

City of Vancouver

**PROPOSAL AND CONTRACT
DOCUMENTS
FOR**

BID # 26-19: WATER STATION 1 - WELLHOUSES 3B & 5B

April 2026

PROJECT NO. PRJ100490



**CITY OF
Vancouver
WASHINGTON**

INVITATION TO BID (ITB) #26-19: WATER STATION 1 – WELLHOUSES 3B & 5B

<u>Invitation to Bid Information:</u> ITB Number: 26-19 ITB Title: Water Station 1 – Wellhouses 3B & 5B Date Issued: Tuesday, April 21, 2026 Contact Person: Anna Vogel Email Address: anna.vogel@cityofvancouver.us Contact Phone: 360-487-8429 Project Manager: Patrick Craney Engineer’s Estimate: \$2,900,000 Pre-Bid Meeting: Tuesday, April 28, 2026 Questions Due: Thursday, May 7, 2026 Addendum Due: Tuesday, May 12, 2026 Bid Opening: Tuesday, May 19, 2026	<u>Submit Bids to:</u> Procurement Portal: cityofvancouver.bonfirehub.com For delivery in person, by courier, UPS or FedEx: Attn: Procurement Services Vancouver City Hall 415 W 6th Street Vancouver, WA 98660 For Delivery by US Postal Service: Attn: Procurement Services City of Vancouver PO Box 1995 Vancouver, WA 98668 *Please refer to Section 1: Instructions to Bidders, Submittal Instructions for Further Information

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ATTACHMENTS:

EJCDC General Conditions
Supplementary Conditions to EJCDC
Specifications, Division 1 – 111 Pages
Specifications, Division 2-18 – 268 Pages
Plan Set – 82 Pages

SECTION A: INSTRUCTIONS TO BIDDERS

INVITATION TO BID

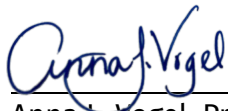
Notice is hereby given that sealed bids will be received by the City of Vancouver, Washington, for ITB 26-19 Water Station 1 – Wellhouses 3B & 5B bids up to the hour of **11:00 a.m., Pacific Local Time, Tuesday, May 19, 2026** and will publicly open and read aloud at that time on the same day in the Vancouver City Hall, 415 W 6th St, Vancouver, Washington and via an [online platform](#).

An optional pre-bid meeting is to be held at 1:00 pm, local time, on Tuesday, April 28, 2026 at Water Station 1, located at 2103 E Reserve St, Vancouver WA 98661. Interested prime contractors are encouraged to attend. At this meeting questions concerning the Contract Documents and the proposed work will be discussed.

The City of Vancouver is committed to providing equal opportunities to State of Washington certified Minority, Disadvantaged, and Women's Business Enterprises in contracting activities. (Section 4 of Chapter 56, Laws of 1975, 1st Ex. Sess., State of Washington).

The City of Vancouver in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that in any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

The City reserves the right to cancel this Invitation to Bid or reject any and all bids submitted or to waive any minor formalities of this call if the best interest of the City would be served.



Anna L. Vogel, Procurement Manager

BACKGROUND

The City of Vancouver encompasses 51.84 square miles, has an estimated 2024 population of 202,600 and it is projected to exceed 268,000 by 2042. The City is located on the I-5 corridor and extends along the shore of the Columbia River, 100 miles upstream from the Pacific Ocean. It lies directly across the river from Portland, Oregon and is the southwestern gateway to the State of Washington.

The City is responsible for vital municipal infrastructure and urban services. It builds and repairs roads, maintains water and sewer service, provides fire and police protection as well as parks & recreation programs, administers land use policy and takes an active role in Vancouver's commercial and industrial development.

Vancouver has a Council/Manager form of government with a City Council comprised of the Mayor and six councilmembers who set policy and direction. The City Manager oversees the day-to-day operations of the City.

ANTICIPATED BID SCHEDULE

These dates are estimates and are subject to change by the City.

Event	Date
Pre-Bid Meeting	Tuesday, April 28, 2026
Questions Due by 4:00 pm PST	Thursday, May 7, 2026
Final Addendum Issued by 5:00 pm PST	Tuesday, May 12, 2026
Bid Opening at 11:00 am PST	Tuesday, May 19, 2026

SCOPE OF SERVICES

This Contract provides for the installation of two new well house buildings around recently drilled municipal drinking water wells and other work, all in accordance with the attached Contract Plans, these Contract Provisions and the Standard Specifications. The scope includes extending existing access, a structure, a vertical-turbine well pump and motors while connecting to the existing water, electrical and communications systems to make those new wells functional for the Water Station 1 Wellfield.

The Contract Work shall be Physically Complete within 180 Working Days from the Notice to Proceed.

DELIVERY REQUIREMENTS

Bids shall be delivered by or before **11:00 a.m., Pacific Local Time, on Tuesday, May 19, 2026.**

The City will not accept any submittals after that day and time. Bidders accepts all responsibility and risk for method of delivery.

The bid opening will be held in person and via an online platform. Contractors are invited to join in person, [online](#), or by phone by calling (347) 941-5324 (access code: 787831137#):

SUBMITTAL INSTRUCTIONS

Bids are to be submitted to Procurement Services on the bid forms provided for this purpose, in a sealed envelope. The outside of the envelope(s) or package(s) must clearly state the project name, bid number, Bidder's name and return address, and the date and time of the Bid opening.

Bidders may submit sealed bids online through the City of Vancouver's Procurement Portal cityofvancouver.bonfirehub.com or select one of the following options for delivery of the Bid:

Delivery Address:

(In Person, Courier, UPS or
FedEx)
Procurement Services Manager
City of Vancouver
Customer Service Desk
1st Floor Lobby
415 W 6th Street
Vancouver, WA 98660

Mailing Address:

(USPS does not deliver to City Hall)
Procurement Services Manager
City of Vancouver
PO Box 1995
Vancouver, WA 98698

Bids delivered to locations other than as indicated in this document or received after the designated time will not be accepted.

It is the Bidder's responsibility to allow enough time for delivery to occur before the designated Bid due date and time. Please be advised that bid deliveries requiring signature may not be delivered to Procurement Services in a timely manner as our receiving point is not staffed at all times and there may be no one available to sign at the time of delivery.

