contraction and expansion joints.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Materials shall meet the requirements of the following sections.
  - 1. Cement – as described in Section 00440 of the State of Oregon Standard Specifications current edition for commercial concrete. Cementitious materials from same source shall be used throughout the project.
  - 2. Aggregates – as described in Section 002000 of the State of Oregon Standard Specifications current edition for commercial concrete.
  - 3. Premolded Joint Filler - as described in Section 00440 of the State of Oregon Standard Specifications current edition for commercial concrete.
  - 4. Detectable Warning Surface (if required)
  - 5. Concrete Curing Materials and Admixtures – as described below

**PART 3 PRODUCTS**

**3.01 CONSTRUCTION REQUIREMENTS**

- A. The concrete in the sidewalks and curb ramps shall be air entrained concrete Class 3300 in accordance with the requirements of Section 00540 of the State of Oregon Standard Specifications current edition.
  - 1. Excavation
    - a. Excavation shall be made to the required depth and to a width that will permit the installation and bracing of the forms. The foundation shall be shaped and compacted to a firm, even and unyielding surface conforming to the section shown in the Plans. All soft and yielding material shall be removed and replaced with acceptable material at no additional cost.
  - 2. Forms
    - a. Forms shall be of wood or metal and shall extend for the full depth of the concrete. All forms shall be straight, free from warp, and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal. After the forms have been set to line and grade, the foundation shall be brought to the grade required and thoroughly wetted before placing the concrete.
  - 3. Placing and Finishing Concrete
    - a. Placement shall be in accordance with State of Oregon Standard Specifications current edition Sections 00759 and 00440 for commercial concrete. The concrete shall be placed in

the forms and struck off with an approved straightedge. As soon as the surface can be worked, it shall be troweled smooth with a steel trowel. After troweling and before installing the contraction joints or perimeter edging, the walking surfaces of the sidewalk and curb ramps shall be brushed with a stiff bristled broom. Brush strokes shall be perpendicular to the travel direction of the sidewalk. Expansion and contraction joints shall be constructed as shown in the approved contractors submittal unless there are layouts shown in the Plans or as directed by the Engineer. When the sidewalk abuts a cement concrete curb or curb and gutter, the expansion joints in the sidewalk shall have the same spacing as the curb. The expansion joint shall be filled to full cross-section of the sidewalk with  $\frac{3}{8}$  inch premolded joint filler.

4. Sawcutting is described in the demolition section 02 41 00.

### **3.02 CURING:**

- A. Concrete sidewalks shall be cured for at least 72 hours. Curing shall be by means of moist burlap or quilted blankets or other approved methods. During the curing period, all traffic, both pedestrian and vehicular, shall be excluded. Vehicular traffic shall be excluded for such additional time as the Engineer may specify.

### **END OF SECTION**

## **SECTION 32 92 19 SEEDING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Hydroseeding, mulching and fertilizer.
- D. Maintenance.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 01 57 13 - Temporary Erosion and Sediment Control

#### **1.03 PRICE AND PAYMENT PROCEDURES**

- A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.
- B. Topsoil: included in other bid items
- C. Grassed Areas: included in other bid items.

#### **1.04 REFERENCE STANDARDS**

- A. ASTM D7322/D7322M - Standard Test Method for Determination of Erosion Control Product (ECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions 2017.

#### **1.05 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

#### **1.06 SUBMITTALS**

- A. Certificate: Certify seed mixture approval by authority having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

### **PART 2 PRODUCTS**

#### **2.01 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

#### **2.02 SEED MIXTURE**

- A. Seed Mixture:
  - 1. Local yard mix for Oregon Coast Range Eco-Region Seed Mix

#### **2.03 SOIL MATERIALS**

- A. Topsoil: Excavated and stockpiled from site and free of weeds.

#### **2.04 ACCESSORIES**



- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable. Hydromulch shall be applied with the final seeding installation.
- B. Fertilizer: Recommended for grass, slow release nitrogen, biological materials, and biostimulant materials; of proportion necessary to eliminate deficiencies of topsoil.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this Section.

#### **3.02 PREPARATION**

- A. Prepare subgrade in accordance with normal landscaping requirements.
- B. Place topsoil in accordance with normal landscaping requirements.

#### **3.03 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

#### **3.04 SEEDING**

- A. Apply seed at a rate of 11.4 lbs per acre or as recommended by supplier evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- D. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- E. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- F. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

#### **3.05 HYDROSEEDING**

- A. Apply seeded slurry with a hydraulic seeder at a rate of 30 gallons per acre evenly in two intersecting directions.
- B. Do not hydroseed area in excess of that which can be mulched on same day.
- C. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.
- D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.
- E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

#### **3.06 MAINTENANCE**

- A. Provide maintenance at no extra cost to Owner; Owner will pay for water.
- B. See Section 01 70 00 - Execution Requirements, for additional requirements relating to maintenance service.
- C. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

- D. Neatly trim edges and hand clip where necessary.
- E. Immediately remove clippings after mowing and trimming.
- F. Water to prevent grass and soil from drying out.
- G. Roll surface to remove minor depressions or irregularities.
- H. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
- I. Immediately reseed areas that show bare spots.
- J. Protect seeded areas with warning signs during maintenance period.

**END OF SECTION**

**SECTION 33 01 10.58  
DISINFECTION OF WATER UTILITY PIPING SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Disinfection of site domestic water lines and site fire water lines.

**1.02 RELATED REQUIREMENTS**

- A. Section 33 14 16 - Site Water Utility Distribution Piping.

**1.03 REFERENCE STANDARDS**

- A. AWWA B300 - Hypochlorites 2018.
- B. AWWA B301 - Liquid Chlorine 2018.
- C. AWWA B302 - Ammonium Sulfate 2016.
- D. AWWA B303 - Sodium Chlorite 2018.
- E. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).

**1.04 SUBMITALS**

- A. The contractor shall provide the following:
  - 1. Provide a disinfection plan for review and acceptance by the Owner. The plan shall include disinfection and tie in of individual components.
  - 2. Provide a plan for connection of the new system to the existing system.
  - 3. Provide a plan for disposal of disinfection water for review and acceptance by the Owner.

**PART 2 PRODUCTS**

**2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate, and AWWA B303 Sodium Chlorite.

**PART 3 EXECUTION**

**3.01 DISINFECTION**

- A. Use method prescribed by the applicable state or local codes, health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system if needed.
- D. Provide a disinfectant swabbing system, equipment and materials.
- E. Maintain disinfectant in the complete system including services as approved by the Owner.
  - 1. Samples may be taken to the City WWTP for analysis of chlorine and residual chlorine content. The contractor shall be responsible for coordinating testing with the Owner.
- F. Dispose of disinfected water in an environmentally acceptable manner that conforms to applicable regulations.

**END OF SECTION**

**SECTION 33 05 05.31**  
**PIPELINE PRESSURE TESTING AND INSPECTION**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes hydrostatic testing of pressurized piping systems

**1.02 REFERENCES**

- A. American Water Works Association:
  - 1. Installation of Ductile-Iron Water Mains and their Appurtenances.
  - 2. Installation of HDPE Water Mains and their Appurtenances.

**1.03 QUALITY ASSURANCE**

- A. Notify Engineer a minimum of 24 hours in advance of testing. All testing shall be made in the presence of the Engineer.

**1.04 SUBMITTALS**

- A. Shop drawings shall include the following:
  - 1. Test bulkhead locations and design calculations, pipe attachment details, and methods to prevent excessive pipe wall stresses.
  - 2. Testing Schedule, including proposed plans and locations for water conveyance and discharge, shall be submitted in writing to the Engineer for approval a minimum of 14 Calendar Days before testing is to start. Testing and Inspection shall be coordinated with the Owner.

**PART 2 PRODUCTS**

**2.01 MATERIALS REQUIREMENTS**

- A. All equipment, valves, connections and blind flanges, or other water control equipment and materials shall be visually inspected at startup by the Contractor and Engineer. The Contractor shall be held solely responsible for ensuring that a sufficient water source is available for all operations, that all materials have been disinfected and that no leakage occurs.

**PART 3 EXECUTION**

**3.01 HYDROSTATIC TESTING**

- A. Conduct testing using a visual inspection process.
- B. Before applying test pressure, completely expel air from section of piping under test. Provide temporary blow-off(s) as necessary so air can be expelled as pipeline is filled with water.
- C. Test Pressure: based on the greatest available system pressure.
- D. Slowly bring piping to test pressure and allow system to stabilize. Do not open or close valves at differential pressures above rated pressure.
- E. Conduct test for at least a minimum 1-hour duration and verify that there is no leakage. Provide notification to the Owner and schedule acceptance inspection by the Owner/Engineer.
- F. Examine exposed piping, fittings, valves, hydrants, and joints carefully during testing. Repair or replace damaged or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.
- G. Testing Allowance. Shall not incur a drop in pressure in a test section.
- H. When leakage exceeds acceptable amounts, locate source and make necessary repairs. Repeat test until specified leakage requirements are met.

### **3.02 TEST RESULTS**

- A. Hydrostatic Testing Report
  - 1. Pipe section tested
  - 2. Test Pressure
  - 3. Duration of the test
  - 4. Owner/Engineer and the Contractor shall sign report

**END OF SECTION**

**SECTION 33 05 61  
CONCRETE MANHOLES**

**PART 1 GENERAL**

**1.01 DESCRIPTION**

- A. This Work consists of designing and constructing buried structures of the various types vaults, manholes or other structures in accordance with the Contract documents.

**1.02 REFERENCE STANDARDS**

- A. Oregon Standard Specifications for Construction, current edition

**PART 2 PRODUCTS**

**2.01 CONCRETE MANHOLES**

- A. Shall conform to Section 00470 and Section 02450 of the State of Oregon Standard Specifications for Construction, current edition

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. The excavation for all manholes shall be sufficient to leave 1 foot in the clear between their outer surfaces and the earth bank.
- B. The cover or grating of a manhole, shall not be grouted to final grade until the final elevation of the pavement, surface, or sidewalk in which it is to be placed has been established, and until permission thereafter is given by the Engineer to grout the cover or grating in place. Covers shall be seated properly to prevent rocking. Leveling and adjustment devices that do not modify the structural integrity of the metal frame, grate or cover, and do not void the originating foundry's compliance to these specifications and warranty are allowed. Leveling and adjusting devices that interfere with the backfilling, backfill density, grouting and asphalt density will not be allowed. The hardware for leveling and adjusting devices shall be completely removed when specified by the Engineer. The channels in manholes shall conform accurately to the sewer grade. Ladder rungs shall be grouted in the precast concrete walls. Rungs shall be uniformly spaced at 12 inches and be vertically aligned.
- C. In the event any pipe enters the manhole through the precast concrete units, the Contractor shall make the necessary cut through the manhole wall. The ends of all pipes shall be trimmed flush with the inside walls. Rubber gaskets or flexible plastic gaskets shall be used in precast units. Joints between precast manhole units shall be grouted. All other joints and all openings cut through the walls shall be grouted and watertight. Mortar shall conform to the requirements of Section 02440.80. If gaskets are used, handling of the precast units after the gasket has been affixed shall be done carefully to avoid disturbing or damaging the gasket or contaminating it with foreign material. Care shall be exercised to attain proper alignment before the joints are entirely forced home. Flexible pipes connecting to manholes shall be provided with an entry coupling or gasket approved by the Engineer. No pipe joint in flexible pipe shall be placed within 10 feet of the manhole. Backfilling around the Work will not be allowed until the concrete or mortar has thoroughly set.
- D. Backfilling of manholes shall be done in accordance with the provisions of Section 00470. Manholes, shall be constructed on a compacted or undisturbed level foundation. If the Contractor elects to use a separate cast-in-place base, the concrete shall be Class 4000. Upon final acceptance of the Work, all manholes, vaults, and other Structures shall conform to the requirements of the Standard Plans except as approved by the Engineer.

**END OF SECTION**

**SECTION 33 14 16**  
**SITE WATER UTILITY DISTRIBUTION PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water pipe for site conveyance lines.
- B. Pipe valves.
- C. Fire hydrants.
- D. Other installations as shown in the plans

**1.02 RELATED REQUIREMENTS**

- A. Section 31 23.16 - Excavation and Borrow: Excavating, bedding, and backfilling.
- B. Section 33 01 10.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.
- C. Section 33 05 05.31 - Pipeline Hydrostatic Pressure Testing
- D. Section 40 27 00 - Piping, Valves, and Accessories

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.
- B. Pipe, Elbows, Restraints and Fittings: By the linear foot of pipe. Includes excavation, pipe, elbows fittings, bedding, thrust restraints, connection to other appurtenances, backfill.
- C. Valves: for all valve, fittings gaskets, bolts, valve box and accessories.
- D. Hydrant Assemblies shall include all piping, valve, valve box, hydrant, elbows and all other components for a complete installation.

**1.04 REFERENCE STANDARDS**

- A. AWWA C600 - Installation of Ductile-Iron Mains and their Appurtenances 2017.
- B. AWWA C906 - Polyethylene (PE) Pressure Pipe and Tubing,

**1.05 SUBMITTALS**

- A. Submit product data for all piping, fittings, HDPE fittings, hydrants, valves, resilient gaskets, castings, etc. for review and approval.

**PART 2 PRODUCTS**

**2.01 WATER PIPE**

- A. Polyethylene Pipe: AWWA C901: AWWA C906
- B. Ductile Iron Pipe: AWWA C151, AWWA C150
- C. Toning Wire. Toning wire shall be insulated copper wire, number 14-gauge, color coded.
  - 1. Insulated copper wire shall be buried within the trench area on the top of the pipe.
  - 2. Wire shall be brought to the surface at all valve boxes, toning wire access boxes or other permanent structures. A watertight splice shall be made where necessary to achieve electrical continuity between valve boxes and/or other structures.
  - 3. Toning wire will be tested to insure continuity of system. Any deficiencies found during testing shall be corrected by the Contractor. The toning wire shall not be wrapped around valve stems.

**2.02 VALVES & ACTUATORS**

- A. Valves 3 Inches and Over: As specified in Section 40 27 00

### **2.03 REPLACEMENT SPOOLS**

- A. The Contractor shall provide make-up spools for each actuator operated valve. Spools shall be mortar lined AWWA NSF 61 rated pipe of the same cross section and finish of the adjacent piping. Costs will be based on the measurement of the pipe installed.

### **2.04 FIRE HYDRANT ASSEMBLIES**

- A. Fire hydrants shall meet or exceed the requirements of AWWA Standard C502 and be UL listed. The hydrant shall be equipped with a 5¼-inch valve, three port nozzles, two of which shall be 2½-inch hose nozzles and one shall be a 4½-inch pumper nozzle. Hydrants shall be designed for a minimum working pressure of 250 psi. Hydrants shall be a dry barrel type with a safety break-away flange.
- B. Acceptable fire hydrant manufacturer and model is as follows:
  - 1. Mueller, Super Centurion A423
- C. Hydrants shall be painted with standard AWWA Gloss "B" Yellow.
- D. The Contractor shall provide one valve operator key for the project.

### **2.05 BEDDING AND BACKFILL MATERIALS**

- A. Bedding: As specified in Section 31 23 16.
- B. Backfill: As specified in Section 31 23 16.

### **2.06 CONCRETE THRUST BLOCKS**

- A. Fittings shall be adequately "blocked" with poured-in-place concrete, poured shaped to establish a firm minimum bearing area, against an undisturbed earth wall as shown on the Plans. Timber blocking or dry blocking will not be permitted. Concrete thrust and/or anchor blocking, as indicated on the Plans, shall be placed at bends, dead ends, crossed, and as designated by the Engineer. Blocking shall be 3,000 psi concrete mix poured in place. All concrete thrust blocking configurations and sizes shall be per the Plans. The poured in place concrete thrust and/or anchor blocks shall be in place at least 24 hours before beginning the pressure test, to allow the concrete to set.

## **PART 3 EXECUTION**

### **3.01 TRENCHING**

- A. See the section on excavation and fill for additional requirements, Section 31 23 16.

### **3.02 INSTALLATION - VALVES**

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

### **3.04 FIRE HYDRANT ASSEMBLIES**

- A. Hydrants shall be installed at the general location shown in the plans. Location of the actual hydrant shall be coordinated with the Owner. The hydrant valve and box shall be installed to the finished grade.

**END OF SECTION**



**SECTION 40 27 00**  
**PIPING, VALVES, AND ACCESSORIES**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes: Provide all piping, including fittings, valves, supports, and accessories as shown on the Drawings, described in the Specifications and as required to completely interconnect all equipment with piping for complete and operable systems, including equipment drains. Piping must meet the criteria for American made materials as discussed in Specification Section 00 72 50. All materials installed shall be certified for NSF 61 rating and use in potable water installations.

**1.2 REFERENCES**

- A. ASTM International (ASTM)
1. ASTM D638 - Standard Test Method for Tensile Properties of Plastics.
  2. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  3. ASTM D792 - Standard Test Method for Density of Plastics by the Density - Gradient - 1 Technique.
  4. ASTM D1235 - Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.
  5. ASTM D1599 - Standard Test Method for Short -Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings.
  6. ASTM D1603 - Standard Test Method for Carbon Black in Olefin Plastics.
  7. ASTM D1693 - Standard Test Method for Environmental Stress - Cracking of Ethylene Plastics.
  8. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
  9. ASTM D1785 - ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  10. ASTM D2122 - Standard Method of Determining Dimensions of Thermoplastic Pipe and Fittings.
  11. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  12. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
  13. ASTM F2620 - Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
  14. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
  15. ASTM D2839 - Standard Practice for Use of a Melt-Index Strand for Determining Density of Polyethylene.
  16. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  17. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR - PR) Based on Controlled Outside Diameter.

18. ASTM D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
  19. ASTM D3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
  20. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Material.
  21. ASTM DD3967 - Standard Test Method for Apparent Tensile Strength of Ring or Tubular Plastics and Reinforced Plastics by Split Disk Method.
  22. ASTM D4218 - Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
  23. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
  24. ASTM F679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
  25. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR PR) Based on Outside Diameter.
  26. ASTM F1055 - Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Pipe and Tubing.
  27. ASTM F1056 - Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining of Polyethylene Pipe or Tubing and Fittings.
  28. ASTM F1336 - Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings.
  29. ASTM F1668 - Standard Guide for Construction Procedures for Buried Plastic Pipe (PVC and other Thermoplastic Pipe)).
  30. ASTM F2206 - Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE)
- B. Plastic Pipe Institute (PPI)
1. PPI TR-3 - Policies and Procedures for Developing Recommended Hydrostatic Design Stresses for Thermoplastic Pipe Materials.
  2. PPA TR-4 - PPI Listing of Hydrostatic Design Bases (HDB), Strength Design Bases (SDB), Pressure Design Bases (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.
  3. PP! TR-45 - Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe.
- C. American Society of Mechanical Engineers (ASME)
- D. American National Standards Institute (ANSI)
- E. American Water Works Association (AWWA)
1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
  2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
  3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  4. AWWA C116 - Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior of Ductile-Iron and Gray-Iron Fittings for Water Supply Service.
  5. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
  6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water.
  7. AWWA C153 - Ductile-Iron Compact Fittings for Water Service.

8. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances. AWWA C906 Standard for Polyethylene (PE) Pressure Pipe and Fittings, through 63 inches OD for Water Distribution.
  9. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) And Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
  10. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. Through 60 in.
  11. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in.
  12. AWWA M55 - Manual for the Design and Installation of Polyethylene Pipe in Water Applications.
- F. American Welding Society (AWS)
  - G. Cast Iron Soil Pipe Institute (CISPI)
  - H. U.S. Department of Transportation (DOT)
  - I. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS)
  - J. National Fire Protection Association (NFPA)

### **1.3 SUBMITTALS – GENERAL REQUIREMENTS**

- A. Shop Drawings
  1. Verify by excavation, inspection and measurement all installation conditions, including existing utilities and structures, for buried OR all pipe before preparation of Shop Drawings. Submit field measurements and photos with Shop Drawings where exposed conditions are significantly different than indicated on the Drawings.
  2. Submit data to show that the following items conform to the Specification requirements:
  3. Pipe, fittings and accessories (Product Review).
  4. Pipe couplings and flexible pipe pieces (Product Review).
  5. Valves and Accessories (Product Review).
  6. Submit reinforcement calculations for T.M 2P to demonstrate compliance with AWWA M11.
  7. Submit samples of gaskets and other materials where required by the detailed specifications.
  8. Submit certified test reports as required herein and by the referenced standard specifications (Product Information).
  9. All items utilized on systems supplying or producing drinking water or on reclaimed water systems, including, but not limited to, pipe and valve linings, solvent cements, welding materials, gaskets and gasket lubricants, and additives in concrete or cement mortar shall comply with the Safe Drinking Water Act and NSF requirements for use in water systems (in accordance with local requirements Submit proof of NSF certification for each item.
  10. Submit leak and pressure testing plan in accordance with the requirements in 3.09 and Section 33 05 05.31.
  11. Submit made in America documentation for metal products.
  12. Submit pipe support design and anchorage including calculations.

- B. Manuals: Furnish manufacturer's installation and operation manuals, bulletins, and spare parts lists for the following items:
1. Valves 4 inches and larger and all actuated valves.
  2. Pneumatic/motorized actuators, including positioners and I/P converters. Include the actuator manuals for the valves requiring them.

#### **1.4 HDPE PIPING (SUBMITTAL REQUIREMENTS)**

- A. HDPE pipe and fitting materials submittal shall include:
1. Manufacturing method and material standards
  2. Grade of material
  3. Wall thickness and tolerances
  4. Pressure rating
  5. Fitting fabrication details
- B. Prior to each shipment of pipe, submit one electronic copy OR hard copy of the following certified test reports and certificates.
1. Certification that all materials delivered comply with the AWWA C906 Standards and these Specifications, including the testing requirements. Measurements of pipe dimensions performed as per AWWA C906
  2. Certified test reports for all the tests to be performed in accordance with these Specifications and the AWWA C906 Standards. Certified test reports shall be submitted to the Engineer OR Owner prior to shipment of pipe.
  3. The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific product. Said certification shall include a stress life curve per ASTM D2837. The stress regression testing shall have been done in accordance with ASTM D2837 and PPI TR-3, and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1,600 psi, as determined in accordance with ASTM D2837.
  4. The Manufacturer's certification shall state that the pipe was manufactured from one specific resin in compliance with these Specifications. The certificate shall state the specific resin used, its source, and list its compliance to these Specifications. Reuse of recycled product with not be allowed.
- C. A detailed plan of method for assembly of the pipe. Any deviations from procedure as per the manufacturer's recommendations, the Plastic Pipe Institute guidelines or these Specifications shall be noted in the submittal and the submittal cover sheet. The procedures in the plan shall include:
1. Checking condition of HDPE pipe inside and outside for manufacturing defects and damage not detected at the manufacturer's plant or that which occurred during shipping.
  2. Step-by-step description of pipe assembly procedure, which can be checked and verified in the field by the Owner, for butt fusion both at the surface and in the trench.
  3. Allowable tolerances for pipe wall mismatch or offset. Maximum offset or mismatch shall not exceed 10 percent of the supplied pipe minimum wall thickness. An offset or mismatch shall be defined as the measured distance of the profile between the outside walls from two conjoining pieces of fused pipe. For example, if the minimum pipe wall thickness is 2.57 inches, then the maximum allowable mismatch between two of pipes of the same thickness is 0.257 inch as measured from the outside of the pipe at the fused joint, perpendicular to the axis of the fused pipe joint.

4. Method of checking and ensuring pipe wall mating profile matches or is within allowable tolerances.
  5. Method for matching pipe ends in the event pipe pieces to be joined are not round or will not match circumferentially on the initial attempt to join the pipes.
  6. Installation of the pipe including staging of pipe pieces, placement of lengths of fused pipe into the trench and length of open trench.
- D. If HDPE pipe and fittings are manufactured/fabricated by different companies, then each company shall submit a written statement/certification that each manufacturer and fabricator is listed in and complies with the generic butt fusion joining procedure for polyethylene pipe in the Plastics Pipe Institute (PPI) TR-33 for the resin to be used. All pipe and fittings shall perform together in accordance with the requirements of the Specifications.
- E. List of butt fusion machine(s) to be used, including the manufacturer's procedure for calibrating and checking the proper function of the machine(s).
- F. Detailed computer printouts of fusion parameters at each fused joint. Hardcopy printouts shall be submitted to the Owner at the end of each day during pipe fusion work and additionally as requested by the Owner. The hard copy shall define the following for each fused joint.
1. Heat of fusion.
  2. Applied interfacial pressure.
  3. Time of fusion, including melt and hold time.
  4. Visual inspection comments.
- G. Shop drawings or manufacturer's information on longitudinal and axial pipe rollers.
- H. Certificates of qualifications of technicians/operators that will perform butt fusion for joining HDPE pipe and fittings. Operator/technician shall have the minimum experience as specified in this Section under Quality Assurance.
- I. HDPE Fitting and Appurtenance Experience: Submit documentation verifying that the fitting and appurtenance fabricator that will be fabricating the HDPE pipeline fittings and appurtenances (HDPE Pipe Fabricator) meets the following minimum requirements:
1. The HDPE Pipe Fabricator shall have completed five projects within the last five (5) years fabricating solid wall, pressure rated HDPE molded fittings meeting requirements similar to those required by this Section. Experience documentation for each project shall include: Client, project name, description of the project, project location, completion date, contact person, and telephone number.

## **1.5 DUCTILE IRON PIPING (SUBMITTAL REQUIREMENTS)**

- A. Product Data: Submit data on ductile iron pipe material, fittings, joint type, coating, lining, restraint devices and polyethylene encasement.
- B. Engineer may require Manufacturer's Certificate: Certify pipe material, fittings and accessories meet or exceed specified requirements.

## **1.6 PVC PIPING (SUBMITTAL REQUIREMENTS)-NIC**

- A. Product Data: Submit data on PVC pipe material, fittings, joint type and gaskets.

## **1.7 QUALITY ASSURANCE - GENERAL**

- A. Materials and equipment furnished under this Section shall be of manufacturers who have been regularly engaged in the design and manufacture of the materials and equipment for a period of at least 5 years. Demonstrate to the satisfaction of the Engineer that the quality is equal to the materials and equipment made by the manufacturers specifically named herein, if an alternate manufacturer is proposed.
- B. Factory Quality Control: The Contractor shall test all products as noted herein and by the reference specifications.
- C. Field Quality Control:
  - 1. The Owner will:
    - a. Inspect field welds and test the welds if it is deemed necessary.
  - 2. The Contractor shall:
    - a. Perform leakage tests and any repairs necessary.
    - b. Be responsible for the costs of additional inspection and retesting by the Owner resulting from noncompliance.

## **1.8 APPURTENANCES**

- A. Furnish and install all necessary guides, inserts, anchors and assembly bolts, washers and nuts, hangers, supports, gaskets, couplings and flanges; all other appurtenant items shown on the Drawings, specified or required for the proper installation and operation of the piping; devices included in or on the piping equipment; and piping accessories.

## **1.9 HDPE PIPING (QUALITY ASSURANCE)**

- A. One size of pipe manufactured in each of three size ranges, 4 to 12 inches, greater than 12 to 24 inches, and greater than 24 inches, in each particular standard material code designation shall be tested by the elevated-temperature, sustained- pressure test by the manufacturer. Each particular standard material code designation to be used shall be tested in at least one specified size of pipe at the beginning of production. For pipes greater than 24 inches, the ring tensile test may be substituted.
- B. Plant Inspection:
  - 1. The manufacturer is responsible for the performance of all testing and inspection requirements as specified in AWWA C906.
  - 2. All pipe and fittings to be installed under this Contract may be inspected at the plant by the Owner for compliance with these Specifications using an independent testing laboratory selected and paid for by the Owner.
  - 3. Manufacturer shall notify the Owner/independent testing laboratory at least 72 hours in advance, if plant is within 250 miles of the Owner's office, or 10 Calendar Days in advance, if outside of 250 miles of the Owner's office, prior to beginning manufacture or fabrication of any pipe or fitting, requesting inspections or performing tests. The inspector shall have free access to those parts of a manufacturer's plant that are necessary to ensure that products

comply with all requirements and may take photographs for his and the Owner's use. Failure to comply with this notification requirement shall be cause for to Owner to reject any pipe manufactured without the Owner's Material Inspector present.

4. The manufacturer shall make available for use by the inspector, without charge, such tools and assistance as are necessary for inspection and handling of materials.
  5. The Owner OR Contractor will bear the cost of inspection for any one plant producing HDPE pipe and one plant fabricating HDPE fittings at any one time. Should two or more different manufacturing plants produce HDPE pipe or fittings at the same time, the Contractor shall bear the cost of labor, travel, and lodging associated with inspection for all but the closest manufacturing plant.
- C. The Owner or Representative will make inspection of the pipe and fittings after delivery. The pipe is subject to rejection at any time on account of failure to meet any of the requirements specified herein, even though other pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job immediately and shall not be allowed to be reworked or reused on any portion of the job.
- D. Workmanship and Testing:
1. The Owner may select the time and pipe or fitting piece to be tested for any required testing except at the beginning of production run, which will be conducted as specified herein.
  2. The manufacturer shall take adequate measures in the checking of incoming materials and in the production of pipe to ensure compliance with the requirements of these Specifications. The following tests relative to qualification of compounds and manufacturing processes and for quality assurance shall be conducted not less frequently than at the indicated intervals. Higher frequencies of these tests and additional tests shall be conducted, if necessary, and as determined by the manufacturer's quality control program, to ensure compliance with the requirements of the Contract Documents and AWWA C906.
    - a. All incoming lots of raw polyethylene materials shall be sampled and tested for melt-flow index and density. The testing results shall fall within the limits established between the material supplier and piping manufacturer.
    - b. Pipe inside and outside walls shall be smooth and free of surface abnormalities. Each length of pipe surface shall be visually checked inside and outside for defects. No abnormalities inside or outside of the pipe surface will be allowed and the presence of such defects shall be cause to reject the pipe.
    - c. Dimensions and tolerances shall be measured once per hour or once per length of pipe, whichever is less frequent.
    - d. Bend-back test shall be performed at the beginning of each production run and daily thereafter for each pipe size in accordance with AWWA C906. The specimens tested shall be representative of the entire inside surface of the pipe. The elongation-at-break test may be substituted for this test.
    - e. Ring-tensile strength test shall be performed at least once per production run, at 2,500 feet and at every 5,000 feet thereafter. The quick burst test may be substituted for this test.

- f. Carbon black content shall be determined for each individual lot of pre-compounded black PE material.
- g. A 5-second pressure test shall be performed at least once per production run. The elevated-temperature sustained-pressure test may be substituted for this test. In lieu of performing the 5-second pressure test for fittings at four-times rated pressure as specified in ASTM D1598, the pressure may be reduced to two-times rated pressure with all other test requirements remaining the same. Tested fittings will not be allowed to be installed under this Contract.
- h. Melt-flow index test shall be run on samples from the pipe at least once per Calendar Day.
- i. Density test shall be run on samples from the pipe once per Calendar Day, or once per lot of pre-compounded black PE material, whichever is less.
- j. Marking on each length of pipe shall be visually examined and checked for marking accuracy and legibility.
- k. Each fitting shall be visually checked inside and outside for defects and the presence of defects shall be cause to reject the fitting. Should defects be found on the pipe and the manufacturer feels that such defects do not affect the structural integrity or longevity of the pipe, the manufacturer must, in writing, explain the nature of the defects and provide positive witnessed test results which demonstrate that the integrity of the pipeline has not been compromised. It is the Contractor's responsibility to ensure that the proper documentation is submitted. The Owner and Engineer will be the determiners as to whether the documentation submitted is satisfactory and the pipe acceptable.
- l. A 5-second pressure test shall be performed on the first fitting of a particular size and every fiftieth fitting thereafter in accordance with AWWA C-906 and ASTM D1598.

E. Heat Fusion Machine and Operator:

- 1. The heat fusion machine(s) shall be capable of providing a detailed computer-recorded report of fusion parameters at each joint. Pipe fusion will not be allowed if the computer-recorder is not functioning properly. Manually-kept records of fusion parameters for main line HDPE pipe will not be an acceptable substitute for computer generated reports submitted to the Owner.
- 2. All pipe fusion machine operator(s)/technician(s) shall have a minimum of 3 years' experience in the fusion of solid wall HDPE pipe, with a combined total length of pipe fused of at least 4,000 feet. Pipe fusion operator(s)/technician(s) shall have fused at least 2,000 feet of solid wall HDPE pipe 8 inches or larger within the last 3 years. Fusing of pipe will not be allowed unless the operator(s)/technician(s) performing the work meets these experience requirements.
- 3. Each fusion machine to be used by the Contractor shall be certified by the manufacturer or manufacturer's authorized agent (which shall not be the Contractor) as being in proper working order and capable of performing the work intended, excepting that the manufacturer's authorized agent cannot be an agent which, in addition to representing the manufacturer, provides HDPE pipe fusing services directly or indirectly to the Contractor. Certification shall be performed prior to scheduled HDPE pipe fusion training. Prior to certification, each fusion machine shall be checked and calibrated by the same company.



4. The Contractor shall submit certification from the fusion machine manufacturer that the operator is qualified to operate the machine to be used for fusion on this project.
5. Where not specified or shown otherwise in the Contract Documents, the requirements of AWWA M55 shall apply. If in the event there is a conflict between the Contract Documents and AWWA M55, the more stringent shall apply.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

- A. Pipe and valve sizes are nominal inside diameter unless otherwise noted.
- B. All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class, and other appropriate data such as thickness for piping.
- C. Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the completed product. Acceptance of installed piping systems shall be based on inspection and leakage tests as specified hereinafter.
- D. Cutoff Flanges: Provide at all pipe or sleeve penetrations where cast into wall for pipes 4 inches and greater in nominal diameter, and at all penetrations of 3 inch and smaller nominal diameter pipe in wet or potentially wet locations as indicated on the Drawings. Cutoff flange outside diameter shall be at least a standard connection flange's outside diameter except that for pipe 30 inch-diameter and larger, nominal size, cutoff flange outside diameter may be 6 inches greater than outside pipe diameter. Cutoff flange shall be at least ¼ inch thick and shall be continuously welded (or cast) onto the pipe.

### **2.2 PIPING MATERIALS**

- A. Pipe and Fitting Designation: Piping materials are identified by a "Type" designation in these Specifications. The "Type" designation identifies not only the pipe itself but the associated fittings and appurtenances and the installation and test procedures described for that "Type." The designation of a particular type shall indicate a complete installation including fittings, joints, cleaning and testing. The pipe and fitting materials for each type designation shall be as specified herein.

### **2.3 DUCTILE IRON (PIPING MATERIALS)**

- A. Applicable for ductile iron pipe 4 to 64-inches in diameter.
- B. Pipe furnished shall be manufactured in accordance with AWWA C151 under method of design outlined in AWWA C150.
- C. Unless otherwise specifically indicated on the contract plans, the wall thickness shall be Pressure Class 200 for all pipe.
- D. Pipe furnished shall have normal laying length of 18' or 20'.
- E. Iron used in the manufacture of pipe shall have 60/42/10 iron strength.
- F. External Coating:

1. External Pipe Coating shall be an AWWA C151 asphaltic coating approximately 1-mil thick.
  2. Exposed pipe shall have a protective coating - factory primed. Final painting of exposed piping shall be compatible with the type of installation (exposed marine climate).
- G. Internal Lining:
1. Pipe furnished shall have standard thickness cement-mortar lining in accordance with AWWA C104. Minimum standard thickness per AWWA C104 is as follows:
    - a. Minimum Thickness of Lining
    - b. 1/8"
- H. Acceptable Pipe Manufacturers:
1. American Ductile Iron Pipe
  2. United States Pipe and Foundry
  3. Or Equal

## 2.4 DUCTILE IRON FITTINGS

- A. All cast iron and ductile iron fittings shall be manufactured in accordance with AWWA C104, C110, C111, and C153 and shall meet the requirements for NSF 61 certification.
- B. Provide Fitting with Mechanical (MJ) joints or Push-on (Fastite or Tyton). Restraint for fitting joints will be addressed under "Joint Restraint".
- C. Acceptable Manufacturers:
  1. Tyler Pipe Industries
  2. Griffin Pipe Products
  3. United States Pipe and Foundry
  4. Union Foundry Company
  5. Substitutions: Proposed Equivalents will be reviewed after award of contract.
  6. Anchor Couplings shall be Foster Adaptor, or approved equal.

## 2.5 JOINT RESTRAINT FOR DUCTILE IRON PIPE

- A. Mechanical Joint Restraint
  1. Mechanical joint restraints shall be incorporated in the design of a follower gland. The gland shall be manufactured in accordance with ASTM A 536.
  2. Dimensions of gland shall be used with standard mechanical joint bell and tee-head bolts conforming to AWWA C111 and C153.
  3. Minimum working pressure of 350 psi for pipe sizes 3" - 16" and 250 for pipe sizes 18" - 42" with a minimum safety factor of 2:1.
  4. Acceptable Manufacturers:
    - a. ROMAC
    - b. EBAA Iron (3"-48")
    - c. Uni-Flange Series 1400 (4"-12")
    - d. StarGrip Series 3000, 3000S and 3000OS (3" - 48")
- B. Push-on Joint Restraint Systems for Ductile Iron Pipe and Fitting Joints
  1. Gasket System shall conform to AWWA C11
  2. Pressure Ratings shall be 350 psi for 4" - 24", 250 psi for 30" - 64"

3. Acceptable Restraints applied to Standard Push-on Bell per AWWA C111:
  - a. ROMAC (4"-36")
  - b. EBAA Iron (4"-36")
  - c. Uni-Flange 1390 Series (4"-24")
  - d. Uni-Flange 1450 Series 30"-36")
  - e. StarGrip 3100P Series
  - f. The use of manufacturers' restraint closure devices such as American Field Flex-Ring or US Pipe TR-Gripper Ring may be used for field adaptability as needed. Use of these products must be approved by the Owner.
4. Standard spigot end bell and pipe socket shall conform to AWWA C151.
5. Push-on joints shall conform to AWWA C111.
6. Gasket type restraining devices are not acceptable.

## 2.6 FLANGED OR GROOVED END DUCTILE IRON PIPE

- A. Flanged Pipe: AWWA C115 including Appendix A, minimum thickness Class 53.
- B. Grooved End Pipe: AWWA C151 with grooves in accordance with AWWA C606, Table 3, for rigid joints. Provide minimum thickness classes in accordance with AWWA C606. Joints: Where flanges are shown on the Drawings, provide mechanical rigid grooved couplings up to 24 inch or flanges, at the Contractor's option, except where grooved couplings are required in the Drawings. (See paragraph 1.09A.1 for special requirements for pipe supports with grooved couplings.) Provide flanges where required to connect to valves, equipment or certain pipe supports.
- C. Flanges: Ductile iron, plain faced, AWWA C115. Submit certification that flanges comply with AWWA C115. Provide insulating flanges with two cathodic test stations for buried ductile iron to steel connections.
- D. Mechanical Grooved Couplings: AWWA C606, minimum pressure rating of 150 psi.
- E. Fittings:
  1. Flanged: Ductile iron, AWWA C110 or AWWA C153.
  2. Grooved End: Ductile iron, AWWA C110 for materials, dimensions and pressure ratings. Grooves shall be in accordance with AWWA C606, Table 3, for rigid joints.
  3. Special Fittings: Special fittings not available in ductile iron may be fabricated of fusion epoxy lined and coated welded steel pipe with a design pressure of 450 psi. Submit design and wall thickness to the Engineer for review.
  4. Buried bolts and nuts for flanged and grooved end joints shall be Type 304 stainless steel.
  5. Bonding: Bond ductile iron to provide electrical continuity, except that insulating flanges without bonding shall be provided where shown on the Drawings.
  6. Gaskets:
    - a. Flanged: Full face, 1/8 inch-thick SBR rubber or NBR (Nitril or Buna N), AWWA C115, Appendix A.
    - b. Mechanical Grooved Coupling: SBR rubber or NBR (Nitril or Buna N), AWWA C606.
  7. Flange Bolts: AWWA C115, Appendix A unless stainless steel is required in paragraph 2.02.