Bids submitted via FAX or EMAIL will not be accepted.

Bids will be opened publicly and read in person and via an online platform at the Vancouver City Hall, 415 W 6th Street, Vancouver WA 98660 at the time and date specified. **Contractors are invited to join in person, through the website, or by phone:**

Online:

https://teams.microsoft.com/l/meetup-join/19%3ameeting_M2Q0NjRkYmEtNTJlNS00NTFhLTk3MDUtYzM4MzVlYWJjYzlw%40thread.v2/0?context=%7b%22Tid%22%3a%22bf6d19b6-9266-4686-a93a-50b537dc583a%22%2c%22Oid%22%3a%22c58d7094-c394-48f9-9b8d-2dfaaf95cfd5%22%7d

By Phone:

(347) 941-5324

Meeting number (access code): 787831137#

No bidder may withdraw their bid after the hour set for the opening thereof, unless the award of contract is delayed for a period exceeding forty-five days. If it is determined to be in the best interest of the City, the City reserves the right to request an extension of bid prices during the review process.

The City of Vancouver, at its sole discretion, reserves the right to cancel this invitation or reject any and all bids submitted or to waive minor formalities if the best interests of the City would be served.

BIDDING DOCUMENTS

Bidding documents may be obtained from the City of Vancouver's Procurement Portal: cityofvancouver.bonfirehub.com. These are available for viewing, downloading, and printing on your own equipment, free of charge.

Bids shall be in accordance with the Plans, Specifications, General Conditions, Special Provisions and all other contract documents prepared for the above referenced project, on file in the office of Procurement Service. Bid results may be obtained within 24 hours after the Public Bid Opening by accessing the City of Vancouver Procurement Portal: cityofvancouver.bonfirehub.com. Bids are to be submitted to Procurement Services on the proposal forms provided for this purpose, in a sealed envelope. **The outside of the envelope(s) or package(s) must clearly state the project name, bid number, bidder's name and return address, and the date and time of the Bid opening.**

All Bids must be accompanied by a bid deposit in cashier's check or surety in an amount equal to five percent (5%) of the amount of such bid. Should the successful bidder fail to enter into such contract and furnish satisfactory performance bond within the time stated in the specifications, the bid deposit may be forfeited to the City of Vancouver.

ADDENDA

All project-specific questions, requests for clarification, and request for substitutions must be submitted in writing, via email, by Thursday, May 7, 2026 to Anna Vogel at anna.vogel@cityofvancouver.us. If required, an addendum will be prepared and issued by the City of Vancouver no later than Tuesday, May 12, 2026.

It is the sole responsibility of the Bidder to learn of and obtain any and all issued Addenda. Addenda may be obtained from the City of Vancouver Procurement Services website at cityofvancouver.bonfirehub.com. The City of Vancouver accepts no responsibility or liability and will provide no accommodation to Bidders who fail to check for addenda and as a result, submit a non-responsive Bid submittal.

RESPONSIBILITY CRITERIA

It is the intent of the City to award a contract to the lowest responsive and responsible bidder. In accordance with RCW 39.04.350, before award, the bidder must meet the following bidder responsibility criteria to be considered a responsible bidder.

The bidder may be required to provide the City documentation demonstrating compliance with the criteria.

- 1) **At the time of bid submittal**, have a certificate of registration in compliance with Chapter 18.27 RCW, a plumbing contractor license in compliance with Chapter 18.106 RCW, an elevator contractor license in compliance with Chapter 70.87 RCW, or an electrical contractor license in compliance with Chapter 19.28 RCW, as required under the provisions of those chapters;
- 2) **Before award of contract:**
 - A. Have a current Washington Unified Business Identifier (UBI) number.
 - B. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
 - C. If applicable, have industrial insurance coverage for the bidder's employees working in Washington as required in Title 51 RCW; an employment security department number as required in Title 50 RW; and a state excise tax registration number as required in Title 82 RCW.
 - D. If bidding on a public works project subject to the apprenticeship utilization requirements in RCW 39.04.320, not have been found out of compliance by the Washington state apprenticeship and training council for working apprentices out of ration, without appropriate supervision, or outside their approved work processes as outlined in their standards of apprenticeship under Chapter 49.04 RCW of the one-year period immediately preceding the date of the bid solicitation.
 - E. Have received training on the requirements related to public works and prevailing wage under Chapter 39.04 RCW and Chapter 39.12 RCW.

- F. Within the three-year period immediately preceding the date of the bid solicitation, not have been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through a civil judgement entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of Chapter 49.46, 49.48, or 49.52 RCW.
- 3) Supplemental responsible bidder criteria, if applicable.

Pursuant to RCW 39.06.020, the bidder who is awarded the contract must verify responsibility criteria in accordance with RCW 39.04.350 and as listed in 1) – 3) above for each first-tier subcontractor, and a subcontractor of any tier that hires other subcontractors must verify responsibility criteria for each of its subcontractors. Verification shall include that each subcontractor, at the time of subcontract execution, meets the responsibility listed in 1) – 3) above and possess and electrical contractor licenses, if required by Chapter 19.28 RCW, or an elevator contractor license, if required by Chapter 70.87 RCW. This verification requirement, as well as the responsibility criteria, must be included in the project contract and in each subcontract of every tier.

SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA

In addition to the mandatory bidder responsibility criteria, the bidder must also meet the following relevant supplemental bidder responsibility criteria applicable to the project. As evidence that a bidder meets the supplemental bidder responsibility criteria, the Apparent Successful Bidder must submit, upon request, the required documentation to the City of Vancouver, within 72 hours of notification. The City reserves the right to request such documentation from other bidders as well.