8. Field Closure Connections for Restrained Joints: Pipe cut in the field where necessary and when favorably reviewed by the Engineer shall be connected by one of the following methods:
  - a. Series 3800 Mega-Coupling by EBAA Iron, Inc.; or equal.
  - b. Mechanical Joint Sleeve with two Series 1100 Megalug Restraints by EBAA Iron, Inc.; or equal.
- F. Connections to Existing Pipelines
  1. Connections to existing ductile iron waterlines shall be made using a mechanical joint transition sleeve with steel transition gasket, such as a solid sleeve, restrained with Megalug joint restraint devices or approved equal as shown on the drawings.
- G. HDPE PIPE AND FITTINGS (PIPING MATERIALS)
  1. Fusible HDPE Pipe and Fittings:
    - a. Pipe: High molecular weight, high density, polyethylene pipe, ASTM D3350 OR AWWA 906.
      - 1) Cell Classification: 345464C, or 445474C; color material shall be 345464E.
      - 2) Dimension Ratio (DR): 17 maximum rated to 125 psi working pressure under AWWA C906.
      - 3) Pipe shall be ductile iron OR iron pipe size.
      - 4) Submit manufacturer's certification, including AWWA C906 affidavit of compliance that pipe and fitting complies with the Specifications.
  2. Joints: Butt fusion, ASTM D2657, except mechanical where required to connect with other pipe, valve or equipment materials.
    - a. Butt Fusion Joints: The tensile strength of the joint at yield shall not be less than the pipe. Joints shall be made with equipment acceptable to the manufacturer. The equipment operators shall have been trained by certified fusion technicians. Submit description of the equipment and methods for favorable review.
    - b. Mechanical Joints: Joint shall consist of a flange adaptor fitting butt-fused to the pipe, a back-up ring of cast iron, aluminum, Type 316 stainless steel made to ANSI B16.1 dimensional standards (with modified pressure rating), bolts of galvanized steel, Type 316 stainless steel, and chloroprene gaskets.
  3. Fittings: Molded fittings to ASTM D3261 required where available of the same material as the pipe, with DR no greater than the pipe, and with a pressure rating at least equal to the pipe. Manufacturer shall conduct X-ray inspection on samples from each molded fitting production lot. Fabricated fittings shall comply with AWWA C906 and ASTM F2206 and shall only be used where molded fittings are unavailable. Fitting shall be produced by the same manufacturer as the pipe.

## 2.7 HDPE PIPE COUPLINGS AND FLEXIBLE PIPE PIECES

- A. General: For typical pipe joints refer to pipe material specifications. Other joint devices shall be furnished where called for on the Drawings and as specified below.
- B. Flexible Couplings and Flange Coupling Adaptors:
  1. Sleeve: Cast iron or fabricated steel.

2. Followers: Cast iron, ductile iron, or steel.
3. Sleeve Bolts: ASTM A325, Type 3; malleable iron; or equivalent, except for buried and submerged, which shall be Type 304 stainless steel and Type 316 stainless steel, respectively.
4. Coating: Fusion epoxy OR High-build epoxy line and coat sleeve and followers.
5. Pressure Rating: The test pressure of the applicable service or 50 psi, whichever is greater.
6. Performance: Longitudinal movement and angular deflection capabilities shall meet AWWA C219.
7. Flanged Coupling Adaptor Flanges: Match mating flanges. If required by connecting valve or other device, provide flanges with inside diameter equal to nominal pipe diameter.
8. Buried Flexible Coupling Sleeve: Long barrel; Smith-Blair 442, Dresser Style 40; or equal.
9. Manufacturers:
  - a. Flange Coupling Adaptors: Smith-Blair 912 or 913; Dresser Style 128 W; or equal.

C. Flexible Connectors:

1. Up to 12-inch-Diameter:
  - a. Type: Built-up, single arch (unless otherwise shown on Drawings) rubber expansion joints with full rubber flanges and retainer rings. Provide filled arch-type or wide flowing arches on raw sewage, sludge, and grit service.
  - b. Materials: Neoprene cover over nitrile tube, reinforced with nylon or polyester body and galvanized steel retainer rings, except those used on ozone gas piping systems which shall have Hypalon cover over Hypalon tube, and Type 316 stainless steel retainer rings. OR Protect cover with Hypalon paint where exposed outdoors.
  - c. Pressure Rating: 190 psi.
  - d. Manufacturers:
    - 1) Standard: Proco Series 230; Holz Type 200; Garlock Style 200HP; or equal.
    - 2) Concentric Reducers: Proco RC Series; Holz 200TC.
    - 3) Eccentric Reducers: Proco RE Series; Holz 200TE.
    - 4) For connections to plastic piping systems provide connectors with additional flexibility as recommended by the manufacturer. Proco Series 261R; Holz Type 320EZ; or equal.

D. Flexible Expansion Joints:

1. Type: Single, Double ball joints with integral expansion sleeves. Minimum 15, 30 degrees deflection and 4, 8, 12 inches expansion.
2. Materials: Ductile iron conforming to AWWA C153.
3. Pressure Rating: 350 psi minimum.
4. Lining: Fusion epoxy.
5. Connections: Flanges.
6. Manufacturer: EBBA Iron Flex-Tend; equivalent by U.S. Pipe; or equal.

## 2.8 VALVES AND ACCESSORIES (MATERIALS)

A. General Requirements for Valves:

1. All valves of each type shall be the product of one manufacturer.

2. All exposed valves shall be furnished with operators, handwheels, levers, or other suitable type wrench including handles as specified herein or as shown on the Drawings. Valves 4-inch and larger located more than 7 feet above the floor level shall be furnished with chain operators. All buried valves shall be provided with 2 inch-square operating nut and valve boxes.
3. All threaded stem valves shall open by turning the valve stem counter-clockwise.
4. All exposed valves and valve operators shall have a non-bleeding shop coat, unless otherwise specified. Buried valves and operators shall be painted with an appropriate coating for direct burial installation.
5. Pneumatic and Hydraulic Valve Actuators: Conform to AWWA C504 and AWWA C540 as modified herein. Cylinder bodies, heads, and ends fabricated from plastic, fiberglass, or other non-metallic materials will not be acceptable.

B. Valve and Accessory Systems:

1. Gate Valves 4 inch through 12 inch:
  - a. Rating: 200 psi WOG.
  - b. Type: Rising stem, O.S. and Y, solid wedge, handwheel operated.
  - c. Connections: Flanged, 200 psi WOG.
  - d. Materials: Cast iron, bronze trimmed.
  - e. Manufacturers:
    - 1) American Flow Control Series 2500; or equal.
    - 2) For system pressure above 200 psi, provide Jenkins Figure 20J; Crane 7 1/2 E; or equal.
2. Resilient Seated Gate Valves, 6 inch direct buried.
  - a. General: Comply with AWWA C509 or C515 except where otherwise specified herein. Valve shall be epoxy lined and coated.
  - b. Rating: 200 psi.
  - c. Type: Rising stem, OS&Y, handwheel operated OR except for buried service use OR non-rising stem with operating nut.
  - d. Connections: Flanged.
  - e. Manufacturers: U.S. pipe Metroseal; Clow; or equal.
  - f. Actuators:
    - 1) Type: Manual, except where specified otherwise, or shown otherwise on the. Provide valve position indicators on all actuators.
    - 2) Manual Actuators: Traveling nut, self-locking, or worm gear above 48 inches.
      - a) Buried: Designed for buried service, watertight up to 10 psi. Provide 2-inch-square standard AWWA operating nut, with extension stem to reach the ground surface as shown on the Drawings, and with a ground level position indicator.
      - b) Provide three valve operator tee handles to the Owner.
    - 3) Electronic Actuators:
      - a) Manufacturers: Rotork IQD10, Auma, Limitorque, or approved equal.
      - b) Design of resilient seated gate valves was with American Flow Control Series 2500 gate valves and Rotork IQD10 Actuators.
        - (1) Contractor shall be responsible for verifying space and vault changes if using other manufacturers.

3. Swing Check Valves 2-inch through 12 inch:
  - a. Rating: 175 psi
  - b. Type: Swing, metal seats, outside spring and lever, AWWA C508.
  - c. Connections: Flanged, 125-pound ANSI.
  - d. Materials: Cast iron, bronze trim.
  - e. Manufacturers: Muller; or equal.
4. Electronic Valve Actuators
  - a. Gate Valve with Actuators 8 inch through 12-inch.
  - b. General: Comply with AWWA C509 or C515 except where otherwise specified herein.
  - c. Rating: 200 psi.
  - d. Type: Rising stem, OS&Y, handwheel operated OR except for buried service use OR non-rising stem with operating nut.
  - e. Connections: Flanged.
  - f. Manufacturers: American Flow Control Series 2500; or equal.
  - g. Actuators:
    - 1) Electronic Actuators:
      - a) Manufacturers: Rotork IQD10, Auma, Limitorque, or approved equal.
  - h. Design of gate valves with actuator used American Flow Control Series 2500 gate valve and Rotork IQD10 Actuators. Contractor shall bear all costs for proposing the use of other actuators including verifying space limitations within the vault, increase in vault sizing, operational needs, power configurations and any other changes required if using other actuator manufacturers.
5. Air Valves: **NIC**
  - a. Standard: AWWA C512, except as modified herein.
  - b. Air Release Valves (ARVs):
    - 1) Function: Releases accumulated air under pressure at pipeline high points.
    - 2) Materials: Cast or ductile iron body; stainless steel float.
    - 3) Pressure Rating: 150 psi.
    - 4) Manufacturers: Apco Series 200; equivalent by Valmatic; or equal.
  - c. Air and Vacuum Valves (AVVs):
    - 1) Function: Exhausts large volumes of air during pipeline filling and allows air back in when pipeline pressure drops below atmospheric pressure.
    - 2) Provide slow closing Surge Check below air valve consisting of a globe style, sliding disc spring return valve.
    - 3) Materials: Cast or ductile iron body; stainless steel float.
    - 4) Pressure Rating: 150 psi.
    - 5) Manufacturers: Apco Series 140 or 150; equivalent by Valmatic; or equal.
  - d. Combination Air Valves (CAVs):
    - 1) Function: Exhausts large volumes of air during pipeline filling, releases accumulated air under pressure and allows air back in when pipeline pressure drops below atmospheric pressure.

- 2) Provide slow closing Surge Check below air valve consisting of a globe style, sliding disc spring return valve.
- 3) Materials: Cast or ductile iron body; stainless steel float.
- 4) Pressure Rating: 150 psi.
- 5) Manufacturers: Apco Series 140C or 150C; equivalent by Valmatic; or equal.

C. Valve and Accessory: **NIC**

1. Applicable Service Conditions: Clean water at pressures to 150 psi and temperatures to 150°F utilizing copper piping.
2. Gate Valves through 2 ½ inch:
  - a. Rating: 200 psi water.
  - b. Type: Rising stem, solid wedge.
  - c. Connections: Solder ends for copper pipe.
  - d. Materials: All bronze.
  - e. Manufacturers: Jenkins; Crane; or equal.
3. Globe Valves through 2-½ inch:
  - a. Rating: 200 psi water.
  - b. Type: Renewable disc, globe or angle.
  - c. Connections: Solder ends for copper pipe.
  - d. Materials: All bronze.
  - e. Manufacturers: Jenkins; Crane; or equal.
4. Check Valves through 2 ½ inch:
  - a. Rating: 200 psi water.
  - b. Type: Regrinding swing check.
  - c. Connections: Solder ends for copper pipe.
  - d. Materials: Bronze with bronze or brass disc.
  - e. Manufacturers: Jenkins; Crane; or equal.
5. Pressure Relief Valves:
  - a. Rating: 150 psi for valves 2-inch and smaller.
  - b. Type: Adjustable spring loaded.
  - c. Connections: Threaded.
  - d. Materials: Bronze body.
  - e. Manufacturers: Consolidated 2478; Farris 1400S; or equal.

D. Miscellaneous Valves and Accessories:

1. Kor n Seal boots: Kor n Seal brand or approved equal flexible seals shall be flexible booted connections at the vault penetrations. The boots shall form a watertight seal of the annular space between a pipe and the hole in the wall.
2. Valve Boxes for Buried Valves: Adjustable, cast-iron, screw-type, installed with top set at finished grade. All valve boxes and covers shall be suitable for H20 AASHTO wheel load. Clow Figure F-2454 with Figure F-2476 extension; equivalent products by Mueller; or equal.
3. Concrete Vaults and Valve Boxes: Precast reinforced concrete, of the size and orientation shown on the Drawings. Unless otherwise shown or noted, all vaults, boxes, and their covers shall be designed for H20 AASHTO wheel loads. Steel lids shall be galvanized. Provide Christy, Brooks, or equal.
4. Pipe Supports: The contractor shall design and submit his design of pipe supports for review and approval. Pipe supports shall be adjustable and shall include anchorage design and calculations.



## **PART 3 EXECUTION**

### **3.1 PIPING INSTALLATION**

#### **A. General Handling and Placing:**

1. Exercise care to prevent injury to or scoring of the pipe lining and coating, as applicable, during handling, transportation or storage. Do not store pipe on rough ground and do not roll the pipe on the coating. Any damaged pipe sections, specials, or fittings shall be repaired or replaced at the expense of the Contractor as satisfactory to the Engineer.
2. Carefully inspect each pipe, fitting, valve and accessory before installation to insure there is no defective workmanship or obstructions. Inspect the interior and exterior protective coatings and patch all damaged areas in the field or replace to the satisfaction of the Engineer.
3. Place or erect all piping to accurate line and grade and backfill, support, hang, or brace against movement as specified or shown on the Drawings, or as required for proper installation. Remove all dirt and foreign matter from the pipe interior prior to installation and thoroughly clean all joints before joining.
4. Use reducing fittings where any change in pipe size occurs. Do not use bushings unless specifically noted on the Drawings. Use eccentric reducing fittings wherever necessary to provide free drainage of lines.
5. Pipes 5 inches and smaller may be cast in place or installed in a smooth core drilled hole using a link type seal at the Contractor's option. Maintain at least ½ inch clearance between reinforcing steel and metal pipe in penetrations.
6. Cover polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC) and polyethylene (PE) pipe stored outside for more than two months with canvas or other opaque material. Provide for air circulation under the covering.

#### **B. General Buried Piping Installation:**

1. Trenching, bedding, and backfill for buried piping shall be as shown on the Drawings and as specified in Section 31 23 16.
2. Where pipe grade elevations are shown on the Drawings, install the pipe with straight grades between the indicated elevations.
3. Where no pipe grade elevations are shown on the Drawings, install buried piping with at least 3 feet of cover to finished grade. Where piping crosses under buried electrical ducts, provide 12 inches minimum separation between the buried pipes and ducts.
4. Provide each pipe with a firm, uniform bearing for its full length in the trench except at field joints. Do not lay pipe in water or when trench conditions or weather are unsuitable for such work.
5. Protect buried piping against thrust by use of restrained pipe joints and/or thrust blocks. All exposed free pipe ends shall be securely braced. Cap or plug pipe ends that are left for future connections as shown on the Drawings and in a manner favorably reviewed by the Engineer.
6. Where piping leaves a structure or concrete encasement, provide a joint capable of angular deflection within 12 inches of the structure for pipes 12 inch and smaller or as shown on the Drawings for larger pipe sizes. Conform to details on the Drawings where such details are shown.
7. Concrete Encasements: All piping and conduits except plumbing lines installed under slabs or footings on earth or crushed rock shall be encased in concrete not less than 6-inch thickness on all sides and extending up to the bottom of the slab or footing, unless otherwise specifically noted on the Drawings.

Encasement shall extend to within 6 inches of the first pipe joint beyond the slab or footing. Provide concrete encasement whether or not the encasement is shown on the Drawings. Provide encasement under slabs on earth or crushed rock even if the structure is supported on piles, caissons, or footings. Provide continuous concrete cradles where shown.

8. Do not pull bell and spigot, gasketed joints more than 75% of the maximum deflection permitted by the pipe manufacturer.

C. General Exposed Piping Installation:

1. Unless shown otherwise, install piping plumb and level.
2. Install piping without springing or forcing the pipe in a manner that would set up stresses in the pipe, valves, or connected equipment.
3. Set all pipe flanges level, plumb, and aligned. All flanged fittings shall be true and perpendicular to the axis of the pipe. All bolt holes in flanges shall straddle vertical centerline of pipes.
4. Flexibility and Expansion: Provide flexible couplings, flexible hose, or flexible spools for all piping connections to motor driven equipment and where otherwise shown. The Contractor may install additional flexible couplings at favorably reviewed locations to facilitate piping installation, provided that he submits complete details describing location, pipe supports, and hydraulic thrust protection. Anchor piping subject to expansion or contraction in a manner permitting strains to be evenly distributed. Sleeves for branches through walls from adjacent mains shall be of sufficient size to allow for free side motion of covered pipe in sleeves.
5. Install unions or flexible connections where shown on the Drawings, and at all non-motor-driven equipment to facilitate removal of the equipment.

D. Water Main Installation:

1. The Contractor is advised that precautions taken to keep the pipeline clean during construction will facilitate achieving the disinfection requirements of this project with a minimum of effort and expense. Compliance with these suggested minimum procedures will not relieve the Contractor of the disinfection requirements.
2. Prior to installation, thoroughly clean the interior of each length of pipe and each fitting or valve and inspect to ensure that no foreign material remains. Cover both ends with plastic and do not uncover them until just prior to completing the joint.
3. Whenever pipe laying is discontinued for short periods, or whenever work is stopped at the end of the day, close the open ends of the pipe with water-tight plugs or bulkheads.
4. Provide adequate trench pumping to ensure against groundwater contacting the inside of the pipeline at any tie. Do not lower any pipe or fitting into a trench where groundwater is present and may enter the pipe. When necessary, pump the water from trenches and keep the trench dry until the joint has been completed and the open ends of the pipe have been closed with a water-tight plug. Do not remove the plug until the trench has again been pumped dry.
5. Keep new pipe sections clean and dry.
6. When making the connection between a new pipeline and an existing pipeline, or when repairing a damaged pipe, take the following extra precautions:
  - a. Clean the exterior of the existing pipeline of all dirt and debris, and spray or swab with a standard 5.25% or stronger chlorine solution (as specified) in the immediate vicinity of the work. Clean equipment and

- materials, including new pipe and fittings, to be used in making these connections of all dirt and debris and disinfect them. Allow at least 30 minutes contact time before the chlorine solution is diluted or rinsed off. Provide sufficient trench pumps to prevent flooding of the trench.
- b. When an old line is opened either by accident or by design, the excavation may be wet or badly contaminated from groundwater. Apply liberal quantities of standard chlorine solution tablets to the open trench areas to lessen the danger from such pollution. Tablets are recommended because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation. Scatter liberally around and locate the tablets so that flow entering the work site will contact the disinfecting agent. Trenching application should be done very carefully to avoid contact by skin and clothing with chlorine solution. Minimally, safety dictates wearing safety goggles and rain gear.
  - c. When excavating a leaking or broken pipeline, "valve-off" the system gradually to less than watertightness. This is to prevent causing areas of zero pressure which would allow entry of foreign material. A flow should be maintained which is slightly less than trench pump capability. Once the break is exposed and cleaned to disallow site contamination, the valving can then be made watertight.
  - d. Flanged Joints: Flanged joints shall be made up tight with care being taken to avoid undue strain in the flanges, fittings, and other accessories. Bolt holes shall be aligned for each flanged joint. Bolts shall be full size for bolt holes; use of undersize bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Adjoining flange faces shall not be out of parallel to such a degree that the flanged joint cannot be made watertight without overstraining the flange. Any flanged pipe or fitting whose dimensions do not allow the making of a proper flanged joint as specified herein shall be replaced by one of the proper dimensions. Clean flanges prior to making joints. Buried flanged pipe connections shall be made with the smallest practical "bell" hole. After the joint is completed take special care to completely fill the "bell" hole under and around the pipe with compacted backfill.
  - e. Mechanical Grooved Couplings: Install in accordance with the manufacturer's instructions.

## 3.2 HDPE PIPING (INSTALLATION)

### A. LAYING PIPE AND FITTINGS

1. Handling and laying of pipe and fittings shall be in accordance with the manufacturer's instructions, PPI guidelines, as specified herein, and to line and grades as shown on the Drawings.
2. Pipe and fittings shall not be dropped. All pipe and fittings shall be examined before laying and no piece shall be installed which is found to be defective. Any damage to the pipe shall be repaired as directed by the manufacturer and approved by the Owner. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner at the Contractor's own expense. Any pipe with gouges exceeding 10 percent of the nominal wall thickness will be rejected (e.g., 0.257 inches for 54-inch SDR 21 HDPE pipe).

3. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work and shall conform to the lines and grades required when laid. Good alignment shall be preserved in laying. Fittings, in addition to those shown on the Drawings, shall be provided, if required, for crossing utilities or other obstructions that may be encountered upon opening the trench.
4. The Contractor shall not drag the pipe. Rollers or other such devices shall be used to reduce dragging of the pipe. Continuous dragging of long lengths of pipe for transport or installation will not be allowed. Damage to pipe caused by dragging is the responsibility of the Contractor and may be cause for replacement of damaged portion as determined by the Owner. If, in the opinion of the Owner, the pipe may have been dragged to an extent where damage may have occurred to the pipe wall, the Contractor may be asked to install or rotate the pipe such that the section of the pipe which was dragged on the ground be placed in the trench in a manner which will facilitate inspection. The Owner will determine the best orientation of the pipe for inspection. Orientating the pipe for inspection shall be done at no additional cost to the Owner. Any pipe with damage exceeding 10 percent of the nominal wall thickness will be rejected.
5. Pipe shall be installed on grade as shown on the Drawings. Elevation at each joint shall not deviate from that shown on the Drawings by more than 0.5 inch for 1,000 feet of pipe and at all times must slope in the same direction as shown on the Drawings.
6. As much as practicable, the print line on the pipe shall be installed facing upward to facilitate identification of the pipe when initially installed.
7. Except for short runs, which may be permitted by the Owner, pipes shall be laid uphill on grades exceeding 10 percent. Pipe which is laid on a downhill grade shall be blocked and held in place until the downgradient pipe is installed to prevent movement which furnishes sufficient support. All bends shall be properly installed as shown on the Drawings.
8. Pipe fused above ground shall be carefully handled to avoid damage to the pipe. Chains or cable type chokers will not be allowed when lifting fused sections of pipe. Nylon or other wide fabric slings or other similar lifting apparatus with spreader bars shall be used where necessary.
9. The length of open trench required to construct the pipeline shall be kept to a minimum. Lengths of open trench not required for construction of the pipe shall be backfilled and paved such as to allow that portion of the roadway to be opened to the public. The maximum length of open trench shall not exceed that which is shown on the Drawings, unless otherwise accepted by the Owner and agencies having jurisdiction.
10. Prior to installing a pipe section, the bedding material shall be brought to grade along the entire length of the section to be installed. The pipe bedding materials shall be as specified in the Contract Documents.
11. Bending of the pipe to achieve horizontal or vertical changes in direction is allowed. The minimum bending radius, measured along the centerline axis of the pipe is 50 times the nominal pipe size.
12. Vertical pipe deflections shall be checked in the presence of the Owner as soon as practicable after backfill has reached ground elevation with the use of a suitable mandrel measuring device approved by the Owner. Measurement of inside diameter of pipe shall be true vertical and shall be between pipe soffit and pipe invert (12 and 6 o'clock positions). Percentage deflection of pipe shall be calculated as:

- a.  $\text{Percent Deflection} = (\text{Base ID} - \text{Measured Vertical ID}) \times 100 \text{ Base ID}$
- b. A maximum 5 percent deflection of pipe will be allowed. Owner may measure pipe deflection at later date. Where pipe deflection is found to be more than 5 percent (2.70 inches), the pipe will be rejected. The Contractor shall perform all corrective measures as agreed upon with the Owner.
13. The Contractor shall excavate additional trench holes as required to permit removal of the slings, install flanges and providing coating and protective covers.
14. As pipe laying progresses, the Contractor shall keep the pipe interior free of all debris. The Contractor shall completely clean the interior of the pipe of all sand, dirt, and any other debris following completion of pipe laying and fusing of joints prior to testing the completed pipeline.
15. Until the pipe is backfilled, trench shall be free of water and kept dry to avoid floatation of the pipe. Laying of pipe with water in trench shall not be allowed.
16. The Contractor shall provide anchors if required and as recommended by the pipe manufacturer and approved by the Owner to avoid floatation of pipe until the pipe is backfilled at no additional cost to the Owner.
17. Install tracer wire and warning tape as shown on the Drawings.
18. Backfill trench in accordance with the Contract Documents.
19. All HDPE pipe must be at the temperature of the surrounding soil at the time of backfilling and compaction.

#### B. HEAT FUSION OF PIPE

1. The joining method shall be the thermal butt fusion method and shall be performed in strict accordance with these Specifications, PPI guidelines, and the pipe manufacturer's recommendations. Should there be a conflict between these Specifications and the pipe manufacturer's recommendations, the more stringent requirement shall govern. The butt fusion equipment used in the joining procedures shall be capable of meeting all conditions and procedures recommended by the pipe manufacturer, including but not limited to, temperature requirements, alignment, and interfacial fusion pressure and automatic recording of parameters for joining.
2. Sections of polyethylene pipe should be joined into continuous lengths on the work site above ground or in the pipe trench as applicable or required.
3. Heat fusion joining shall be complete, efficient, and match the outer diameter of the two pipe being heat fused. Any offset or mismatch shall not exceed the requirements of this Specification. In all cases, heat fusion pipe joints shall have a joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion shall not be used. Extrusion welding or hot gas welding of HDPE shall not be used.
4. Butt fusion procedure shall include the following steps:
  - a. Fill out an inspection record sheet for this joint. Each joint shall have a separate inspection record sheet. Include the fusion machine datalogger joint number on the separate inspector sheet so matching the records can be done later if require.
  - b. Support the pipe on each end of the fusion machine on longitudinal pipe rollers not less than the height of the fuser bed for three pipe lengths each end of the machine.
  - c. Clamp down the pipes to be joined.
  - d. Verify that both pipe ends to be joined are round.
  - e. Face the pipe ends.

- f. Inspect the inside of each pipe prior to fusion welding and make sure that no defect will interfere with the welding and that there are no surface anomalies anywhere on the inside of the pipes. Check that the cutting blades have not been dulled and damaged the sharp edges of the cut.
  - g. Align the pipe profile so that pipes are properly aligned around the entire circumference.
  - h. Melt the pipe interfaces at recommended temperature for the recommended time.
  - i. Remove the heater plate.
  - j. Join the two profiles together.
  - k. Hold under recommended pressure for the cool down period.
  - l. Mark each welded joint with a joint number matching the inspection sheet record.
5. Should the Contractor be unable to maintain less than 10 percent offset or mismatch at the joint as specified herein, irregular curvature of the pipe joints or irregular toe-in of the ends should be checked by the Contractor. The use of internal hydraulic jacks will be allowed to round the pipe as will cutting the pipe ends and spinning of the pipe to match the profile, but in no case, shall polyethylene pipe be fused if it cannot meet any of the fusing parameters as specified herein, without written consent by the Owner and pipe manufacturer. Any such consent shall not void any warranty or reduce the pressure rating of the pipe.
6. In situations where different polyethylene piping materials must be joined, both pipe manufacturers should be consulted to determine the appropriate fusion procedures.
7. Submit detailed fusion joint reports as recorded by the heat fusion machine for all joints. Submit a report to the Owner's Inspector the same day the fusion is made. Submit a formal report of all fusions to the Owner's Project Manager on a weekly basis, no later than 4:00 p.m. each Friday. If any joint as indicated by these reports is found to be unsatisfactory, the Contractor shall remove portions of the pipe containing such joint and install a new pipe piece as required and approved by the Owner.
8. The first fusion shall be a trial fusion to be performed in the field in the presence of the Owner. The trial fusion shall be allowed to cool completely, then fusion test straps shall be cut out. The test strap shall be the longer of 12 inches or 30 times the wall thickness in length with the fusion in the center, and 1-inch minimum or 1.5 times the wall thickness in width. The test strap shall then be bent until the ends of the strap touch. If the fusion fails at the joint, or if the joint exhibits cracking or crazing, a new trial fusion shall be made, cooled completely and tested. Butt fusion of the pipe to be installed shall not commence until the trial fusion has passed the bend back test.
9. Following the successful initial trial fusion, the bend back test shall be performed once every fiftieth joint or once per week, whichever is more frequent.
10. Optional limited access fusion machine may be used for joining of HDPE pipe by butt fusion. Limited access fusion machines must meet the same certification, quality, and capability requirements of the regular fusion machines specified herein.

### C. THERMAL EXPANSION AND CONTRACTION

1. The contractor's attention is directed to the table below showing the increase or decrease in length for a given change in temperature in HDPE pipe. The table presents length changes based on the temperature differentials of ambient temperature when fused minus the installed in-use temperature. The coefficient of thermal expansion for HDPE is 0.000067 inch per inch of pipe length, per degree F.
2. Expansion and Contraction
  - a. Change in Temperature
  - b.

	10° F	30° F	50° F
1)	0.08 inches	0.24 inch	0.40 inch
2)	0.40 inches	1.2 inches	2.0 inches
3)	0.80 inches	2.4 inches	4.0 inches
3. The Contractor shall be responsible for the effects of accommodating the change in length of HDPE pipe during HDPE pipe installation. Care shall be taken to bury HDPE at the coolest time in the morning to avoid pipe shrinkage following placement.

### 3.3 COUPLING INSTALLATION

- A. Flex Tend installations shall be performed in accordance with manufacturers' installation requirements.
- B. Flexible Couplings and Flange Coupling Adaptors: Prior to installation, thoroughly clean oil, scale, rust, and dirt from the pipe to provide a clean seat for the gasket. Wipe gaskets clean before they are installed. If necessary, flexible couplings and flanged coupling adapter gaskets may be lubricated with soapy water or manufacturer's standard lubricant before installation on the pipe ends. Install in accordance with the manufacturer's recommendations. Tighten bolts progressively, drawing up bolt on opposite sides a little at a time until all bolts have a uniform tightness. Workers tightening bolts shall be equipped with torque-limiting wrenches or other favorably reviewed type. Anchor studs on restrained flanged coupling adaptors shall be installed so as to lock into holes drilled through the pipe wall in accordance with manufacturer's recommendation.

### 3.4 INSTALLATION OF VALVES AND ACCESSORIES

- A. Use reducing fittings where any change in pipe size occurs between valves or accessories and the attached pipeline. Bushings shall not be used, unless specifically noted on the Drawings. Use eccentric reducing fittings wherever necessary to provide free drainage of lines.
- B. Install valves and accessories such that all parts are easily accessible for maintenance and operation. Provide valve boxes for buried valves.
- C. Where valve handwheels are shown on the Drawings, valve orientation shall be as shown. Where valve handwheels are not shown, orient valves to permit easy access to the handwheels or handles and to avoid interferences.
- D. Install pressure gauges and thermometers if required, in a position to permit reading them from a point approximately 5 feet above floor level, except that pump pressure gauges shall be installed close to the pump elevation.

- E. Rigidly support pressure switches and connect them to piping and equipment using a suitable flexible linkage that will not permit transmission of vibrations from the piping or equipment to the pressure switches.
- F. Provide a union adjacent to each screwed end valve and accessory with additional unions as necessary to facilitate removal.
- G. Provide a shutoff valve below each pressure gauge, protective device or air valve unless otherwise specified.
- H. Connections between ferrous and non-ferrous piping, valves, accessories or pipe supports shall be made using a dielectric coupling, union, or flange.
- I. Where valves or other pipeline items require metal full-face connecting flanges, provide intermediate flanges if the connecting flange is not adequate.
- J. Install Kor n Seal boots in smooth core drilled holes. Grout both sides flush with non-shrink grout unless otherwise shown on the Drawings.

### **3.5 CONCRETE THRUST BLOCKS**

- A. Fittings shall be adequately “blocked” with poured-in-place concrete, poured shaped to establish a firm minimum bearing area, against an undisturbed earth wall as shown on the plans. Timber blocking or dry blocking will not be permitted. Concrete thrust and/or anchor blocking, as indicated on the plans, shall be placed at bends, dead ends, crossed, and as designated by the engineer. Blocking shall be 3,000 psi concrete mix poured in place. All concrete thrust blocking configurations and sizes shall be per the plans. The poured in place concrete thrust and/or anchor blocks shall be in place at least 24 hours before beginning the pressure test, to allow the concrete to set. Longer durations may be required to ensure adequate curing has been established to conduct the necessary testing. All blocking dimensions shown on the plans are considered as minimums with the ideal trench excavation results, and consideration shall be given to unusual circumstances, soil conditions, and topography. All valves and all fittings requiring a concrete block shall first be covered with 4-mil visqueen plastic sheets, before concrete is poured. At no time shall the concrete be allowed to cover joints, bolt heads, or nuts.

### **3.6 FIELD QUALITY CONTROL**

- A. The Owner will:
  - 1. Inspect field welds and test the welds if it is deemed necessary.
  - 2. Perform bacteriological analysis for pipeline to be disinfected.
- B. Factory Quality Control: The Contractor shall test all products as required herein and by the reference specifications.
- C. The Contractor shall:
  - 1. Perform leakage tests.
  - 2. Be responsible for the costs of additional inspection and retesting by the Owner resulting from non-compliance.



### 3.7 CLEANING

- A. Prior to testing, thoroughly clean the inside of each completed piping system of all dirt, loose scale, sand and other foreign material. Cleaning shall be by sweeping, flushing with water or blowing with compressed air or oil-free nitrogen gas, as appropriate for the size and type of pipe. Flushing shall achieve a velocity of at least 3 feet per second. The Contractor shall install temporary strainers, temporarily disconnect equipment, or take other appropriate measures to protect equipment while cleaning piping. Cleaning shall be completed after any pipeline repairs.

### 3.8 FIELD TESTING

- A. General: Perform leakage tests on all pipe installed in this project as required by Section 33 05 05.31. Furnish all equipment, material, personnel and supplies to perform the tests and make all taps and other necessary temporary connections. The test pressure, allowable leakage and test medium shall be submitted by the contractor for review by the Design Professional. Leakage tests shall be performed on all piping at a time agreed upon and in the presence of the Design professional. All visible leaks shall be repaired. The Contractor may use water for construction, cleaning, testing, and disinfection of the pipelines from the City at a fire hydrants designated by the City. At any connection to the City water system, the Contractor shall provide an air-gap or reduced pressure backflow valve system to prevent backflow into the water source.
- B. Buried Piping: The leakage test for buried piping shall be made before all pipes are backfilled. If the Contractor elects to conduct preliminary tests, provide any necessary temporary thrust restraint.
- C. Exposed Piping: All supports, anchors and blocks shall be installed prior to the leakage test. No temporary supports or blocking shall be installed for final test.
- D. Accessories: It shall be the responsibility of the Contractor to block off or remove equipment, valves, gauges, etc., which are not designed to withstand the full test pressure.
- E. Testing Apparatus: Provide pipe taps, nozzles and connections as necessary in piping to permit testing including valves to isolate the new system, addition of test media, and draining lines and disposal of water, as is necessary. These openings shall be plugged in a manner favorably reviewed by the Engineer after use. Provide all required temporary bulkheads.
- F. Correction of Defects: If leakage exceeds the allowable, the installation shall be repaired or replaced and leakage tests shall be repeated as necessary until conformance to the leakage test requirements specified herein have been fulfilled. All visible leaks shall be repaired even if the pipeline passes the allowable leakage test.
- G. Reports: The Contractor shall keep records of each piping test, including:
  - 1. Description and identification of piping tested.
  - 2. Date of test.
  - 3. Witnessing by Contractor and Engineer.
  - 4. Test evaluation.
  - 5. Remarks, to include such items as:

- a. Leaks (type, location).
  - b. Repairs made on leaks.
- 6. Test reports shall be submitted to the Engineer.
- H. Venting: Where not shown on the Drawings, the Contractor may install valved "tees" at high points on piping to permit venting of air. Valves shall be capped after testing is completed.
- I. Testing Specifics: Piping shall be tested as indicated in Section 33 01 10.58. All other piping systems shall be tested as required for the pipe type used. Unless specified otherwise, test each system for four hours.

### **3.9 DISINFECTION OF POTABLE WATER SYSTEMS**

- A. As specified in 33 01 10.58 Disinfection of Water Utility Piping Systems.

**END OF SECTION**

**SECTION 48 09 00**  
**INSTRUMENTATION AND CONTROLS, GENERAL REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Work Included:
  - 1. Provide all tools, equipment, materials, and supplies and be responsible for all labor required to complete the installation, startup and operational testing of a complete and operable Instrumentation and Control (I&C) System as indicated on the Drawings and as specified herein.
  - 2. Provide all the necessary equipment components and interconnections along with the services of manufacturers' engineering representatives necessary to ensure that the Owner receives a completely integrated and operational I&C system as herein specified.
  - 3. Provide all terminations for wiring at field mounted instruments, equipment enclosures, alarm and status contacts.
  - 4. Provide all Instrumentation and Control wire required for a fully functioning Instrumentation and Controls System as shown on the Drawings except for wire specifically specified in Division 26.
- B. Work Specified in Other Divisions:
  - 1. Process piping, installation of inline instrumentation and other mechanical work and equipment as specified in relevant Divisions.
  - 2. Instruments and controls which are not directly used for process control, i.e., those provided as part of a package system, such as a boiler, air compressor, etc. as specified in relevant Divisions.
  - 3. Division 26 work, including all instrumentation and controls conduit, and only that wire specified in Division 26. Refer to Division 26 Specifications for specific requirements for wire, conduit, grounding, and other electrical equipment.

**1.02 REFERENCE STANDARDS**

- A. American National Standard Institute (ANSI) Publications:
  - 1. Y14.15a Drafting Practice
  - 2. C62.1 Surge Arrestors
- B. Instrumentation Society of America (ISA) Publications:
  - 1. S5.4 Instrument Loop Diagrams
  - 2. S20 Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

**1.03 I&C SUBCONTRACTOR QUALIFICATIONS**

- A. An I&C Subcontractor shall be an electrical contractor who has demonstrated experience in purchasing, calibrating, fabricating, installing and testing the Instrumentation and Control (I&C) products listed in this Specification Section. Normally, the I&C Subcontractor is a systems house regularly engaged in the business of panel fabrication, control component procurement, programmable logic controller, remote terminal unit, and personal computer (PC) application in the process control industry.

- B. The I&C Subcontractor has been regularly engaged for a period greater than five years in performing all aspects of the type of work specified in this Section and shown on the Drawings and must prequalify as specified below.
- C. To prequalify, the I&C Subcontractor shall submit 1) proof in the form of names and references of jobs over the past five years where this work was accomplished, 2) present samples and an explanation of representative work performed at a meeting with the Engineer prior to bid award, 3) submit the name and qualifications (resumes) of the proposed employees of the firm who would be responsible for the day-to-day work, and 4) an explanation of how the I&C Subcontractor will carry out and implement the responsibilities described in the following section.
- D. Demonstrated experience installing and programming the Mission Controls RTU as shown in the drawings. Programming will be required modifying existing and on new devices.

#### 1.04 I&C SUBCONTRACTOR SYSTEM RESPONSIBILITIES

- A. General:
  - 1. The I&C subcontractor shall be responsible for the correct design and installation of all hardware and systems specified in this Division. The I&C subcontractor shall be a qualified and competent electrical contractor. Entire systems installation, calibration, validation, startup, operational testing and training shall be performed by qualified personnel who have had experience performing similar installations.
  - 2. Certain primary elements, final control elements, etc., which are installed in the process lines are specified under other Divisions of these Specifications; however, the installation of these elements shall be under the supervision of the I&C subcontractor to the extent recognized by previous labor agreements.
- B. System Responsibilities:
  - 1. Instrumentation and control system drawings are diagrammatic only. Ensure that all components of the instrumentation system, including primary measuring, indicating, transmitting, receiving, recording, totalizing, controlling, and alarming devices and all appurtenances are completely compatible and shall function as outlined and shall furnish and install such additional equipment, accessories, etc., as are necessary to meet these objectives at no cost to the Owner.
  - 2. Instrumentation and control system drawings are diagrammatic only. Obtain technical data, determine performance requirements, develop installation details and integrate I&C subcontractor supplied equipment with Contractor supplied equipment where depicted on the Drawings.
  - 3. Compatibility: See that all components of the instrumentation system, including equipment specified under other Divisions, are completely compatible and function properly as a system. Provide such additional equipment, accessories, etc., as are necessary to meet these objectives at no cost to the Owner.
  - 4. Coordination: For control components, devices, and systems specified in relevant Divisions or shown on the Drawings.
    - a. Provide technical advice to mechanical and electrical subcontractors as necessary regarding their installation of instruments.
    - b. Work with Mechanical contractor on 24 VDC motorized valve actuators sizing and conductor sizing.