- 1) **Federal Debarment** – The bidder shall not currently be debarred or suspended from bidding on Public Works Projects by the Federal government.
- 2) **State Debarment** – The principals of the bidder shall not currently have any company that is debarred or suspended from bidding on Public Works by Washington State.
- 3) **Claims against Retainage and Bonds** – The bidder shall not have a record of excessive claims filed against the retainage or payment bonds for public works projects during the previous three years, that demonstrate a lack of effective management by the bidder of making timely and appropriate payments to its subcontractors, supplies, and workers, unless there are extenuating circumstances acceptable to the City.
- 4) **Experience Modification Rate** – The bidder's Experience Modification Rate should be at or below 1.0. EMR rates above 1.0 are cause for Determination of Non-Responsibility unless the circumstances raising the rate have been accepted by the City.
- 5) **Apprenticeship Utilization** – The table below reflects the required minimum apprenticeship utilization labor hours. The City encourages Contractors to exceed these minimum utilization hours. These goals must include the labor hours of the prime and any subcontractor's working the project. Before final payment, the Prime Contractor and all subcontractors will be required to file an approved Affidavit of Wages Paid form. If the Contractor does not meet the minimum established utilization

requirement, they will be assessed a penalty of \$100.00 for each unmet apprenticeship labor hour. For projects with an engineer's estimate of less than \$2,000,000 the contractor will be assessed a penalty of \$25.000 for each unmet hour for the first time the contractor is unable to meet the goal. Each subsequent failure to meet the goal will be at the \$100.00 per hour for each unmet hour. If the Contractor is able to meet or exceed the minimum utilization hours the Contractor will receive a incentive as noted on the bid form. For additional information on the City's updated apprenticeship program, please visit the [City's website](#). The apprenticeship utilization requirement will be based on the Engineer's Estimate for the project, not the bid amount.

Engineer's Estimate	Required Minimum Utilization Labor Hours
Under \$500,000	N/A
\$500,000 - \$1,000,000	3%
\$1,000,000 - \$1,500,000	5%
\$1,500,000 - \$2,000,000	10%
\$2,000,000 and greater	15%

For more information on apprenticeship programs, you can visit the Washington State Department of Labor & Industries website at [Apprenticeship Registration & Tracking System \(ARTS\)](#).

6) Completion of Similar Projects: The bidder shall have successfully completed 3 projects of similar size and scope as required by the contract documents for this project within the last 5 years. In evaluating whether the projects were "successfully completed" the Owner may check references for the previous projects and may evaluate the owner's assessment of the Bidder performance, including but not limited to:

- a. Quality Control
- b. Safety Record
- c. Timeliness of performance
- d. Use of skilled personnel
- e. Management of subcontractors
- f. Availability of and use of appropriate equipment
- g. Compliance with contract documents
- h. Management of submittals process, change orders, and close-out.

7) A Bidder may be deemed not responsible if:

- a. Evidence of collusion exists with any other Bidder or potential Bidder. Participants in collusion will be restricted from submitting further bids; or
- b. The Bidder, in the opinion of the City, is not qualified for the work or to the full extent of the bid, or to the extent that the bid exceeds the authorized prequalification amount as may have been determined by a prequalification of the Bidder; or
- c. An unsatisfactory performance record exists based on past or current City work or for work done for others, as judged from the standpoint of conduct of the

work; workmanship; or progress; affirmative action; equal employment opportunity practices; termination for cause; or Disadvantaged Business Enterprise, Minority Business Enterprise, or Women's Business Enterprise utilization; or

- d. There is uncompleted work (City or otherwise), which in the opinion of the City might hinder or prevent the prompt completion of the work bid upon; or
- e. The Bidder failed to settle bills for labor or materials on past or current contracts, unless there are extenuating circumstances acceptable to the City; or
- f. The Bidder has failed to complete a written public contract or has been convicted of a crime arising from a previous public contract, unless there are extenuating circumstances acceptable to the City; or
- g. The Bidder is unable, financially or otherwise, to perform the work, in the opinion of the City; or
- h. There are any other reasons deemed proper by the City; or
- i. More than one proposal is submitted for the same project from a Bidder under the same or different names.

As evidence that the bidder meets the bidder responsibility criteria 1 A above, the apparent low bidder must submit, upon request, the following documentation to the Owner within 72 hours of notification. The Owner reserves the right to request such documentation from other bidders also.

- 1) Federal Debarment** – The bidder shall not be listed as a current debarred or suspended bidder on the U.S. Governments System for Award Management (SAM) website: <http://www.sam.gov>.
- 2) State Debarment** – The principals of the bidder shall not have any company listed as a current debarred or suspended bidder on the State of Washington Labor & Industries [Debarred Contractors List](#).
- 3) Claims against Retainage and Bonds** – The bidder shall submit a list of any public works projects over \$500,000 completed within the last five years (5) that have had a claim against the retainage and/or payment or performance bond. Documentation provided should include a written explanation of the circumstances surrounding each claim and the ultimate resolution of the claim.
- 4) Experience Modification Rate** – The bidder shall not have an Experience Modification Rate that exceeds 1.0 as indicated on the Department of Labor & Industries website. If the bidder's score exceeds 1.0 additional information may be requested.
- 5) Apprenticeship Utilization** - The Bidder shall submit an Apprenticeship Utilization Plan that demonstrates how the company plans to achieve the Apprenticeship Utilization Requirement. The Plan shall:
 - a. Provide an estimated outcome for utilization of apprentices for the prime contractor and all subcontractors.
 - b. Provide an estimated total hours and work times that are reasonable to complete the scope of the project.

- c. Demonstrate how the contractor (and subcontractors) intends to meet or exceed the requirement, including the labor type and approved program(s) from which the labor is obtained.
- d. Quantify the cost of the apprenticeship utilization on this particular project.

6) Completion of Similar Projects - The Bidder shall submit a list of projects of similar size and scope that either they or a named sub-contractor have successfully completed. For the purposes of meeting this criterion, the Owner has determined that “similar size and scope to this project” means projects having the following characteristics: Constructing municipal water system structures. The information about each project shall include the following:

- Owner’s name and contact information for the owner’s representative
- Awarded contract amount
- Final contract amount
- A description of the scope of the project and how the project is similar to this project
- The Bidder’s assessment of its performance of each project, including but not limited to the following:
 - Quality control;
 - Safety record;
 - Timeliness of performance;
 - Use of skilled personnel;
 - Management of subcontractors;
 - Availability of and use of appropriate equipment;
 - Compliance with contract documents;
 - Management of submittals process and change orders

By signing the Signature page of the Bid, the Contractor confirms to be in compliance with all items listed under Supplemental Bidder Criteria item 7 above. The City may request additional information or confirmation of compliance with the above items.