- c. Work with ShakeAlarm seismic controller manufacturer on their panel location, interface with existing RTU, and placement of the seismic sensor on the building structure.
  - d. Verify the correctness of installation of all instruments.
  - e. Verify that the proper type, size, and number of control wires with their conduits are provided.
  - f. Verify that the proper type, size, and number of pneumatic tubes with their conduits are provided.
  - g. Verify that proper electric power circuits provided for all components and systems.
  - h. Resolve all manufacturers' installation discrepancies between requirements and the detail requirements of the Drawings and Specifications.
  - i. Supervise final signal connections, both electric and pneumatic, to all process instrumentation and control equipment.
  - j. Adjust, startup, and test all process instrumentation and control equipment.
  - k. Provide specified documentation and training.
5. Performance: While the Drawings provide sufficient information to establish the form and function of the systems and their relationships, the responsibility for system integration and performance rests solely with the Contractor. The Engineer provides technical instruction and guidance where needed.
6. Site and Instrument Inspection: Inspect site for conformance to Drawings, paying special attention to space allocation and dimensions shown or required on Drawings. Inspect completed work and verify that it is ready for installation of instruments and equipment. Inspect each instrument and piece of equipment for damage, defects, completeness, and correct operation.

#### 1.05 SUBMITTALS

- A. Refer to Division 1 for required method of preparation and transmittal, and conform to requirements herein.
- B. Shop Drawings: Submit shop drawings for review in complete bound sets indexed by Specification number, with exterior tabs marked by subject. Submit manufacturer's catalog cuts for each item for which shop drawings are not required. Manufacturer's catalog cuts, specifications or data sheets shall be clearly marked to delineate the options or styles to be furnished. Show dimensions, physical configurations, methods of connecting instruments together, mounting details, and wiring schematics. Drawings shall be complete with device tag numbers, wire numbers and terminal board numbers. Submit fabrication details, nameplate legends, and control panel internal wiring and piping schematic drawings. Submit panel graphic drawings where applicable. Include material lists and/or bills of material.
  - 1. Loop Diagrams:
    - a. Submit Instrument Loop Diagrams per ISA S5.4 to provide necessary detail for connection of analog instrument and control system components including those components specified in other sections of these Specifications.
    - b. Provide with the Instrument Loop Diagrams all instrument model numbers, ranges, set points, sizes, process fluids, specification reference numbers, and all other information listed as "desirable and optional items of information" per ISA S5.4.

2. Interconnection Diagrams: Submit point-to-point type interconnection diagrams conforming to ANSI Y14.15a. Include each conduit run, with wirefill noted for each run. Include electric panel and circuit numbers for all sources of 120 Vac power. Show conduit and wiring interconnections between each control panel, instrument, multiplexer or telemetry unit, motor control center, motor combination starter, valve actuator, and other field-mounted device. Include all equipment and appurtenances provided in this contract regardless of the Division in which it is specified.
  3. Elementary Diagrams: Submit an elementary diagram for control, protection, and monitoring circuits. Elementary diagrams are not required for lighting, communications and those systems clearly defined on the single line diagram. Show all interconnections between power sources, apparatus, and device elements of a particular system or equipment, and all interlocks with other systems in a manner which fully indicates circuit function and operation. Refer to the Drawings for functional and operational requirements.
- C. Specification Forms:
1. Submit completed Specification Forms per ISA S20, including those instrumentation and control components directly related to process control, but specified in other Divisions of these Specifications.
  2. Include on each form the assigned tag numbers, manufacturer's part numbers, and device data. More than one tag numbered item may be included on a sheet.
- D. As-Built Drawings: Submit a revised set of shop drawings that incorporates all change orders and modifications made during performance of the work. In addition to updated loop diagrams, interconnect diagrams and elementary diagrams, submit equipment and device wiring diagrams and other drawings as necessary to depict the "as-built" condition of equipment. Include all installed field and panel conduit and piping/tubing runs and routing, tray systems, supports, mounting details, interconnection diagrams with cable, wire, tube and termination numbers. Coordinate all drawings with the conductor identification requirements in Section 26 05 19 and Section.26 05 13 Submit a copy of CAD produced drawings on magnetic media in AutoCAD DWG or DXF or IGES format.
- E. Operation and Maintenance Manuals: Furnish Operation and Maintenance Manuals, including Instruction Manuals and Part Lists, for equipment provided under Divisions 40 and 48 as required by Division 1. Obtain data from manufacturers, and format and bind as specified. Obtain distribution method instructions from the Owner or his representative.
1. Schedule: Deliver at least two (2) copies of manuals in 3-ring binders (8-1/2 by 11-inch format) not later than the equipment shipment date.
  2. Contents: Include in manuals not less than the following information, as applicable, for each instrument, equipment, subsystem and/or control loop:
    - a. General, introduction and overall description, purpose, functions, simplified theory of operations, etc.
    - b. Specifications (including equipment specification data sheet as described above under Shop Drawings), sufficiently detailed for reordering exact duplicates of the original items.
    - c. Installation instructions, procedures, sequences, tolerances, and precautions.
    - d. Operational procedures.
    - e. Shutdown procedures.
    - f. Maintenance, calibration, and repair instructions.

- g. Parts list and spare parts recommendations.
- h. Calibration curves, rating tables, and any other data showing the relationship of the variable inputs and the calibrated output of all measuring devices and controlled equipment.
- i. Software programs (PLC Ladder Logic, BASIC, or Source Code).
- j. Computer screens (DWG.PIC).
- 3. Format:
  - a. Use drawings and pictorials to illustrate the text to the extent necessary to insure a clear, concise presentation. If manuals have been written to cover a family of similar instruments or equipment, strike out inapplicable information in a neat fashion or emphasize applicable portion by heavily weighted arrows, circles or boxes; whichever provides the clearest and neatest presentation.
  - b. Group manuals by system control panels, including field instrumentation connected or associated with the panel. Where identical instruments are used in more than one control loop or subsystem, include only one instruction manual, per panel grouping; however, an index by tag number for all instruments shall identify its location in that manual.
  - c. Provide control loop and/or subsystem operational descriptions to identify the function of each instrument and its relation to the other instruments in the loop.
- 4. Binding: Bind each manual in a cover which indicates the panel or process area to which it applies, manufacturer's name, local address and telephone number, and year of purchase. Punch and bind manuals in standard three ring binders and include system name and subcontractor's name on binding.
- F. Accessory and Maintenance Materials: Submit data for the following items:
  - 1. Special Tools and Accessories: Special tools, instruments, and accessories for maintaining instruments and equipment requiring periodic repair and adjustment as specified elsewhere herein. Also, furnish special lifting and handling devices for equipment requiring such devices.
  - 2. Maintenance Materials and Spare Parts: Submit a list of manufacturer recommended spare parts for each item specified. Refer to other sections of these Specifications.
- G. Test Reports: Submit the following test reports as described herein:
  - 1. Instrument Calibration Data Sheets
  - 2. Factory Testing of Control Panels
  - 3. Instrument Verification Report
  - 4. Final Operational Testing
- H. Demonstration and Final Operation Test Plan and Results: Submit a document that outlines all procedures to be used in final operational testing of instrument and control systems. Include a description of each system, the scope of testing, test methods and materials, testing instruments and recorders, a list of functional parameters to be recorded on each item, and Shop Drawings showing temporary bypasses, jumpers, and devices.

## 1.06 QUALITY ASSURANCE

- A. Standard of Quality: The Contractor shall provide equipment of the types and sizes specified which has been demonstrated to operate successfully. Provide equipment which is new and of recent proven design.

## 1.07 INSPECTIONS

- A. The Engineer may inspect the fabricated equipment at the factory before shipment to job site. Provide the Engineer with sufficient prior notice so that an inspection can be arranged at the factory.
- B. Inspection of the equipment at the factory by the Engineer will be made after the manufacturer has performed satisfactory checks, adjustments, tests and operations.
- C. Favorable review of the equipment at the factory only allows the manufacturer to ship the equipment to the project site. The Contractor shall be responsible for the proper installation and satisfactory startup operation of the equipment to the satisfaction of the manufacturer and the Engineer.

## 1.08 DRAWINGS

- A. Drawings: The Instrumentation Drawings are diagrammatic; exact locations of instrumentation products shall be determined in the field by the Engineer. Except where special details are used to illustrate the method of installation of a particular piece or type of equipment or material, the requirements or descriptions in this Specification shall take precedence in the event of conflict.
  - 1. Locations of equipment, inserts, anchors, motors, panels, pull boxes, manholes, conduits, stub-ups, fittings, power and convenience outlets, and ground wells are approximate unless dimensioned; verify locations with the Engineer prior to installation. Field verify scaled dimensions on Drawings.
  - 2. Review the Drawings and Specification Divisions of other trades and perform the instrumentation work that will be required for the installations.
  - 3. Should there be a need to deviate from the Instrumentation Drawings and Specifications, submit written details and reasons for all changes to the Engineer for favorable review.
  - 4. Resolution of varying interpretations of the Contract Documents shall conform to Division 0, General and Supplementary Conditions.
  - 5. The Drawings provide details of installation and supersede the manufacturer's recommendation where a conflict exists.

## 1.09 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Box, crate, or otherwise enclose and protect instruments and equipment during shipment, handling, and storage. Keep all equipment dry and covered from exposure to weather, moisture, corrosive liquids and gases or any element that could degrade the equipment. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Notify the Engineer in writing in the event that any equipment or material is damaged. Obtain prior favorable review by the Engineer before making repairs to damaged products.



## 1.10 INSTRUMENT SCHEDULE

Type	Loop	Description	Drawings	Manufacturer
ZSO	200	South Reservoir Isolation Valve Open Switch	E101	Rotork (integral)
ZSC	200	South Reservoir Isolation Valve Closed Switch	E101	Rotork (integral)
IS	200	South Reservoir Hatch Intrusion Switch	E101	Allen Bradley
IS	201	South Reservoir Valve Vault Intrusion Switch	E101	Allen Bradley
ZSO	300	North Reservoir Isolation Valve Open Switch	E102	Rotork (integral)
ZSC	300	North Reservoir Isolation Valve Closed Switch	E102	Rotork (integral)
IS	300	North Reservoir Hatch Intrusion Switch	E102	Allen Bradley
IS	301	North Reservoir Valve Vault Intrusion Switch	E102	Allen Bradley

## PART 2 - PRODUCTS

### 2.01 MATERIALS AND STANDARD SPECIFICATIONS

- A. Provide instruments, equipment and materials suitable for service conditions and meeting standard specifications such as ANSI, ASTM, ISA, and SAMA. The intent of this Specification is to secure instruments and equipment of a uniform quality and manufacture throughout the plant. All instruments in the plant of the same type shall be made by the same manufacturer.

### 2.02 NAMEPLATES

- A. For each piece of equipment, provide a manufacturer's nameplate showing his name, location, the pertinent ratings and the model designation.
- B. Identify each piece of equipment and related controls with a rigid laminated engraved phenolic nameplate. Engrave nameplates with the inscriptions indicated on the Drawings and, if not so indicated, with the equipment name. Securely fasten nameplates in place using two stainless steel screws or, where favorably reviewed by the Engineer, with epoxy cement. Where no inscription is indicated on the Drawings, furnish nameplates with an appropriate inscription furnished by the Engineer upon prior request by the Contractor.
- C. Each control device, including pushbuttons, control switches, and indicating lights, shall have an integral legend plate or nameplate indicating the device function. These shall be inscribed as indicated on the Drawings or as favorably reviewed by the Engineer.
- D. Provide CAUTION or SAFETY nameplates to alert operators of special conditions that may result in faulty equipment operations. Devices containing batteries that must be replaced periodically must be clearly identified. Nameplates are not required if the device senses and displays a low battery warning.

## 2.03 NAME TAGS

- A. All instrumentation and equipment items or systems shall be identified by name tags. Field equipment shall be tagged with the assigned instrumentation tag number listed in the Instrument Schedule.
- B. Name tags shall be stainless steel with engraved or stamped black characters of 3/16 inch minimum height. Tags shall be attached to equipment with a tag holder and stainless steel band with a worm screw clamping device. Use 20-gauge stainless steel wire where banding is impractical. For field panels or large equipment cases use stainless steel screws; however, such permanent attachment shall not be on an ordinarily replaceable part.

## 2.04 FIELD-MOUNTED EQUIPMENT

- A. All instrument and control equipment mounted outside of protective structures shall be equipped with suitable surge arresting devices to protect the equipment from damage due to electrical transients induced in the interconnecting lines from lightning discharges or nearby electrical devices. Protective devices used on 120 Vac inputs to field mounted equipment shall be secondary valve surge protectors conforming to the requirements of ANSI C62.1.

## 2.05 EQUIPMENT OPERATING CONDITIONS

- A. All equipment shall be rated for normal operating performance with varying operating conditions over the following minimum ranges:
  - 1. Electrical Power: 120 Vac  $\pm 10\%$ , 60 Hz, unregulated, except where specifically stated otherwise on the Drawings or in the Specifications, or when two-wire, loop-powered devices are specified.
  - 2. Field Instruments:
    - a. Outdoor Areas:  
Ambient Temperature: +15 °F to +120 °F

## 2.06 EQUIPMENT LOCATIONS

- A. Provide equipment and materials suitable for the types of locations in which they are located as defined under Division 26. All equipment specified for field mounting shall be weatherproof and splash proof as a minimum. If electrical or electronic components are contained within the equipment, they shall be housed in NEMA 3R gasketed cases, NEMA 4 cases, NEMA 4X in corrosive locations, and NEMA 7 in hazardous locations unless noted otherwise on the Drawings.

## 2.07 ANALOG SIGNAL INDICATED UNITS

- A. For all instruments with local or remote indicators, provide indicators scaled in actual engineering units, i.e., gallons per minute, feet, psi, etc., rather than 0 to 100%, unless noted otherwise on the Drawings or Instrument Schedule.

## 2.08 SIGNAL TRANSMISSION

- A. Analog:
  - 1. Signal transmission between electric or electronic instruments shall be 4 20 mA and shall operate at 24 Vdc. Signal output from all transmitters and controllers shall be current regulated and shall not be affected by changes in load resistance within the unit's rating. Where practical, milliampere signals

- from the field shall be converted to a voltage signal at the external terminals of each panel, and all instruments within a panel shall be parallel wired.
2. Nonstandard transmission systems such as impulse duration, pulse rate, and voltage regulated will not be permitted except where specifically noted in the Instrument Schedule or shown on the Drawings. When transmitters with nonstandard outputs do occur, their output shall be converted to 4 20 mA prior to transmission.
- B. Discrete: All alarm and status signals shall be 120 Vac unless specified otherwise on the Instrument Schedule. Proprietary data highway or serial bit transmissions such as RS232C shall be allowed to the extent shown on the Drawings.

## 2.09 PANEL/RACK/ENCLOSURE BAY POWER SUPPLIES

- A. Provide each main rack and/or enclosure bay with a separate isolation transformer to prevent ground loops between the instrument and electrical power grounds. These transformers may be nonshielded control power type.
- B. For each two-wire transmitter, provide a 24 Vdc regulated 50 mA power supply with 120 Vac input. Output voltage may be 24 Vdc  $\pm 5\%$  manufacturing tolerance at no load, but shall hold within 1% from no load to full load at 120 Vac  $\pm 10\%$  input. Line to-load regulation shall be within 0.1% from no-load to full load. Ripple shall be less than 15 mV peak-to-peak.
- C. Manufacturer: Provide Model AP9046 instrument loop power supply as manufactured by Action Instruments with plug-in mounting base, equivalent capacity Lambda power supply with terminal blocks for external connections, or equal.

## 2.10 PAINTING

- A. Factory paint all instruments and equipment except where installed in pipelines. Where instrument panels are installed adjacent to electrical control panels provided under Division 16, provide instrument panels of identical color to that of electrical control panels. Paint as required in Division 9 for structural supports, brackets, etc. Repair damaged factory paint to satisfaction of the Engineer. Feathering, priming and painting shall produce a reasonable match to the surrounding paint work.

## 2.11 FASTENERS

- A. Fasteners for securing equipment to walls, floors and the like shall be either hot-dip galvanized after fabrication or stainless steel. Provide stainless steel fasteners in corrosive locations. When fastening to existing walls, floors, and the like, provide capsule anchors, not expansion shields. Size capsule anchors to meet load requirements. Minimum size capsule anchor bolt is 3/8 inch.

## 2.12 TUBING, PIPE, FITTINGS AND SUPPORTS

- A. General: Instrument tubing listed below is required for all instruments and control valves. Select the appropriate tubing materials to satisfy service conditions except where specifically shown on Installation Detail Drawing.
  1. Copper Tubing: Soft-annealed copper tubing shall be 1/4 inch O.D. x 0.030 inch wall, 3/8 inch O.D. x 0.032 inch wall, or 1/2 inch O.D. x 0.032 inch wall as shown on the Drawings. Copper tubing shall be seamless copper, Type DHP, bright annealed after coiling, dehydrated and sealed in 50 foot

- aluminum coils, per ASTM B75. Use for instrument or valve connections only.
2. Copper Tubing: Hard drawn copper tubing shall be in accordance with ASTM B88. Sizes shall be 3/8 inch standard: 3/8 inch O.D. x 0.030 inch wall; 1/2 inch standard: 1/2 inch O.D. x 0.035 inch wall; or 5/8 inch standard: 5/8 inch O.D. x 0.040 inch wall in 20 foot straight lengths with plastic capped ends. Use for header or branch service only.
  3. Stainless Steel: Stainless tubing shall be Type 304 seamless, cold drawn and annealed per ASTM A269. Sizes shall be 1/4 inch O.D. x 0.045 inch wall, 3/8 inch O.D. x 0.035 inch wall or 1/2 inch O.D. x 0.035 inch wall. Use for instrument or valve connections.
  4. Pneumatic Tubing: Pneumatic tubing for panel internals shall be 1/4 or 3/8 inch O.D. rigidwall, clear polyethylene, 125 psi rating. Tubing shall be supported in plastic duct or conduit where appropriate. Use for enclosed or indoor instrument or valve connections.
  5. Fittings:
    - a. Copper Tube: Solder joint fittings shall be seamless wrought copper per ASTM B75. Compression fittings shall be Brass equal to Imperial or Swagelok.
    - b. Stainless Steel Tube: Weld joint fittings shall be Type 304 stainless. Compression fittings shall be Type 316 stainless steel equal to Imperial or Swagelok.
    - c. Supports for Tubing: Supports located in areas exposed to the weather or corrosive atmosphere shall be Type 304 stainless steel Unistrut or equal or made of steel conforming to ASTM A276. Supports not exposed to the weather or corrosive atmosphere shall be carbon steel painted.
    - d. Weld joint fittings shall be permitted for header and branch service only. Instrument and valve connections shall be compression-type only. Use unions on as necessary to simplify instrument removal.
  6. Valves:
    - a. Pipe, Pipe Fittings and Valves: Main-line piping material and root valves for instrumentation shall be as specified in Section 15050.
    - b. Instrument valves shall be 1/4-inch, 3/8-inch or 1/2-inch from Whitey or Hoke to match tubing material and size.

## 2.13 INSTRUMENT CALIBRATION

- A. Each field instrument shall be calibrated at 0%, 25%, 50%, 75% and 100% of span using test instruments to simulate inputs and read outputs that are rated to an accuracy of at least 5 times greater than the specified accuracy of the instrument being calibrated. Such test instruments have accuracies traceable to the National Institute of Standards and Technology (NIST).
- B. Submit a written report to the Engineer on each instrument. This report shall include a laboratory calibration sheet or the manufacturer's standards calibration sheet on each instrument and calibration reading as finally adjusted within tolerances.
- C. The Contractor may, at his option, choose to perform calibration on an instrument by acquiring the services of an independent test lab, or by obtaining the required test instruments and performing the calibration.

## 2.14 FACTORY TESTING OF CONTROL PANELS

- A. All fabricated equipment shall be tested before it leaves the factory. At the factory verify wiring continuity and equipment operation by simulating input and output.
- B. Factory testing of control panels/devices/equipment shall be accomplished. Refer to individual Specification sections for tests requiring favorable review.
- C. Upon completion of factory testing, submit a report certifying the control panels/devices/equipment are operable and meet the Specifications.