If the City determines the bidder does not meet the bidder responsibility criteria and is therefore not a responsible bidder, the City shall notify the bidder in writing with the reasons for its determination. If the bidder disagrees with this determination, they may appeal the determination within 24 hours of receipt of the City’s determination by presenting additional information to the City. The City will consider the additional information before issuing its final determination. If the final determination affirms that the bidder is not responsible, the City will not execute a contract with any other Bidder until two (2) business days after the bidder determined to be not responsible received the City’s final written determination as required by RCW 39.04.350(3)(d).

The time deadline for a bidder to appeal a determination that they are not responsible, as indicated here, may be modified by the City, adopting either a standard for all projects or changing it on a project-by-project basis.

SECTION B: TERMS AND CONDITIONS

RECIPROCAL PREFERENCE FOR RESIDENT CONTRACTORS

In accordance with RCW 39.04.380 the State of Washington is enforcing a Reciprocal Preference for Resident Contractors. Any public works bid received from a nonresident contractor from a state that provides an in-state percentage bidding preference, a comparable percentage disadvantage must be applied to the bid of that nonresident contractor.

A nonresident contractor from a state that provides a percentage bid preference means a contractor that:

- a. Is from a state that provides a percentage bid preference to its resident contractors bidding on public works contracts.
- b. At the time of bidding on a public works project, does not have a physical office located in Washington.

The state of residence for a nonresident contractor is the state in which the contractor was incorporated or, if not a corporation, the state where the contractor's business entity was formed.

All nonresident contractors will be evaluated for out of state bidder preference. If the state of the nonresident contractor provides an in-state contractor preference, a comparable percentage disadvantage will be applied to their bid prior to contract award.

This section does not apply to public works procured pursuant to RCW 39.04.155, 39.04.280, or any other procurement exempt from competitive bidding.

PREVAILING WAGE REQUIREMENTS

If awarded the project, the contractor and each subcontractor shall have on file current project specific "Statement of Intent to Pay Prevailing Wages" with the Washington State Department of Labor and Industries before payment will be made for work performed. An approved "Affidavit of Wages Paid" form must be filed upon completion of the project before release of retainage.

The State of Washington prevailing wage rates applicable for this public works project, which is located in Clark County, may be found at the following website address of the Department of Labor and Industries: <https://secure.lni.wa.gov/wagelookup/rates/journey-level-rates>. Based on the bid submittal deadline for this project, the applicable effective date for prevailing wages for this project is Tuesday, May 19, 2026. For Contracts where award was delayed more than six months after the bids were due, the prevailing wage in effect on the date of award shall apply for the duration of the Contract.

A copy of the applicable prevailing wage rates will also be available for viewing, upon request, at the Vancouver City Hall, located at 415 W 6th Street, Vancouver WA 98660. Upon request, the City will mail a hard copy of the applicable prevailing wages for this project. To request a copy of the applicable prevailing wage rates please call 360-487-8430 or email procurement.services@cityofvancouver.us.

RETAINAGE

Payment of the retained percentage shall be withheld, by the City, for a period of 45 days following the completion of all Contract work, as defined by WSDOT Section 1-01.3, and shall be paid the Contractor at the expiration of 60 days per RCW 39.12 and RCW 60.28, in the event no claims, as provided by law, have been filed against such funds; and provided further, that releases or certificates have been obtained from the State Department of Labor and Industries, from the State Department of Revenue, and the Employment Security Department and all other departments and agencies having jurisdiction over the activities of the Contractor.

In the event such claims are filed, the Contractor shall be paid such retained percentages less an amount sufficient to pay any such claims, together with a sum sufficient to defray the cost of foreclosure action and to cover attorney fees as determined by the City.

Every person performing labor or furnishing supplies toward the completion of said improvement of work shall have a lien upon said monies so reserved; provided, that such notice of the lien of such claimant shall be given in the manner provided in RCW 39.08.030 and within the time provided in RCW 60.28 as now existing in accordance with any amendments that may hereafter be made thereto.

E-VERIFY PROGRAM

Contractor shall register and enter into a Memorandum of Understanding (MOU) with the Department of Homeland Security E-Verify program within sixty days after execution of this Agreement. Contractor shall ensure all Contractor employees and any sub-contractor(s) assigned to perform work under this Agreement are eligible to work in the United States. Failure by Contractor to comply with this subsection shall be considered a material breach.

CITY BUSINESS AND OCCUPATIONAL LICENSE

The Contractor, at no expense to the City, shall be responsible to obtain all necessary licenses, permits, and similar legal authorizations required to perform the work associated with this Agreement. The Contractor will be required to hold a city business license if working within Vancouver city limits. The Contractor shall apply for city license via the State of Washington Department of Revenue (DOR), [Business Licensing Services website](#). For application assistance, contact DOR BLS at 360-705-6741. For more information about city business license regulations and fees visit [the City website](#) or call 360-487-8410, option 3.

REJECTED BIDS

The City will not be responsible for any errors in bids. Bidders will not be allowed to alter bids after the bid submittal deadline. The City may consider a bid irregular and reject if any of the Bid Item prices are excessively unbalanced (either above or below the amount of a reasonable bid) to the potential detriment of the City. Bids submitted must be complete and include pricing for the work to be completed, in whole, per the plans and specifications.

Qualified bids will be deemed non-responsive and will not be accepted.

The City reserves the right to adjust the scope of this work to match available funds. The City, at its sole discretion, reserves the right to cancel this invitation, reject any or all bids submitted, and to waive any minor formalities if deemed to be in the best interest of the City.

TIE BREAKING

After opening Bids, if two or more lowest responsive, responsible Bids total are exactly equal, the tiebreaker will be determined by a coin toss by the Procurement Manager or their designee before at least two witnesses. Bidders shall choose “Heads” or “Tails” in alphabetic order by the name of the firm as registered with the Washington State Department of Licensing prior to the Coin Flip. Only those Bidders who submitted a Bid total that is exactly equal to the lowest responsive, responsible Bid are to participate.

CLAIM ERRORS

A Bidder who wishes to claim error after the Bids have been publicly opened and read shall promptly notify the City that an error occurred. The Bidders shall submit a declaration under penalty of perjury signed by the Bidder and accompanied by the worksheets used in the preparation of the Bid, requesting relief from the responsibilities of award. The affidavit or declaration shall describe the specific error(s) and certify that the worksheets are the ones used in preparing the Bid.

APPRENTICESHIP UTILIZATION

The City of Vancouver recognizes that a well-trained construction work force is critical to the ability of constructing successful public works projects. Apprenticeship training programs are particularly effective in providing training and experience to individuals seeking to enter or advance in the work force. By providing for apprenticeship utilization on public works projects, the City can create opportunities for training and experience that will help assure that a trained work force will be available in sufficient numbers in the future for the construction of public works projects.

All public works construction projects estimated to cost \$500,000 dollars or more, will require the Contractor to have a percentage of their labor hours performed by apprentices enrolled in an approved Apprenticeship Program.

Prior to the payment of the final pay estimate the Contractor and all subcontractors will be required to file the affidavit of wages paid for the project and all applicable certified payrolls. Based on the information from the affidavits and payrolls, the City will use the apprenticeship utilization information in the L & I portal to determine the incentive or penalty applicable for the project based on the City's apprenticeship policy.

BID AWARD

Once bids have been received and reviewed, staff will prepare a Staff Report to be presented to Council. Once Council has formally awarded this contract, an Award email will be sent as evidence of the acceptance of the bid. No other act of the City shall constitute acceptance of a bid.

Bidders may not alter their bid prices after the hour set for the public Bid Opening, unless the award of contract is delayed for more than 45 days. The City reserves the right to request an extension of time for firm bid prices during any such delay to allow for the review process.

FAILURE TO EXECUTE CONTRACT

Failure to return the required insurance certificate, performance and payment bonds, and labor and material bonds (if applicable), or failure or refusal to sign the Contract within 10

calendar days, shall be considered failure to execute the contract. The City may then Award the Contract to the second lowest responsible Bidder or reject all remaining Bids. If the second lowest responsible Bidder fails to return the required documents as stated above within the time provided after Award, the Contract may then be Awarded successively in a like manner to the remaining lowest responsible Bidders until the above requirements are met or the remaining Proposals are rejected. The City may grant an extension to the Contractor to submit the required insurance and bonds for up to an additional 20 calendar days for extenuating circumstances. The extension shall be granted at the City's sole discretion.

PROTESTS

Pre-Bid or Solicitation Phase Protest

The City must receive a Pre-Bid or Solicitation Protest at least five (5) Days before the bid open date or proposal/qualifications response due date. These protests are to be submitted to the Procurement Specialist overseeing the project.

Upon receipt of the Protest the Procurement Specialist shall review the concerns outlined and consult with the necessary parties as need. The Procurement Specialist shall reply to the protest within three (3) Days.

Pre-Award Protest

The City must receive a Pre-Award Protest within five (5) Days after the date of publication of the bid tab to the City's website for bids or notification of Intent to Award for a Solicitation. These protests are to be submitted to the Procurement Manager. The City may provide copies of the Protest to the bidder/proposer against whom the Protest is made if the Protestor does not copy them on the Protest. The bidder/proposer subject of the Protest will have two (2) Days to respond to the City about the Protest following its receipt of copies of the Protest, either from the Protestor or the City.

Upon receipt of the Protest, the Procurement Manager, upon receipt of the protest, shall review all of the issues brought forward in the protest and consult with the necessary parties as needed. All available facts will be considered. The Procurement Manager shall respond, in writing, to all parties within ten (10) Days. The Procurement Manager may extend this deadline to respond at any time during the ten (10) Day period with written notice to all parties. The Procurement Manager will respond to the Protest in writing by email if an email address is provided, requesting acknowledgement of receipt or will mail a response using certified mail.

The Procurement Manager will not execute a contract for the project with anyone other than the Protestor without first providing at least two (2) Days' written notice of the City's Intent to Award.

For more information see the City of Vancouver Procurement's Protest Policy at: [Procurement Services -The City of Vancouver, WA](#)

SECTION C: BID SUBMITTAL REQUIREMENTS & PROCEDURES

PHASE 1: BID SUBMITTAL CHECKLIST

The bidder's attention is especially called to the following form, which must be executed in full as required. This checklist has been prepared and furnished to aid the bidder in including all necessary supporting information with their bid. It is not guaranteed to be complete or accurate, and the responsibility for compliance with all bidding requirements remains with the bidder. Items in **bold** shall be submitted with your bid. Failure to do so, shall make your bid non-responsive.

☐ **BID FORM**

Bids shall be completed and submitted on the bid forms provided.

☐ **ADDENDA ACKNOWLEDGEMENT FORM**

The bidder must sign, where indicated on the last page of the bid documents, acknowledgement of any addenda prior to the bid opening. *Failure to comply with this provision will render the bid non-responsive and therefore void.*

It is the sole responsibility of the Bidder to learn of addendum, if any. Such information may be obtained from the City of Vancouver's Procurement Services' website at: cityofvancouver.bonfirehub.com.

However, the sole responsibility for obtaining and learning of Addendum belongs to the Bidder. The City of Vancouver accepts no responsibility or liability and will provide no accommodation to bidders who fail to check for addendum and submit inadequate or incorrect responses.

☐ **NON-DISCRIMINATION**

Bidders must provide evidence of compliance as required by RCW 35.22.650 on the attached form.

☐ **CERTIFICATION OF COMPLIANCE WITH WAGE PAYMENT STATUSES**

Bidders are required to submit a statement verifying that within the three-year period immediately preceding the date of the bid solicitation, they not have been determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgement entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of Chapter 49.46, 49.48 or 49.52 RCW.

☐ **LIST OF SUBCONTRACTORS**

The City has determined that requirements of RCW 39.30.060(1) applies to this solicitation and requires each bidder to submit, as a part of the bid, the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of heating, ventilation and air conditioning, plumbing as described in RCW 18.106, electrical as described in RCW 19.28, structural steel, and rebar installation or to name itself for the work. The City requires that this information is required to be submitted as a part of the bid, otherwise this shall deem the bidder non-responsive. The bidder shall not list more than one subcontractor for each

category of work identified, unless subcontractors vary with bid alternates, in which case the bidder must indicate which subcontractor will be used for which alternate. The requirement of this section is to name the bidder's proposed heating, ventilation and air conditioning, plumbing, electrical subcontractors, structural steel and rebar installation who will contract directly with the general contractor submitting the bid to the public entity.