## PART 3 - EXECUTION

### 3.01 SCOPE OF WORK

- A. Complete detailed I&C design of instrumentation, controls, drawings, and programming
- B. Build, test, and install control panels :
  - 1. Three Reservoir panels
  - 2. Street Isolation Valve panel
- C. Configure and program Mission RTUs including cellular communications to the existing SCADA system

### 3.02 MOUNTINGS

- A. Mount and install equipment as indicated. Mount field instruments on pipe mounts or other similar means in accordance with suppliers' recommendation. Where mounted in control panels, mount according to requirements of that section.
- B. Equipment specified for field mounting shall be suitable for direct pipe mounting or surface mounting, surface-mounted indicators and equipment with calibration adjustments or requiring periodic inspection shall be mounted not lower than 3 feet 6 inches nor higher than 6 feet above walkways, platforms, catwalks, and the like.
- C. Note that applicable specifications require detail drawings showing seismic sway bracing design and anchorage requirements for their equipment. Seismic zone requirements are specified in Division 1.
- D. All devices shall be accessible to operators for servicing, operating, reading, etc. Provide permanent platforms to assure devices are continuously accessible.

### 3.03 PROCESS CONNECTIONS

- A. Provide instrument impulse tubing to meet the intended process service and ambient environmental condition for corrosion resistance, etc. Install impulse tubing with a continuous slope according to service to promote self-draining or venting back to the process. Terminate connection to process lines or vessels in a service rated roof valve, provided under other Divisions, that will permit closing off the impulse line or removal of the element without requiring shut down of the process. Include blowdown of drip legs and valves for terminations of impulse lines at the instruments.
- B. Process vessels, line penetrations, and root valves shall be furnished and installed under other Divisions of these Specifications. Instrument tubing and valve manifolds are installed as part of this Specification.

### 3.04 FIELD WIRING

- A. Ring out signal wiring prior to termination and perform surge withstand tests where required (see Section 26 05 00, Part 3 for methods). Verify wire number and terminations are satisfactory as designated on the Loop and Interconnect Diagrams. Verify all terminations are tight and shields are uniformly grounded at one location.

### 3.05 ELECTROMAGNETIC INTERFERENCE (EMI)

- A. Construction shall proceed in a manner which minimizes the introduction of noise (RFI/EMI) into the I&C System.
- B. Cross signal wires and wires carrying ac power or control signals at right angles.
- C. Separate signal wires from wires carrying ac power or switched ac/dc control signals within control panels, terminal cabinets, telemetry equipment, multiplexer cabinets, and data loggers as much as possible. Provide the following minimum separations within such equipment unless indicated otherwise on the Drawings:

Power Wiring Capacity	Separation (Inches)
120 volts ac or 10 amps	12
240 volts ac or 50 amps	18
480 volts ac or 200 amps	24
4,160 volts ac or 800 amps	48

### 3.06 SIGNAL GROUNDING

- A. Proper grounding of equipment and systems in this Division is critical, especially if or since computer and associated networks and peripherals are involved. The Drawings and Division 26, specify safety grounding for all equipment in this Division.
- B. A single-point grounding system for instrument signals is required for all instrument panels. This instrument single point grounding system does not use building steel or conduit systems for its ground path.
  - 1. Ground all signal shields, signal grounds, and power supplies at an isolated signal bus within each instrument panel, rack, or enclosure. See Section 48 20 00 for isolated bus requirements. The shields at the far ends of these signal cables must be disconnected (floated) from any ground to prevent ground loops.
  - 2. Do not connect the rack or enclosure frames to the signal grounding buses.
  - 3. Connect each isolated signal ground bus within each panel using a stranded, insulated copper wire of size 6 AWG or larger directly to a system ground rod installed per the Drawings.
- C. If more than one instrument panel or rack is installed side-by-side, locate an isolated system grounding plate in one of the panels (see Section 48 20 00 for requirements).
  - 1. Connect all the isolated signal buses in such instrument panel or rack radially to the system ground plate using a stranded, insulated copper wire of size 8 AWG or larger.
  - 2. Do not use conduit, cable raceways or building steel to distribute the grounding connections; use dedicated wires as specified above. Install a single conduit containing a #2 AWG insulated ground wire from the insulated

grounding plate directly to a system ground rod installed per the Drawings.  
See Division 16 for conduit requirements.

### 3.07 PREPARATION

- A. Ensure that installation areas are clean and that concrete or masonry operations are completed prior to installing instruments and equipment. Maintain the areas in a broom-clean condition during installation operations.
- B. Panels shall be protected during construction to prevent damage to front panel devices and prevent dust accumulation in the intervals. Other protective measures (lamp, strip heaters, etc.) shall be included as weather conditions dictate.

### 3.08 FIELD TESTING

- A. General: The purpose of the field testing is to verify instruments are calibrated and operationally performing their intended function. Provide the services of factory trained and experienced engineers to perform verification and operational testing as prescribed below. Since the initial calibration of instruments may not satisfy the final operation of system, perform recalibration or adjust setpoints as required to satisfy the performance requirements of the system. Notify the Engineer and Owner in writing a minimum of 48 hours prior to the proposed date for commencing final operational testing and acceptance.
- B. System Verification Testing: Verify that each instrument shown on the Instrument Schedule is operating and calibrated as specified in the Instrument Schedule by simulating inputs at the primary element in each system loop and verify performance at loop output devices (i.e. recorder, indicator, alarm, etc., except controllers). Simulate inputs at 0%, 25%, 50%, 75%, and 100% of span or with on-off inputs, as applicable. During system verification:
  - 1. Make initial or provisional settings on levels, alarms, etc. listed in the Instrument Schedule.
  - 2. Verify controllers by observing that the final control element moves in the proper direction to correct the process variable as compared to the set point.
  - 3. Cause malfunctions to sound alarms or switch to standby to check system operation.
  - 4. Check all loop instruments thoroughly for correct operation.
  - 5. Immediately correct all defects and malfunctions disclosed by tests.
  - 6. Submit a report certifying completion of verification of each instrument system. This report shall include a data sheet on each instrument tested that indicates instrument tolerances, instrument calibration verification, data and initial settings made to devices.
- C. Final Operational Testing: Upon completion of instrument verification, test all systems under process conditions in the presence of the Owner or designated representative. System testing shall be accomplished in accordance with the approved Test Plan. The test for each portion thereof shall be witnessed, documented and signed off upon completion by the Engineer. The intent of this test is to demonstrate and certify the operational interrelationship of plant instrumentation and control systems. This testing shall include, but not be limited to:
  - 1. Making final adjustments to levels, alarms, etc.
  - 2. Optimum tuning of controllers.
  - 3. Checking all alarms, failure interlocks, and operational interlocks.
  - 4. Verifying all computer input and outputs and CRT displays are fully functional.

5. Verifying automatic computer-generated reports are performing satisfactorily.
6. Immediately correcting all defects and malfunctions and retesting.
7. Submit the witnessed test results and a transmittal letter indicating that all required systems have been tested satisfactorily and the systems meet all the functional requirements of their applicable specifications.

### 3.09 INSTRUCTION OF OWNER'S PERSONNEL

- A. Provide the services of a factory trained and field experienced instrumentation engineer to conduct group training of up to five of the Owner's designated personnel in the operation of each instrument system. This training shall be for the time period of five working days and shall be performed during the operational testing period. Include instruction covering basic system theory, operating principles and adjustments, routine maintenance and repair, and "hands on" operation. The text for this training shall be the Operation and Maintenance Manuals furnished under these Specifications.

**END OF SECTION**



## **SECTION 48 19 00**

### **PANELS**

#### **PART 1 - GENERAL**

##### **1.01 DESCRIPTION**

- A. Provisions: Requirements of Division 1 and Section 48 09 00 form a part of this Section.
- B. Work Included: This Section covers control panels shown on the Electrical or Instrumentation Drawings, or as specified in either Division 26 or 40, and sets minimum standards for all packaged unit panels specified in related Divisions, unless modified under those sections.

##### **1.02 REFERENCE STANDARDS**

- A. National Electrical Manufacturers Association (NEMA) Publications:
  - 1. ICS 1 General Standards for Industrial Controls and Systems
  - 2. ICS 2 Standards for Industrial Control Devices, Controllers and Assemblies
  - 3. ICS 4 Terminal Blocks for Industrial Control Equipment and Systems
  - 4. ICS 6 Enclosures for Industrial Controls and Systems
- B. Underwriters Laboratories (UL) Publication:
  - 1. 508 Industrial Control Equipment

##### **1.03 SUBMITTALS**

- A. Provide submittals in accordance with Division 01. Shop drawings to be submitted in this Section shall be made in one package under the Product Review Category of Shop Drawings.
- B. Shop Drawings: Submit shop drawings for all control panels, including details for the following items:
  - 1. Electric power wiring schematics.
  - 2. Electric signal wiring schematics.
  - 3. Elementary control diagram.
  - 4. Air supply piping schematics.
  - 5. Pneumatic signal tubing schematics.
  - 6. Fabrication drawings, including a dimensioned outline drawing to scale, showing space for conduits, etc.
  - 7. Seismic design certifications and anchorage descriptions as required by Division 01.
  - 8. Details of all panel accessories.
  - 9. A detailed Bill of Materials.
  - 10. Panel layouts and nameplate inscriptions.
  - 11. Connections to external equipment.
  - 12. Wire marking scheme.
  - 13. Arrange submissions in a logical manner and on the shop drawings use the device abbreviation identifications and equipment names as shown on the Drawings, in order to expedite and facilitate review by the Engineer.
  - 14. Where unit arrangement or wiring deviates in any way from that shown on the Drawings, provide a complete record and explanation of such deviations.

- C. Spare Parts List: Include a spare parts list showing recommended parts and quantities as well as complete ordering information for replacement components. Provide instruction books for special control devices and special equipment installed in the control panels. Submit these to the Engineer prior to installation of the equipment.
- D. Manuals: Provide manuals as specified in Section 48 09 00.

#### 1.04 UL LABEL

- A. UL Label:
  - 1. Each control panel and terminal cabinet shall bear the UL label except as noted in the following paragraph. The UL label shall apply to the enclosure, the specific equipment supplied with the enclosure, and the installation and wiring of the equipment within and on the enclosure. If required for UL labeling, provide ground fault interrupters, isolation transformers, fuses, and any other necessary equipment, even though such equipment is not indicated on the Drawings. The fabricator shall be an approved UL listed manufacturer.
  - 2. Control panel enclosures containing instruments mounted through the enclosure walls or door shall meet all requirements for UL labeling as above, but no UL label is required. This exception applies only if UL Recognized instruments for the intended purpose are not made.

#### 1.05 PRODUCT DELIVERY AND HANDLING

- A. Ship assembled control panels in sections that facilitate handling and field installation.

### **PART 2 - PRODUCTS**

#### 2.01 CONSTRUCTION

- A. General:
  - 1. Provide panels as shown on the Drawings. Panels shall conform to the requirements of NEMA Standards ICS 1 (General Standards for Industrial Controls and Systems) and ICS 2 (Standards for Industrial Control Devices, Controllers and Assemblies). The panels shall be wall-mounted or freestanding floor mounted, as shown. Provide sufficient access to the panels.
  - 2. The enclosures shall be code gauge steel of adequate strength, when complete, to withstand seismic forces equivalent to those noted in Division 1, General Conditions. Enclosures shall conform to requirements of NEMA Standard ICS 6 (Enclosures for Industrial Controls and Systems).
  - 3. The enclosures shall have vertically hinged front doors; provide hinge on side of panel that ensures compliance with the 30-inch rule in NEC Paragraph 110-16(a). Freestanding enclosures shall have doors secured by keyed three point latches, except in corrosive locations. Mount the devices through the doors or on recessed plates. Provide nameplates indicated on the Drawings. Each component within the panel shall be securely mounted and arranged for easy servicing, such that all adjustments and component removal can be accomplished without disturbing other components. No fastening devices shall project through the outer surfaces of the cabinet and all components and terminals shall be mounted on mounting pans within the panels.

4. Construction requirements on a specific type of panel are provided in subsequent paragraphs.
- B. Safety Requirements: The electrical supply to each control panel shall be arranged to be disconnected by a single switch or circuit breaker, except for necessary foreign circuits. Any live parts within the control panel fed from foreign control or signal circuits shall be covered or arranged to be disconnected by one of the following methods:
1. Enclosed relays, which are automatically de-energized when the main disconnecting switch is opened.
  2. Door-operated enclosed disconnect switches.
  3. Clearly identified enclosed manually operated disconnect switches, which may be located inside the control panel door, provided the operating handles are isolated or barred from all open live parts. Each control panel shall be arranged so that adjustments to timing relays or replacement of fuses can be done without exposure to live parts.
- C. Piping and Wiring: Factory wire and pipe control panels. Cable all panel wiring by securing to the panel surfaces with plastic cable ties. Permanently identify each wire at each termination by means of a heatshrink numbered sleeve. Number all electrically common wires the same, and number each electrically different wire uniquely. Provide red wire color for ac wiring, with white neutral and green ground. Provide blue wiring for dc wiring. Wiring shall be 14-gauge, Type MTW or THHN, 600 volt, stranded copper wire. Where wiring crosses hinged surfaces, provide an 18-inch "U" shaped hinge loop of extra flexible wires secured at both ends. Provide ring-type lugs for all panel wiring; spade-type lugs are unacceptable. Use ratchet type crimping tools, which do not release until proper crimp pressure has been applied.
- D. Terminal Blocks: Terminal blocks shall be rated 600 volts for signals greater than 30 V and 300 volts for signals less than 30 V, and shall conform to requirements of NEMA Standard ICS 4 (Terminal Blocks for Industrial Control Equipment and Systems). The terminal block and terminal lug shall be compatible. Provide disconnecting terminals for any circuit within the control panel, which can be energized when the branch circuit feeding the control panel, if any, is off. Provide terminals for all external (field) connections and provide at least 15% spare terminals. Identify each terminal permanently with the same number as the wire being terminated. Terminals shall be Allen-Bradley 1492 Series; Buchanan; or equal.
- E. Nameplates: Provide nameplates as shown on the Drawings, and as specified in Section 17010. A "CAUTION" nameplate shall be attached to the outside of access doors warning of foreign voltages inside the panel (see "Safety Requirements").
- F. Finish:
1. After fabrication all external welds shall be ground smooth. The entire unit shall be thoroughly degreased, then filled and sanded. All metal surfaces shall be given a rust-inhibiting treatment or passivator, then one coat of synthetic primer, followed by two coats of synthetic enamel. The average overall finish shall be at least 3 mils in thickness. All damage to the finish during installation shall be touched up at the jobsite as approved.
  2. Exterior panel color shall complement adjacent panels and shall be approved by the Owner. Sharp angled horizontal front edges of panels shall be

protected by brushed and coated stainless steel angled strip with concealed fasteners.

G. Size and Supports:

1. Panels shall be of sufficient size to adequately enclose all instruments designated as "panel-mounted" plus ample interior clearance to allow for installation, general servicing, and maintenance of the instruments. Weight of instruments shall be supported by Unistrut; Famet; Caine; or equal, channel supports. Panel size shall be as indicated on the Drawings.
2. Provide rigid supports for all devices. Supports shall not cause warping or bowing sides or mounting plates.

H. Mounting:

1. Attachment methods shall be detailed on panel fabrication drawing submittals. Heavy panels shall be attached by anchor bolts embedded in beams supporting the floor. See the Structural Drawings for location of beams. Seismic restraints shall be installed as specified by the manufacturer.
2. Mounting pans of rigid sheet steel shall be provided for interior components and accessories as required. A steel divider shall separate pneumatic sections from electrical sections. Devices having both electric and pneumatic connections shall be in the pneumatic section and connected to the electric section with waterproof flexible conduit.

I. Arrangement:

1. The instruments mounted in the panels shall have the nominal size and general arrangement shown. Panel layouts and nameplates shall conform to the approved submittal.
2. Space shall be provided for instruments indicated as furnished by others to be mounted and wired by the control panel manufacturer. These units shall be shipped to the control panel manufacturer in sufficient time for wiring. Coordination of instrument delivery shall be the responsibility of the Contractor. The instruments and controls to be located on each panel are shown on the instrumentation drawings, electrical schematics, and/or in the individual Specification.

J. Ventilation:

1. Ventilation shall be provided to prevent internal panel temperatures from exceeding 100 F.
2. Louvers shall be provided, when required for cooling, near the bottoms and tops on the rear doors and side of panels. 80-mesh screens shall cover the insides of louvers.
3. Provide a thermostatically controlled fan in each enclosure when louvers cannot dissipate heat adequately or cause sufficient flow to all panel areas. Ventilation fans shall be low acoustic type suitable for control rooms. Provide removable cleanable or disposable dust filter for each remote site enclosure.
4. Provide heaters and circulating fans in all outdoor panels to prevent condensation.
5. Provide air control cooling system for panels requiring less than 1,500 Btu/hr heat dissipation.
6. Provide air conditioning for panels requiring high heat removal.

K. Cable Entry Plates:

1. For top entry panels, a gasketed 10-gauge steel cover plate shall be cut that is suitable for the number of conduits. Cable entry plates are not required for

- bottom, side or back conduit entry unless the Contractor must specifically control the position, size, and location of cutouts.
2. Cable entry plates shall mount to and be fastened along panel stiffeners and framing segments. Tee nut fasteners are preferred.
- L. Signal Ground Buses:
1. Provide each panel with at least one isolated signal ground bus. Provide a bus 1-inch wide by 1/4-inch thick, running from top to bottom. Provide the bus with tapped holes to accommodate ground connections from various devices in the rack. Provide separate ground buses for analog and discrete/digital signals.
  2. Connect all signal shield grounds within the panel to the ground bus(es) with ring-tongue connectors that bolt to the bus(es).
- M. Signal Ground Plate: For rack, multiple enclosure, or bay systems provide a separate 1/4-inch-thick isolated copper system ground plate. Mount this plate in a location central to all system components.
- N. Panel Lights and Receptacles: Panels shall be internally lighted by fluorescent lamps, provided with guards and a toggle switch located convenient to each access door. One duplex GFI type receptacle shall be provided in each panel section. The lights and receptacles shall be wired to outgoing terminal blocks for 120 volt, 60 Hertz, single-phase supply.

## 2.02 PANEL HARDWARE

- A. All doors shall be set flush with three-point vault-type key-locking latches in addition to any required screw clamps. A minimum of two sets of keys supplied. Doors shall be labeled with "AUTHORIZED PERSONNEL ONLY" in 1-inch letters.
- B. Hinges shall be piano type. All hardware and handles shall be stainless steel.
- C. Leveling adjustments on each panel section shall be provided on freestanding panels.
- D. Status lights, selector switches, and pushbuttons shall be as specified in Section 48 20 00.
- E. Provide a copy of the elementary control diagram for the control panel, enclosed in plastic and mounted inside the panel.
- F. Where noted on the Drawings, provide rack-out devices and access plates to make panel access easier and safer. Panel fabricators shall add full extension drawer guides and adjust width of front access plates to assure access to all components and hardware.
- G. Floor stand kits shall not exceed 24 inches in height nor cause the panel to exceed 84 inches in overall height.

## 2.03 CONTROL PANELS AND ELECTRONIC RACKS

- A. General:
1. Control panels of steel shall be formed of cold-rolled sheet steel of sufficient thickness and with stiffening as required for fabrication, shipping, erection, and service.
  2. Panels shall be fully enclosed, including top, with no visible seams on the front. Panel front construction shall be minimum 3/16-inch stretcher-leveled, cold-rolled steel with stiffeners as necessary to maintain a flatness of  $\pm 1/16$ -

inch of any 2-foot span and  $\pm 1/8$ -inch over any 8-foot span with all equipment installed. All other sections shall be 12 gauge except doors shall be minimum 14 gauge and shall maintain the same specified flatness when closed and latched. When shown on the Drawings, filler panels shall extend to the ceiling.

3. Cabinets shall be freestanding with adequate internal bracing to support the weight of instruments and wiring. The cabinet design shall be for front access. Doors shall be key locked with a minimum of two sets of keys supplied. Connections to and from the cabinets shall be through conduit through the bottom except when otherwise indicated on the electrical drawings.
  4. Heavy-duty industrial quality racks shall be 19- or 24-inch panel. Framing shall be at least 14-gauge cold rolled steel, and continuously welded, rather than spot welded, at the seams of each intersecting joint.
- B. Finish: After fabrication, all external welds shall be ground smooth. The entire unit shall be thoroughly degreased, then filled and sanded. All metal surfaces shall be given a rust-inhibiting treatment or passivator, then one coat of synthetic primer, followed by two coats of synthetic enamel. The average overall finish shall be at least 3 mils in thickness. All damage to the finish during installation shall be touched up at the job site as approved.
- C. Exterior panel color shall complement adjacent panels and shall be approved by the Owner. Sharp angled horizontal front edges of panels shall be protected by brushed and coated stainless steel angled strip with concealed fasteners.