☐ **BID SECURITY FORM**

The bid bond, or acceptable form, is to be executed by the bidder and a surety company licensed to do business in Washington, unless the bid is accompanied by a cashier's check. No such bid bond will be required where a cashier's check is submitted in lieu of a bond. The amount of the bond or cashier's check shall not be less than five percent of the total amount bid and may be shown in dollars or on a percentage basis. If a surety company form is submitted, please attach the form to the Bid Documents submitted. The submitted bid bond is subject to forfeiture if the successful bidder fails to enter into the contract.

SUPPLEMENTAL BIDDER RESPONSIBILITY CRITERIA

Additional Supplemental Bidder Responsibility criteria will be required of the Apparent Successful Bidder (lowest, responsive, responsible bidder). Bidder must submit required information to City within 72 hours after receipt of the request by the City of Vancouver. Bidders are not required to submit this information with their bid.

Note: If during the Bidding period, a potential Bidder believes that the Supplemental Bidder Responsibility Criteria will exclude them from bidding, Bidder may request the City to consider modifying the criteria. The request for modifications must be submitted by the question deadline. Such modification, if accepted by the City, will be communicated via the issuance of an addendum to the Bidding documents.

PHASE 2: CONTRACT AWARD

The following is to be signed and/or delivered by the awarded Contractor to the City within ten days after the award date.

☐ **CONTRACT**

This agreement is to be signed by the successful bidder.

☐ **PERFORMANCE BOND**

This shall be submitted by the successful bidder and a surety company, licensed to do business within the State of Washington on the approved City of Vancouver form.

☐ **PAYMENT BOND**

This shall be submitted by the successful bidder and a surety company, licensed to do business within the State of Washington on the approved City of Vancouver form.

☐ **INSURANCE CERTIFICATE**

The City shall be named as an additional named insured on all insurance policies. These policies shall comply with the requirements as stated in the Contract.

BID FORM

To the City Council
City of Vancouver
Vancouver, Washington 98660

The undersigned certifies that the locations and construction details of work outlined in the Plans and Specifications have been personally examined for the following:

This Contract provides for the installation of two new well house buildings around recently drilled municipal drinking water wells and other work, all in accordance with the attached Contract Plans, these Contract Provisions and the Standard Specifications. The scope includes extending existing access, a structure, a vertical-turbine well pump and motors while connecting to the existing water, electrical and communications systems to make those new wells functional for the Water Station 1 Wellfield.

The Contract Work shall be Physically Complete within 180 Working Days from the Notice to Proceed.

Bidder certifies they have read and thoroughly understand the Specifications and contract governing the purchase and the method by which payment will be made for said work and hereby propose to undertake and complete requirements in accordance with said Contract and at the following schedule of rates and prices.

The City reserves the right to adjust the scope of this work to match available funds including, if necessary, the elimination of specific work or all work associated with specific locations in this Invitation to Bid.

NOTE:

- Show prices in legible figures (not words) written in ink or typed and expressed in U.S. dollars and cents.
- Where conflict occurs unit price shall prevail.
- Unit Prices required for all non-Lump Sum bid items.
- The Total Price for Non-Lump Sum Bid Items shall be calculated as follows:
 - $\text{Approx. Quantity (as listed for that bid item)} \times \text{Unit Price} = \text{Total Price}$
- Your Bid will be considered irregular and will be rejected if the Unit Price is left blank and a price per unit cannot be determined by equally dividing the "Approx. Quantity" into the Total Price and rounding to the nearest two decimals.
- Your Bid shall be considered *non-responsive* and therefore, void if:
 - Figures are illegible.
 - Minimum Bid requirements are not met (when applicable).
 - Bid is qualified or conditions are added to your Bid.

Item	Approx Qty	Unit of Measure	Description	Unit Price	Total Price
1.	1	LS	Mobilization, Demobilization, Site Preparation and Clean-Up	Lump Sum	\$
2.	1	LS	Excavation Safety and Shoring	Lump Sum	\$
3.	1	LS	Site Work	Lump Sum	\$
4.	1	LS	Site Utilities	Lump Sum	\$
5.	1	LS	Structural Work	Lump Sum	\$
6.	1	LS	Mechanical Work	Lump Sum	\$
7.	1	LS	Electrical Work	Lump Sum	\$
8.	1	LS	Automatic Control	Lump Sum	\$
9.	1	LS	Testing, Startup, and Training	Lump Sum	\$
10.	1	LS	As-Builts and O&M Manuals	Lump Sum	\$
11.	1	EST	Apprenticeship Utilization	\$6,000	\$ 6,000
Subtotal					\$
Washington State Sales Tax 8.9%					\$
Grand Total					\$

The following Addendum/Addenda is/are hereby acknowledged:

Addendum No	Date of Addendum	Signed Acknowledgment
1.		
2.		
3.		
4.		

NOTE: Failure to acknowledge any issued Addenda will render proposal non-responsive and therefore void. It is the sole responsibility of the Bidder to learn of Addendum, if any.

Such information may be obtained from the City of Vancouver Procurement's website at cityofvancouver.bonfirehub.com.

The undersigned, under penalty of perjury, hereby certifies that said person(s), firm, association, LLC, or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this Bid is submitted.

The undersigned declares that they have reviewed the insurance requirements listed in the Contract and have discussed both cost and availability of these insurance requirements with my insurance broker/agent. The bid being submitted accurately reflects the cost and availability of the insurance requirements as outlined by the City of Vancouver, which I will abide by if awarded the contract.

The Contractor hereby certifies that the Contractor has an Employment Security Department number as required to conduct public works projects pursuant to RCW 39.04.350.

The undersigned declares that before preparing their bid, they read carefully the specifications and requirements for bidders and that their bid is made with the full knowledge of the kind, quality and quantity of services and equipment to be furnished, and their said bid is as stated on these pages. **By signing this page of the bid, the Contractor acknowledges and agrees to the terms and conditions of each of the forms (the bid bond form must be signed separately), included in the bid documents.**

_____ Authorized Official (Signature)	_____ Date
_____ Print Name of Authorized Official	_____ Title of Authorized Official
_____ Company Name	_____ Telephone Number
_____ Address	_____ City, State, Zip
_____ E-mail Address	_____ Federal Employee I.D. #
_____ State Contractor's License Number	_____ Washington Unified Business Identifier (UBI#)
_____ Employment Security Reference Number	

Note:

1. If the bidder is a co-partnership, so state, giving firm name under which business is transacted.

2. If the bidder is a corporation or LLC, this Bid must be executed by a duly authorized official.
3. Bids submitted must be complete and include pricing for the work to be completed, in whole, per the specifications.

NON-DISCRIMINATION CLAUSE

RCW 35.22.650-Public Works or Improvements-Minority Business, Employees-Contract, Contents

All contracts by and between a first class city and contractors for any public work or improvement exceeding the sum of ten thousand dollars, or fifteen thousand dollars for construction of water mains, shall contain the following clause:

“Contractor agrees that they shall actively solicit the employment of minority group members. Contractor further agrees that they shall actively solicit bids for the subcontracting of goods or services from qualified minority businesses. Contractor shall furnish evidence of his/her compliance with these requirements of minority employment and solicitation. Contractor further agrees to consider the grant of subcontracts to said minority bidders on the basis of substantially equal proposals in the light most favorable to said minority businesses. The Contractor shall be required to submit evidence of compliance with this section as part of the bid.”

As used in this section, the term “minority business” means a business of at least fifty-one percent of which is owned by minority group members. Minority group members include, but are not limited to, African Americans, Women, Native Americans, Asians, Eskimos, Aleuts, and Hispanics.

By signing the bid form the bidder certifies that they agree to comply with this non-discrimination clause and shall provide documentation of compliance as requested by the City.

By signing the signature page of the proposal, the Contractor acknowledges and agrees to the terms and conditions of this form.

CERTIFICATION OF COMPLIANCE WITH WAGE PAYMENT STATUTES

The bidder hereby certifies that, within the three-year period immediately preceding the bid solicitation date **Tuesday, May 19, 2026** that the bidder is not a “willful” violator, as defined in RCW 49.48.082, of any provision of Chapters 49.46, 49.48, or 49.52 RCW, as determined by a final and binding citation and notice of assessment issued by the Department of Labor and Industries or through a civil judgment entered by a court of limited or general jurisdiction.

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

Bidder

Signature of Authorized Official*

Printed Name

Title

Date

City

State

Check One:

Individual ☐ Partnership ☐ Joint Venture ☐ Corporation ☐

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

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

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

LIST OF SUBCONTRACTORS

FAILURE TO SUBMIT THIS FORM WILL RENDER THE BID NON-RESPONSIVE AND, THEREFORE, VOID.

RCW 39.30.060-Public Works Subcontracting:

The City has determined that the requirements of RCW 39.30.060(1) applies to this contract and the City shall require each bidder, regardless of the amount bid, to submit as part of the bid the names of the subcontractors with whom the bidder, if awarded the contract, will subcontract for performance of the work of heating, ventilation and air conditioning, plumbing as described in chapter 18.106 RCW, and electrical as described in chapter 19.28 RCW, structural steel, and rebar installation or to name itself for the work.

The bidder shall not list more than one subcontractor for each category of work identified, unless subcontractors vary with bid alternates, in which case the bidder must indicate which subcontractor will be used for which alternate. The requirement of this section to name the bidder's proposed heating, ventilation and air conditioning, plumbing, electrical subcontractors, structural steel, and rebar installation applies only to proposed heating, ventilation and air conditioning, plumbing, electrical subcontractors, structural steel, and rebar installation who will contract directly with the general contractor submitting the bid to the public entity.

Failure of the bidder to submit as part of the bid the name(s) of such subcontractors or to name itself to perform such work or the naming of two or more subcontractors to perform the same work shall render the bidder's bid non-responsive and, therefore, void. Bidders must be in compliance with RCW 39.04.350(1)a if choosing to self-perform or shall be deemed non-responsible.

Will this project involve any of the following? If the answer is "yes" to any of the categories the bidder must specify whether itself or a subcontractor will perform each type of work. If a subcontractor will perform the work, bidders must list the subcontractor's name.

Description of Work	Name of Subcontractor	Self Perform	Work Not In Project
Electrical		☐	☐
Plumbing		☐	☐
HVAC		☐	☒
Structural Steel		☐	☒
Rebar Installation		☐	☐

By signing the signature page of the proposal, the Contractor acknowledges and agrees to the terms and conditions of this form.

BID SECURITY FORM
Complete one of the following:

CASHIERS CHECK

Herewith find deposit in the form of a cashier's check in the amount of \$ _____, which amount is not less than five percent (5%) of the total bid.

Signature _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal, and _____

_____, as surety, are held and firmly bound unto the City of Vancouver as Obligee in the penal sum of _____

_____ dollars for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by these presents.

The condition of this obligation is such that if the Obligee shall make any award to the Principal for:

ITB 26-19 Water Station 1 – Wellhouses 3B & 5B

according to the terms of the proposal or bid made by the Principal therefore, and the principal shall duly make and enter into a contract with the Obligee in accordance with the terms of said proposal or bid and award and shall give bond for the faithful performance thereof, with Surety and Sureties approved by the Obligee, or if the Principal shall, in case of failure so to do, pay and forfeit to the Obligee the penal amount of the deposit specified in the call for bids, then this obligation shall be null and void, otherwise it shall be and remain in full force and effect and the Surety shall forthwith pay and forfeit to the Obligee, as penalty and liquidated damages, the amount of this bond.

SIGNED, SEALED AND DATED THIS _____ day of _____, 2026.

Principal

Surety



**CONSTRUCTION CONTRACT # C-#####
BID 26-19 Water Station 1 – Wellhouses 3B & 5B**

This Contract (hereinafter referred to as the “Contract”) is entered into by and between the City of Vancouver, Washington, a municipal corporation organized under the laws of the State of Washington (hereinafter referred to as the “City”) and **Contractor Name** (hereinafter referred to as the “Contractor”). The City and the Contractor may be collectively referred to herein as the “Parties” or individually as a “Party.”