## 2.04 TERMINAL CABINETS

- A. Construction for these panels when mounted within a weather-protected structure shall be NEMA 12 rated. Panels exposed to the weather shall be NEMA 4 rated. Panels may be constructed of fiberglass or steel. Single door enclosures shall be constructed of 14-gauge steel and their interior panels shall be 12-gauge steel. Multiple door enclosures shall be 10-gauge steel. Bracing and stiffeners shall be provided as required for structural rigidity. Fiberglass panels shall have adequate support for instruments and be structurally sound.
- B. Terminal cabinets shall be designed for wall-mounting or stanchion mounting. Cabinets measuring 4 feet or greater in height and 15 inches or more in depth shall be supplied with floor stand kits.

## 2.05 MANUFACTURER

- A. Manufacturers of the control panels and terminal cabinets enclosure shall be Hoffman Engineering Company; Circle A-W Products Company; Gibbons Metal Products; or equal.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

- A. Installation, testing, calibration, validation, startup and instruction shall be in accordance with Section 48 09 00.
- B. Install each control panel level and plumb, and secure by the favorably reviewed seismic mounting method. Doors shall swing freely and close tightly.

- C. Provide a 3-inch-high concrete pad for each field-mounted, freestanding control panel. Provide a 3-1/2-inch-high I-beam kick panel for each control-room mounted, freestanding panel.
- D. Carefully repair any damage to the structure, components or finish to the satisfaction of the Engineer. Clean all nameplates.
- E. Exercise care at all times after installation of control panels to keep out foreign matter, dust, dirt, debris, or moisture. Use protective sheet metal covers, canvas, heat lamps, etc., as needed to ensure equipment protection.
- F. For all metal panels mounted on concrete walls or floors, install 1/8-inch shims, and paint the back sides and bottom of the panels with Mobil Hi-Build Bituminous Coating 35-J-10; Koppers Bitumastic Super Tank Solution; or equal. Film thickness shall be 10 mil minimum.

**END OF SECTION**

## SECTION 48 20 00

### PANEL MOUNTED AND MISCELLANEOUS FIELD INSTRUMENTS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Provisions: Requirements of Division 1 and Sections 48 09 00, 48 19 00 and Division 26 form a part of this Section.
- B. Work Included: This Section specifies the panel mounted and miscellaneous field instruments and equipment to perform the required functions in conjunction with information and equipment specified in other sections of Division 40, 48. Refer to the Instrument Schedule in Section 48 09 00 for a list of required devices. This Schedule shall not be construed as complete bills of material.
- C. Unit Responsibility: It shall be the responsibility of the qualified single firm as described in Section 48 09 00 of this Division to ensure that the instruments and equipment furnished under this Section are compatible with the equipment furnished under sections of this Division and other Divisions of these Specifications, and that the signal transmission methods are compatible.
- D. Control and Performance Terminology used hereinafter in this Section shall be as defined in SAMA Standard PMC20-2-1970, "Process Measurement and Control Terminology."
- E. Cases: Cases of front of panel mounted instruments shall be of uniform design and color scheme wherever possible. Front of case colors shall be compatible with panel colors, subject to final approval by the Owner. Normally, compatible standard colors of the manufacturer shall be acceptable.
- F. Panel Mounted Equipment:
  - 1. All flush mounted miniature electronic controllers, recorders, and stations shall be a matching style family of instruments utilizing multiple unit mounting cases and back of panel plug-in cable connections. The overall height shall be 6 inches. A nine station multi-unit case shall fit standard 19-inch rack spacing. Each multi-unit case and instrument shall be equipped for standby manual operation.
  - 2. All front panel mounted instruments shall be capable of withdrawing chassis to all service and test positions without affecting operation, and complete removal by a single plug connection from the front.
  - 3. All back of panel mounted signal conditioners and auxiliaries shall be mounted in plug-in card files with labeled adjustment and test point at front of card edge.
  - 4. All instruments shall accept 4-20 mAdc or 1 to 5 Vdc input signals and shall produce 4-20 mAdc or 1 to 5 Vdc output signals as specified in the Schedules. Internal panel signals may be of either type. All signals coming to or leaving the panel shall be 4-20 mAdc.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Panels: Section 48 19 00.



### 1.03 SUBMITTALS

- A. Shop drawings to be submitted in this section shall be made in one package under the Product Review Category of Shop Drawings.
- B. Refer to Section 48 09 00 for additional submittals required for each item herein.

### 1.04 QUALITY ASSURANCE

- A. **Manufacturer:** In addition to the requirements of Section 48 09 00, instrumentation and control equipment furnished shall be manufactured by firms regularly and currently engaged in the design and manufacture of similar equipment. All equipment furnished shall be new and of the most recent design. Except where specified otherwise, the instruments furnished under this Section shall be as manufactured by Fischer & Porter; Foxboro; or equal. Behind-the-panel equipment shall be as manufactured by the above or by AGM Electronics; Moore Products; or equal.
- B. **Maintainability:** All equipment shall be designed for ease of maintenance and repair, and access to critical parts shall not require a major disassembly. Internal field adjustments where permitted or required herein shall be easily accessible upon removal of a panel or cover.
- C. **Materials and Installation:** Materials and installation shall comply with the requirements of the current editions of referenced electrical codes and standards, and the codes and standards referred to shall be used for establishing the minimum quality of the materials and equipment supplied and installed. All equipment of the same type shall be products of the same manufacturer. Capacities of all equipment shall not be less than that indicated on the Drawings or specified.

## PART 2 - PRODUCTS

### 2.01 CONTROLLERS AND MANUAL CONTROL STATIONS

- A. **General:** Controllers shall compare a process variable input signal with a remote or locally adjusted set point and shall produce a control output signal to correct any deviation of the process variable from the set point by means of a final control element. Manual control stations shall convert a remote or locally adjusted set point value to an output control signal to control a process variable by means of a final control element.
- B. **Controllers shall have the following features:**
  - 1. **Auto-Manual Switching** shall be provided on the front panel of each controller except for controllers with manual control action only or two-position control action. Switching from automatic to manual control shall be without an intermediate "Balance" position and shall cause no change in the controller output (bumpless transfer).
  - 2. **Remote Set Point** shall be provided where indicated on the "Controller and Manual Control Station Schedule." A switch for transfer from remote to local and vice-versa shall be mounted on the front of the controller panel. When in the remote set point mode, the scale of the controller shall be servo motor positioned so that the value of the set point is always indicated.
  - 3. **Reference Accuracy** for the automatic controllers shall be at least  $\pm 0.5\%$  of span. All automatic controllers shall have provision for manually overriding

and adjusting the controller output signal. Adjustable output limiting shall be furnished on all automatic controllers with integral control.

4. Replacement: Each automatic controller shall have provision for replacement by a manual control plug-in module. If this feature is not available in the manufacturer's line of equipment, manual control stations shall be mounted on the front of each local control panel with patch cords or other connecting devices necessary to reach the terminals of all automatic controllers mounted on that panel. In no case shall the manual control be mounted more than 2 feet from its associated automatic control station.
5. Indicating Scales: Scales of control stations shall be the center deviation indication type. A set point scale on the front of the instrument shall display the process variable and its deviation from set point. The set point scale shall be at least 4-1/2 inches long and shall be vertically oriented. A separate scale shall display the control output signal to the final control element as 0 to 100%. Set point scale graduation shall be readable to the nearest 1%.
6. Cases: Cases of control stations shall have front dimensions with a maximum of 4 inches wide by 6 inches high.
7. Signals: Process variable and analog remote set point input and control output signals shall be 4-20 mAdc except that two-position and proportional speed floating control output signals shall be contacts rated for a minimum of 5 amperes at 120 Vac. Signals between units mounted in a single panel may be 1 to 5 Vdc.
8. Control Algorithms shall be available in controllers with the following control actions:
  - a. Proportional speed floating (integral).
  - b. Proportional with manual bias.
  - c. Proportional plus integral with adjustable output limiting.
  - d. Proportional plus integral plus derivative with adjustable output limiting.
  - e. Manual.
  - f. Two-position with adjustable "dead zone."
  - g. Feed forward in addition to "c" or "d" above.
9. Control Action provided for each controller shall be as indicated on the "Controller and Manual Control Station Schedule." Tuning adjustment of the control actions shall be integral to the control station and shall be accessible from the front of the control panel without disconnecting the controller from the process. When provided, control actions shall be continuously adjustable over the minimum ranges listed below:
  - a. Proportional Speed Floating: 0.1 to 25 seconds repetition period, 0 to 10% dead zone, 0 to 100 speed factor.
  - b. Gain: 0.2 to 33.
  - c. Integral: 0.04 to 30 repeats per minute.
  - d. Derivative: 0.01 to 8 minutes per repeat.
  - e. Two Position: 0 to 10% dead zone.
  - f. Feed Forward: 0.5 to 5 gain.

C. Schedule Abbreviations are listed below:

1. MA - Analog, Manual-Automatic.
2. Control Algorithms:
  - a. I - Proportional Speed Floating
  - b. P - Proportional
  - c. PI - Proportional plus integral
  - d. PID - Proportional gain plus integral plus derivative
  - e. M - Manual

- f. TP - Two-position
- g. FF - Feed forward

## 2.02 PROCESS VARIABLE INDICATORS

- A. Vertical single or dual channel process variable indicators shall have a vertical display at least 3 inches long, shall have a reference accuracy of  $\pm 2.0\%$  or better, and the indicating pointer shall be driven by the output of a solid state electronic amplifier. Zero and span adjustment shall be provided. Indicating scale graduations shall be readable to 1% of full scale. Input signal shall be 1 to 5 Vdc or 4-20 mA as indicated on the Instrument Schedule. An optional single or dual integral alarm unit may be provided.
- B. Large Case Process Indicators shall be provided as shown on the plans and/or specified herein. Scale units shall be as specified in the Instrument Schedule. The pointer shall be servo driven with feedback and null balancing. Accuracy shall be 0.5% of full scale. Input signal shall be 1 to 5 Vdc or 4-20 mA. An optional integrator and 7 digit totalizer shall be provided where shown on the Drawings. When specified, SPDT alarm switches shall be provided, rated at 2 amperes, 120 Vac, 60 Hz. Indicators shall have 4-3/8-inch minimum scale length, and hinged locking door with glass window. Dimensions shall be 15 inches x 14 inches x 8 inches deep maximum. Operating power shall be 120 Vac, 60 Hz.
- C. Digital Indicators shall be provided where indicated and shall display the decimal value of a numerically coded input. Accessories shall be provided to accept analog voltage or current inputs or other digitally coded inputs as specified in the Instrument Schedule. The number and size of the digits shall be as specified. The displayed digits shall be luminous and easily visible in a well-lighted control room. The display style shall be the choice of the I&C Subcontractor, except that all displays shall be of the same style. The accuracy of the display shall be within  $\pm$  one digit but not less than  $\pm 0.1\%$  for analog inputs. There shall be no error with digital inputs. Automatic ranging and polarity selection and sign indication shall be provided.

## 2.03 SIGNAL CONDITIONERS AND CONVERTERS

- A. General: Signal conditioners and converters shall be provided as shown on the Drawings and/or as specified herein. They shall have all solid state circuits on plug-in printed circuit boards and housed in card cases or single cases for in-panel mounting and weatherproof or explosion-proof cases for field mounting depending on the area rating. Accuracy shall be  $\pm 0.25\%$  unless shown otherwise. They shall be as manufactured by AGM Electronics; Rochester Instruments; or equal.
- B. Signal Selectors: Signal selectors, if required, shall receive up to four dc control signals and shall retransmit the lower, the intermediate, or the higher of the signals. Signal selectors shall be back-of-panel mounted.
- C. Signal Isolators and Impedance Converters: Signal isolators and impedance converters shall be provided for all field-located transmitters to prevent ground loops and ensure system compatibility and shall be either field-mounted or back-of-panel mounted in the control panels.
- D. Scale and Bias Transmitter:
  - 1. Provide a solid state scale and bias transmitter signal interface instrument, designed to accept voltage or current inputs and provide a current or voltage output. The basic ranges of the standard instrument shall be 1 to 5 Vdc input

and 4-20 mA output. Current inputs and voltage outputs shall be obtained through the application of proper resistor shunts. Zero suppression shall be provided for true zero input and/or true zero output operation.

2. A full 100% of the input signal shall be available as an input bias adjustment in this instrument. Provide ratio ability, "K", of 0.1 to 10.0.
  3. Provide scale and bias calculating equation as follows:
    - a. Voltage Input  $K(V_i - 1) + V_b = V_o - 1$  Voltage Output
    - b. Current Input  $K(I_i - 4) + I_b = I_o - 4$  Current Output
  4. Where:
 

K = ratio  $I_b$  = current bias  
 $V_i$  = voltage input  $V_o$  = voltage output  
 $I_i$  = current input  $I_o$  = current output  
 $V_b$  = voltage bias
  5. Provide all circuitry packaged on high-quality, military-grade, epoxy fiberglass printed circuit boards. All semiconductor elements used shall be silicon.
    - a. Input Signal (as required):
      - 1) 1 to 5 Vdc ( $Z_{in}$  greater than 5 megohms)
      - 2) 4-20 mA ( $Z_{in}$  250 ohms)
    - b. Input Bias Range:  $\pm 100\%$  of full scale
    - c. Output Bias Range: 0 to 50% of full scale
    - d. Ratio (gain) Range: 0.1 to 10.0 (100:1)
    - e. Output Signals (as required):
      - 1) 4-20 mA
      - 2) 1 to 5 Vdc
  6. Output Drive Capability:
    - a. 4-20 mA into 0 to 800 ohms with any available supply  $\pm 20\%$
    - b. 4-20 mA into 0 to 950 ohms with any available supply  $\pm 2\%$
  7. Output Limiting: 130% of full-scale maximum output
  8. Computing Linearity:  $\pm 0.1\%$
  9. Repeatability:  $\pm 0.1\%$  of span
  10. Response Time: less than 50 milliseconds
  11. Stability and Drift (with 1 to 5 Vdc input, 4-20 mA output):  $\pm 0.5\%$  change for a 50°F (28°C) change in ambient temperature maximum;  $\pm 0.2\%$  typical
  12. Ambient Temperature Range: 0° to 140°F (-18° to 60°C)
  13. Power Input:
    - a. 115 Vac,  $\pm 20\%$ , 50/60 Hz., 5 watts
    - b. 230 Vac,  $\pm 20\%$ , 50/60 Hz., 5 watts
    - c. 24 Vdc,  $\pm 20\%$ , 4 watts
    - d. 48 Vdc,  $\pm 20\%$ , 8 watts
  14. Power Supply Effect (with 800 ohm output load, 4-20 mA signal):  $\pm 0.3\%$  for a  $\pm 20\%$  power variation maximum;  $\pm 0.15\%$  typical
  15. Controls: multiturn input bias, output bias, and gain potentiometers
  16. Connection: barrier terminal strip
  17. Mounting: surface
  18. Electrical Classification: general purpose, CSA approved
- E. Signal Rate Limiters: Signal rate limiters shall be provided where indicated or as required for system stability. Rate limiters shall accept a 4-20 mA input signal and output a 4-20 mA rate limited signal such that if the input varies at a rate in excess of preset rate, the output will change linearly at the preset rate. Provide a contact output to indicate that the output is being limited. The output signal increase and decrease rates shall be independently adjustable within the range specified.

- F. Signal Peak Limiter: The signal peak limiter shall accept a 4-20 mA signal and reproduce a 4-20 mA signal limited to a preset peak value. The peak value shall be adjustable over the upper 50% of the range as a minimum. The output until limited shall be identical to the input within the reference accuracy. The reference accuracy and repeatability of the limiting shall be 0.25%. The limiter shall be mounted within the control panel.
- G. Ramp Generators: Ramp generators shall be provided where indicated and shall produce a 4 to 20 mA signal (or other dc signal as required) that varies linearly with time. The generator shall be capable of producing "up ramp" and "down ramp" signals which vary from zero to 100% or vice versa in an adjustable period of time. The up or down ramp modes shall be selected by closure of external contacts. When the ramp reaches the minimum or maximum level, it shall remain constant at the zero or 100% level. The maximum ramp interval shall be as specified in the Schedule. The output shall be linear within  $\pm 2\%$ . The generators shall be back-of-panel mounted.
- H. Electronic Square Root Extractors: Electronic square root extractors shall be provided where indicated, mounted back-of-panel on the control panels or field-mounted, shall accept 4 to 20 mA inputs and output a 4-20 mA signal which is the specified function of the input. Zero and span adjustment shall be provided. Reference accuracy shall be  $\pm 0.5\%$  of span and 5 to 100% of span with adjustable dropout feature.
- I. Pneumatic Square Root Extractor: A square root extracting relay shall be provided in the Master Control Panel to convert the pneumatic flow signal from the backwash flow transmitted into a linearly proportional 3 to 15 psi flow signal. The instrument shall be provided in a gasketed case, have an accuracy of within 0.50% of span, a repeatability of 0.2% of span and a dead band within 0.1%. Maximum air consumption shall not exceed 0.5 scfm. The square root extractor shall be Foxboro Model 557, Moore Model 65, or equal with pressure regulator.
- J. J.Signal Summators: The signal summators shall accept the specified number of 4 to 20 mA signals, A, B, C, etc., and produce a sum equal to  $A + k_1B + k_2C$ , etc., where the  $k$ s are adjustable fractional constants equal to or less than one. Adjustment may be internal. The output shall be another 4 to 20 mA signal linear and proportional to the sum. The reference accuracy shall be 0.25% or better. The units shall be mounted within the control panels. Operating power, if required, shall be 120 Vac, 60 Hz. commercial power.
- K. Pulse-to-Current Converters: Pulse-to-current converters shall be provided as required and shall be capable of receiving a frequency input range as shown in the Instrument Schedule and transmitting a proportional 4 to 20 mA dc current output signal with a reference accuracy of  $\pm 0.5\%$  of the maximum output. Zero and span adjustment of 50% shall be provided. Converter shall either be field-mounted or rack-mounted behind a panel as required on the Drawings.
- L. Current-to-Pneumatic Converters: Current-to-pneumatic converters shall be furnished, where indicated, to accept a 4-20 mA dc signal and provide a 3 to 15 psig pneumatic output. The outputs shall be field reversible (i.e., 15 to 3 psig) with zero and span adjustments. Housing shall be for pipe or surface mounting and weatherproof or as required by the area in which they are located. An airset with gauge shall be provided with each converter.
- M. Pneumatic-to-Current Converters: Pneumatic-to-current converters shall be furnished, where indicated, to accept a 3 to 15 psig pneumatic signal and convert it

to a 4-20 mA signal output. The output shall be reversible (i.e., 20-4 mA) with zero and span adjustments. An output indicator shall be provided with 0 to 100% scale.

- N. Potentiometer-to-Current Converters: Potentiometer-to-current converters shall be provided where indicated and shall convert a potentiometer setting to a linear 4-20 mA signal by detecting the relative resistance in each leg of a potentiometer. Total potentiometer resistance may be from 1,000 to 5,000 ohms. The converters shall be either control panel or field mounted as required.
- O. Volt-to-Current Converters: Volt-to-current converters shall be provided where indicated to receive a 1 to 5 Vdc input and convert this signal to a 4-20 mA dc current output, proportional to the sensed variable. Zero and span adjustment shall be provided. Unit shall be back-of-panel mounted.
- P. Signal Linearizers: Signal linearizers shall be provided where indicated and shall accept a non-linear 4-20 mA or other dc signal and provide an output 4-20 mA signal proportional to the measured variable. The input signal characteristics shall be as described in the system functional descriptions. Reference accuracy shall be  $\pm 2\%$ . The unit shall be field or behind panel mounted.
- Q. Computing Relays: An automatic analog multiplier-divider shall accept three 4-20 mA dc signals (A, B, and C) and a manually set constant value (K). It shall perform the computations  $Y = K(AB/C)$  where Y is the output value represented by a linear and proportional 4-20 mA dc signal. Accuracy of the computation shall be at least  $\pm 0.75\%$  of span with the inputs A and B varying from 10 to 100% of span and input C varying from 10 to 100% of span but not less than 0.4A. An accessible adjustment shall be provided to adjust the value of K from 0.1 to 10. All inputs and outputs shall have zero offset and span adjustments of at least 25% of span. The computer shall be a separate instrument for mounting within or on the control panel.
- R. Radio Stations:
  - 1. Radio stations shall accept a 4-20 mA signal and output another 4-20 mA signal which is the value of the input signal multiplied by a manually set constant (r) plus or minus a manually set constant bias value (B). The value of (r) shall be variable from 0.3 to 3 and (B) shall be variable from 0 to 100% of output span. The instrument shall have a reference accuracy of 1% of span including setting of the ratio (r). The indicating scale for (r) shall be in percent unless otherwise shown in the Instrument Schedule. All ratio stations shall be mounted inside of the panel.
  - 2. Provide combined ratio stations and manual loading stations where shown on the Drawings.
- S. Analog to Pulse Width Converters: Analog to pulse width converters shall accept the specified analog signal and output a pulse width modulated signal directly proportional to the input. The output shall be a 24 Vdc, 50 mA voltage signal. The converter shall have adjustments for cycle time, span and zero. The "on" time of the output pulse shall increase OR decrease with the input signal. The ratio of "on" time to "off" time shall be adjustable from 5:1 to at most 2.5:1. The maximum cycle time shall be \_\_\_\_\_ and shall be adjustable over a minimum range of 5:1. The linearity between input and output shall be at least 0.1%. Operating power shall be from 120 Vac, 60 Hz, for field installation; when panel mounted, power is optional. The enclosure for field mounting shall be NEMA 4X.

- T. Pulse Rate Adder:
1. The pulse rate adder shall accept up to 4 simultaneous pulse trains and output a pulse train with a pulse count that is the algebraic (plus or minus) sum of the pulses in the input pulse trains. Pulses shall be 25 milliseconds minimum off time and of 25 milliseconds minimum duration with an amplitude of 22 to 30 Vdc, unless otherwise shown in the Schedule. The load rating shall be 500 milliamperes. The output shall be capable of driving a 24 Vdc counter solenoid.
  2. The unit shall be solid state and designed for behind panel mounting and operate from 120 Vac, 60 Hz commercial power. The adder shall be manufactured by Moore Industries, Sparling-Envirotech, or equal.
- U. Track and Hold Signal Conditioners: Track and hold signal conditioners shall be of the all solid state electronic design. Accuracy shall be  $\pm 0.25\%$  full scale with "hold" drift not more than 1% per hour. Input and output shall be 1 to 5 V or 4-20 mA as indicated. Operation shall be to continuously sample and update output until an external contact places the output on hold. It shall hold the output at last value until signaled by contact to return to sampling and updating.

## 2.04 INTEGRATORS-COUNTERS-SCALERS

- A. Analog Integrator-Totalizer: Integrators shall be provided and installed in the control panel as shown on the Drawings. The units shall accept 1 to 5 V or a 4-20 mA signal, as indicated, and convert it to a pulse train the frequency of which is proportional to the input. Provision shall be made to permit adjusting the full-scale pulse rate through range shown in the Schedule in order to scale the flow rate in engineering units shown.
1. The overall conversion accuracy shall be 0.5% from 2% to 100% of full-scale input, with adjustable low signal cutoff.
  2. The outputs shall be isolated contacts rated for 1 ampere at 120 Vac. Where required, additional pulse rates that are factors or multiples of 10 of the base rate shall be provided, alternately a separate pulse rate scaler may be provided.
  3. When specified, a panel mounted totalizing counter shall be provided to count the base rate output. The counter shall be as described hereinafter for Totalizing Counters.
- B. Totalizing Counters: Totalizing counters shall be of the electromechanical non-reset type for panel mounting. The counters shall have a minimum of seven (7) decimal digits. The counters shall operate from pulses of 30 milliseconds minimum duration. Counting rate capability shall be at least 10 counts per second. Numerals shall be 1/8-inch minimum. Life expectancy shall be 10 million counts minimum. Operating voltage and power shall be compatible with the driving unit. Counters shall be as manufactured by Hecon, Durant, or equal.
- C. Batch Counters:
1. General: Batch counters shall accumulate pulses and at a preset count shall provide a 50 millisecond minimum contact closure to initiate other devices.
  2. Description:
    - a. Batch counters shall be solid state counters capable of operating from pulses up to the maximum frequency shown below.
    - b. The counter shall accept and count pulses of up to  $\pm 40$  Vdc, and of minimum duration of 5 milliseconds to steady dc without damage. The

- counter shall not respond to noise pulses of 0.5 milliseconds or less and shall be logic level triggered and not depend on pulse rise or fall time.
- c. The counter shall distinguish pulses separated by "off" periods of 5 milliseconds or greater. Pulse "on" shall be defined as 5 Vdc or greater and "off" as 2 Vdc or less. It shall operate on either high or low terminal switching. Input impedance shall not be less than 1,000 ohms.
  - d. The counter shall be able to operate in a recycling mode such as to generate a momentary 50 milliseconds minimum contact closure upon accumulating a preset number of pulses and then reset automatically unless external contact reset is specified in the Schedule.
  - e. Output contact rating shall be 3 ampere inductive at 28 Vdc, and shall be DPDT. The preset count shall be set in by pushbuttons or thumbwheels operating a 4-digit minimum display register that shall have a capacity of 0000 to 9999 counts. Operating power shall be 120 volts, single-phase, 60 Hz. The output terminations shall be via screw terminals on the rear of the case.
  - f. The unit shall be suitable for panel mounting.
- D. Pulse Rate Scalers:
- 1. Pulse rate scalars shall be provided as specified herein, or as necessary, to convert a pulse rate signal to another pulse rate output capable of driving an electromechanical totalizing counter at a rate that corresponds to the required engineering units for display.
  - 2. The unit shall incorporate input pulse shaping or conditioning such that it will accept pulse signals ranging from sinusoidal to square wave, including powering of isolated contact closures, at zero to 20 kHz repetition rates. Input impedance shall be 100 ohms minimum and it shall accept pulses of 1 to 40 volts peak to peak either high or low terminal switching.
  - 3. The scaling section shall incorporate a minimum of two decades of solid state BCD counters with up to five decades when specified in the Schedule. Count scaling shall be determined by setting BCD or decade switches for each counter decade.
  - 4. The output shall be a solid state switch capable of driving a 24 Vdc electro-mechanical counter OR a SPDT relay contact rated at 125 Vac, 250 VA.
  - 5. The unit shall be for back-of-panel mounting unless an integral counter is specified in the Schedule, in which case the unit shall be front-of-panel mounted and the counter shall be 7 digits minimum, nonresettable.
  - 6. The unit shall operate from 120 Vac, commercial power at 10 watts maximum.

## 2.05 ELECTRONIC TRIP RELAYS

- A. Relays shall be of three types: (1) dual, (2) single, and (3) deviation, as specified in the Instrument Schedule.
- B. Dual Type: The dual type shall accept a 4-20 mA signal and operate two DPDT switches at independently adjustable set points variable from zero to 100% of the input span. The dead band shall be independently adjustable over a range of 0 to 100% of span. The trip mode (i.e., on increasing or decreasing signal) shall be jumper selectable.
- C. Single Type: The single type shall operate one DPDT switch and the dead band shall be adjustable from 1% to 100% of input span. They shall otherwise be identical to the dual type.



- D. Deviation Type: The deviation type shall accept two (2) 4-20 mA signals. It shall compare these inputs, and when the monitored signal deviates from the control signal in excess of the set point deviation, variable from zero to 100%, it shall operate the output DPDT switch. The dead band shall be adjustable from zero to 100% of span.
- E. The comparison sense (positive or negative) for each relay shall be jumper or switch selectable. The unidirectional repeatability of sensing the set sense point shall be  $\pm 0.25\%$ . The set point shall be set by a screwdriver adjustment with shaft friction lock. A legend shall include the setting from zero to 100%. The switches shall be for behind panel mounting unless otherwise shown on the Drawings or herein as panel mounted. Switch contacts shall be rated for 5 amperes at 120 Vac.
- F. Manufacturer: The switches shall be as manufactured by AGM Electronics; Moore Industries; or equal.

## 2.06 THUMBWHEEL SWITCHES

- A. General: Provide subminiature front-mount bi-directional pushbutton indexing thumbwheel switches. Provide lower pushbuttons for advancing the digits from 0 through 9, and upper pushbuttons for retracting the digits.
- B. Dimensions and Mounting: Provide snap-in panel mounting and snap together switch section banking that requires no assembly hardware. Provide switch sections with face height of approximately 1.3 inches and width of approximately 0.3 inches.
- C. Contact Encoding: Provide 10-position thumbwheel switches that produce BCD (Binary-Coded Decimal) combinations of contact closures. That is, each switch section shall have a common connection and four switched lines reading "0000" for a "0" digit, through "1001" for a "9" digit. BCD value is proportional to the numerical input.
- D. Accessories: Provide one pair of end plates for each thumbwheel. Provide blank body switch sections where decimal points are used. Paint a white dot on each blank body where decimals are required.
- E. Manufacturers: Provide Imlec Model II-21 subminiature pushbutton thumbwheel switches with Model II-EP end plates and Model II-BB blank body sections; Cherry Series T56'; or equal.

## 2.07 CONTROL PANEL ACCESSORIES

- A. Relays, timers and other internally mounted equipment shall be of the types specified in other sections of these Specifications.
- B. Panel face mounted equipment shall be of the types specified in other sections of these Specifications.
- C. Standards: All control devices shall conform to applicable provisions of NEMA Standards ICS 1 and ICS 2.
- D. Pushbuttons, selector switches and pilot lights shall be heavy-duty oiltight units. Pushbuttons and selector switches shall have contacts rated 10 amperes continuous, Rating Designation A600 in conformance with NEMA ICS 2.

1. Pushbuttons used as emergency stop devices shall have a padlockable means for maintaining an open circuit. Indicating lights shall be push-to-test transformer type with lenses of the colors shown on the Drawings.
2. Multiposition control switches shall have rotary action, round knurled handle and the number of positions and stages shown on the Drawings. They shall be suitable for panel mounting. Each position shall have a positive detent. Contacts shall have a continuous current rating of 10 amperes at 300 Vac. Switches shall have integral indicator.
3. For 4-20 mAdc and 1 to 5 Vdc signal selector switches, provide oiltight selector switches with electronic duty gold contact blocks. Provide sliding contacts for reliable operation without benefit of thermal cleaning action.
4. Manufacturer: Provide Microswitch heavy duty oiltight manual controls, Type PT, with electronic duty gold contact blocks; Allen-Bradley Bulletin 800T oiltight selector switch with stackable "Logic-Reed" contact blocks; or equal.

**E. Colors and Descriptions:**

1. Indicating Lamps: Unless otherwise noted in the individual Loop Specifications, the following color code and inscriptions shall be followed for the lenses of all indicating lights and annunciators.

Indicating Lamp Inscription	Color	Annunciator Lamp Inscription
ON/START	Red	Refer to Instrument Schedule and Panel Elevation Drawings and Elementary Drawings
OFF/STOP	Green	
CLOSED	Green	
LOW	Amber	
FAIL	Red	
HIGH	Amber	
OPEN	Red	
POWER ON	White	
RESET	Red	
AUTO	Blue	

2. Lettering shall be black on white and amber lenses. Lettering shall be white on red and green lenses.
3. Pushbuttons: Follow color coding for indicating lamp above. All unused or noninscribed buttons shall be black. Lettering shall be black on white and yellow buttons. Lettering shall be white on black, red and green buttons.

**F. Nameplates:** Unless specified otherwise in the Drawings, nameplates shall be black lamacoid with minimum 3/16-inch-high white letters for major area titles, 5/32-inch for component titles, and 1/8-inch for subtitles, and shall be fastened with a permanent but dissolvable adhesive or by screws.

**G. Pneumatic Tubing:** Pneumatic tubing may be copper, stainless steel, or polyethylene as preferred by the panel vendor, except that the air header, valves, and fittings shall not be polyethylene. Tubing shall be 1/4-inch O.D. with a working pressure rating of at least 150 psi. Threaded fittings which hold air shall be

assembled with bias cut teflon tape lubricant. Polyethylene tubing shall be supported in plastic duct to within 1-foot of each termination and shall be color coded in accordance with ISA Recommended Practice RP7.2. Provide individual combination air filter regulators with gauge for each air consuming device.

- H. Pneumatic Piping: Pneumatic piping shall be PVC and shall incorporate sufficient unions for assembly and disassembly. The Contractor shall supply 100 psig dried and refrigerated plant air to the panels requiring air. The control panels shall incorporate all the necessary pressure reducing valves and adapters for the instrumentation air piping. Piping shall be installed in accordance with the standards of ISA.

## 2.08 INSTRUMENT LOOP POWER SUPPLIES

- A. General:
  - 1. For each two-wire transmitter, provide a 24 Vdc regulated 50 mA power supply with 120 Vac input. Output voltage may be 24 Vdc  $\pm 5\%$  manufacturing tolerance at no load, but shall hold within 1% from no load to full load at 120 Vac  $\pm 10\%$  input.
  - 2. Line-to-load regulation shall be within 0.1% from no-load to full load. Ripple shall be less than 15 mV peak-to-peak.
- B. Manufacturer: Provide Model AP9046 instrument loop power supply as manufactured by Action Instruments with plug-in mounting base; equivalent capacity Lambda power supply with terminal blocks for external connections; or equal.

## 2.09 POWER (WATT) TRANSMITTERS

- A. General: Provide watt transmitters that utilize unique digital circuitry eliminating zero adjustments while providing excellent long term stability. Provide 0.2% of reading accuracy. Provide field serviceable transmitter which matches industry accepted sizes and connections.
- B. Features: Provide watt transmitters with:
  - 1. Field serviceability.
  - 2. Sliding access doors for calibration and test.
  - 3. Complete technical manual.
  - 4. Identified service test points terminals provided on component circuit boards.
  - 5. All components symbolized on circuit boards for ease of maintenance.
  - 6. Ability to calibrate multiplier board using dc standards.
  - 7. Multiplier board which plugs in to facilitate removal and calibration.
  - 8. Test jack provided for monitoring output current while in service.
  - 9. All integrated circuits burned-in to eliminate failures and color coded to indicate the burn-in screening.
  - 10. Most components located on a plug-in multiplier board to facilitate service.
- C. Specifications: Provide watt transmitters with:
  - 1. Potential Range (limited to 85V to 135V if input voltage signal used to provide control power): 0 to 150 Vac.
  - 2. Potential Input (nominal): 120 Vac.
  - 3. Potential Overload: 175V continuous.
  - 4. Potential Burden (per element): 0.1VA @ 120V.
  - 5. Current Range: 0 to 10A ac.
  - 6. Current Input (nominal): 5A ac.

7. Current Overload: 15A continuous, 50A 10 s/h, 250A 1 s/h.
8. Current Burden (per element): 0.2VA @ 5A.
9. Rated Output (RO): 4-20 mA dc.
10. Accuracy (includes worst combined effects of current, voltage, PF, Hz., & RL):  $\pm(0.2\% \text{ reading} + 0.01\% \text{ RO})$ .
11. Load Resistance (RL): 0 to 10 kw for 1 mA RO, 2kw - a for 10V RO.
12. Compliance Voltage (for 1.0mA RO, ensure that  $I \times R_L$  is less than 11.0 volts): 11 Vdc minimum.
13. Output Ripple Peak:  $<0.5\% \text{ RO}$ .
14. Response Time (99%):  $<400 \text{ ms}$ .
15. Open Circuit Output Voltage:  $<20 \text{ Vdc}$  (1 mA RO)
16. Frequency Range: 58 to 62 Hz.
17. Calibration Adjustment:  $\pm 10\% \text{ RO}$ .
18. Power Factor: Any.
19. Temperature Range:  $-25^\circ\text{C}$  to  $+75^\circ\text{C}$ .
20. Temperature Coefficient:  $\pm 0.005\%/^\circ\text{C}$ .
21. Relative Humidity: 0 to 95%.
22. Stability (per year):  $\pm 0.1\% \text{ RO max}$ .
23. Dielectric Withstand Voltage: 1,800V RMS 1 min.
24. Transient Test: ANSI C37-90A, IEEE Std. 472.
25. Impulse Test: 6 kV crest 100 kHz.
26. Unidirectional: 6 kV crest 1.2 x 150 es, 70A Short Circuit.
27. Test Voltage Across Output: 100V RMS 2 sec.
28. Complete Isolation Protection Provided: Input, output, case, control power.
29. Output Protection: Open and Short Circuit.
30. Control Power Requirement: 85 to 135 Vac, 60 Hz,  $\pm 10 \text{ Hz}$  (1.5VA @ 120 Vac).
31. Dimensions: Approx. 4 inches wide, by 6 inches long by 6 inches high.

- D. Elements: Provide the following current and potential transformers depending on the three-phase load served:

Type	Load	Current Transformers	Potential Transformers
2-element	3-phase, 3-wire	2	2
3-element	3-phase, 4-wire (wye)	3	3

- E. Telemetry Interface: Provide any signal conditioners, resistors, etc., required to provide proper analog input to telemetry equipment.
- F. Control Power: For watt transmitters that require external control power, provide all necessary conduit and wiring for 120 Vac power.
- G. Manufacturer: Provide watt transmitters as manufactured by Rochester Instruments; Scientific Columbus; or equal.

## 2.10 "PANIC" SWITCHES

- A. General: For each panic switch, provide a dual actuation device that requires the person actuating it to pull a spring clip safety pin (breaking a seal) and depress the button. The switch shall remain engaged until released by unlocking the button with a key. Provide a single normally open contact block.

- B. Construction: The front housing of the switch shall be constructed of stainless steel with the keyed red plastic release button centered and bordered in black trim. The dimensions of this component shall be approximately 4-1/2 inches wide, 4-9/16 inches high and 2-3/8 inches deep, and it shall be mountable to a standard 4 inch electrical box.
- C. Quality: Panic switches shall be Fiquench Model 2-010-0142-7; Chemetron Fire System Manual Station; or equal.

## 2.11 POWER LINE DISTURBANCE MONITOR

- A. General: Provide a power line disturbance monitor that monitors, classifies, and records time, type and magnitude of each power line disturbance. Provide connections for 120/208 Vac and 277/480 Vac, three-phase power circuits.
- B. Features:
  - 1. Provide surge and sag monitoring from 50 to 600 Vac. Provide impulse monitoring from 50 to 4,000 volt, for impulse durations of 1 to 2,000 microseconds. Provide frequency monitoring from 45 to 65 Hertz.
  - 2. Upon occurrence of disturbances, i.e., surges, sags, impulses, and frequency variations, print the time of day to the nearest 0.01 second on the integral thermal printer. Print also the type of disturbance and the magnitude of the disturbance.
- C. Enclosure: Provide power line disturbance monitor in a portable, ruggedized enclosure, with 120 Vac line power cord, and integral uninterruptible power supply.
- D. Manufacturer: Provide power line disturbance monitor Model 626 with 626PA6003 Module as manufactured by Dranetz; Model 3600 as manufactured by Franklin Electric; or equal.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Installation, testing, calibration, verification, startup and instruction shall be in accordance with Section 48 09 00.
- B. Wiring: Refer to Section 48 09 00, Part 3.
- C. Switching Circuit Schematics: Schematics shown are illustrative of the desired function only, the Contractor may elect to perform the required functions by other standard logic techniques. Components and circuits used shall be subject to review and approval. All switching circuits shall be checked and verified by testing before shipment.
- D. Control Voltage:
  - 1. When the control voltage is not specified in the schematics, the Contractor may elect to use the 120 Vac power, as supplied from the power panels supplies under Division 26; however, he shall provide a separate low voltage circuit for the indicating lamps or provide individual transformers with lamps. In any event the lamp voltage shall not exceed 30 Vac or dc.
  - 2. Manual disconnect switches (and relays if necessary) shall be provided internal to the panel to isolate process related groups of circuit elements from panel power and foreign voltages to permit troubleshooting without disabling controls for other processes. Safety interlock switches shall be provided on

access doors to disconnect local and foreign voltages if required by safety codes of applicable regulating authorities.

**END OF SECTION**