WHEREAS, the City desires to engage the Contractor to provide public works construction and other related services for the work described herein;

WHEREAS, Contractor has agreed to offer its services to perform said work per the City issued Invitation to Bid (ITB) No. YR-## and all addenda thereto, Contractor’s Bid to said ITB, the Project Plan Set and Special Provisions, and City Council’s approval on **Click here to enter a date** per Staff Report No. **##-##**; and

WHEREAS, the Contractor represents by entering into this Contract that it is fully qualified to perform the work to which it will be assigned in a competent and professional manner, and to the standards required by the City.

NOW, THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, or attached an incorporated and made a part hereof, the parties hereto agree as follows:

- 1. STATEMENT OF WORK:** The Contractor hereby agrees to furnish all materials, labor, tools, machinery and implements of every description necessary to complete the work in a professional manner within the time limits stated in this Contract for the construction and installation of the following improvements and will make all necessary arrangements for the obtaining of permits from the United States, State of Washington, and/or any of its agencies as may be necessary to do the work required and covered by this Contract.

This Contract provides for the installation of two new well house buildings around recently drilled municipal drinking water wells and other work, all in accordance with the attached Contract Plans, these Contract Provisions and the Standard Specifications. The scope includes extending existing access, a structure, a vertical-turbine well pump and motors while connecting to the existing water, electrical and communications systems to make those new wells functional for the Water Station 1 Wellfield.

The Contract Work shall be Physically Complete within 180 Working Days from the Notice to Proceed.

2. **EFFECTIVE DATE:** This Contract is effective as of the last signature of the Contract.
3. **E-VERIFY PROGRAM:** Contractor shall register and enter into a Memorandum of Understanding (MOU) with the Department of Homeland Security E-Verify program within sixty days after execution of this Contract. Contractor shall ensure all Contractor employees and any subcontractor(s) assigned to perform work under this Contract are eligible to work in the United States. Contractor shall provide verification of compliance upon City request. Failure by Contractor to comply with this subsection shall be considered a material breach.
4. **CONTRACTOR RESPONSIBILITIES FOR SUBCONTRACTOR:** The Contractor shall include the language of this section in all tier subcontracts and shall require each of its subcontractors to include the same language of this section in each of their subcontracts, adjusting only as necessary the terms used for the contracting parties. The requirements of this section apply to all subcontractors regardless of tier. The Contractor shall require all subcontractors to comply with all federal, state and municipal laws, rules and regulations whatsoever.

At any time of the subcontract execution, the Contractor shall verify that all tier subcontractors meet the following bidder responsibility criteria:

- a. Have a current certificate of registration in compliance with Chapter 18.27 RCW, which must have been in effect at the time of subcontract bid submittal.
 - b. Have a current Washington Unified Business Identifier (UBI) number.
 - c. Have received training on the requirements related to public works and prevailing wage as required by RCW 39.04.350.
 - d. Within the three-year period immediately preceding the date of the bid solicitation, not have been determined by a final and binding citation and notice of assessment issued by the department of labor and industries or through civil judgement entered by a court of limited or general jurisdiction to have willfully violated, as defined in RCW 49.48.082, any provision of Chapter 49.46, 49.48 or 49.52 RCW.
 - e. If applicable, have:
 - i. Industrial Insurance (worker's compensation) coverage for the subcontractor's employees working in Washington, as required in Title 51 RCW.
 - ii. A Washington Employment Security Department reference number, as required in Title 50 RCW.
 - iii. A Washington Department of Revenue state excise tax registration number, as required in Title 82 RCW.
 - iv. An electrical contractor license, if required by Chapter 19.28 RCW.
 - v. An elevator contractor license, if required by Chapter 70.87 RCW.
 - f. Not be disqualified from bidding on any public works contract under RCW 39.06.010 or 39.12.065(3).
5. **DELINQUENT STATE TAXES:** The Contractor shall not owe delinquent taxes to the Washington State Department of Revenue without a payment plan approved by the Department of Revenue.

- 6. COMPENSATION AND SCHEDULE OF PAYMENTS:** In consideration of the promises and agreements of the Contractor as set forth herein, and in consideration of the faithful performance and furnishing of the work and materials required by this Contract to the satisfaction of the City, the City agrees to pay to the Contractor as prescribed in the solicitation and Contractor's Bid, and in accordance with the ordinances of the City of Vancouver and the laws of the State of Washington, the following sum as indicated, which amount does include 8.9% Washington State Sales Tax (if applicable) **\$000.00** USD.

The amount finally to be paid is, however, variable upon the Work actually performed, and final payment will be made upon the basis of the amount of work performed and the materials furnished, and at the lump sum or unit prices fixed in the Contractor's Bid as modified by any and all approved Change Orders.

- 7. CONTRACTOR'S INSURANCE:** The Contractor agrees to the following requirements relating to insurance coverage. Provide a Certificate of Liability Insurance. Said certificate must be provided on a standard "ACORD" form, or its equivalent, and must provide that coverage shall not be canceled or modified without 30 days prior written notice to the City of Vancouver.

The City of Vancouver may inspect all policies, and copies shall be provided to the City upon request. The Contractor shall obtain the insurance described in this section from insurers approved by the State Insurance Commissioner pursuant to RCW Title 48. The insurance must be provided by an insurer with a rating of A-: VII or higher in the A.M. Best's Key Rating Guide, which is licensed to do business in the state of Washington (or issued as a surplus line by a Washington Surplus lines broker). The City reserves the right to approve or reject the insurance provided, based on the insurer (including financial condition), terms and coverage, the Certificate of Insurance, and/or endorsements.

The Contractor agrees to procure insurance coverage as required below:

COVERAGE	LIMITS OF LIABILITY
I. Commercial General Liability:	
Policy shall include Bodily Injury, Property Damage, Personal Injury and Broad Form Contractual Liability	
Each Occurrence	\$1,000,000
General Aggregate Per Occurrence	\$2,000,000
Products & Completed Operations Aggregate	\$2,000,000
Personal and Advertising Injury	\$1,000,000
Blanket Contractual Liability	\$1,000,000
II. Commercial Automobile Liability	
Policy shall include Bodily Injury and Property Damage, for any owned, Hired, and/or non-owned vehicles used in the operation, installation and maintenance of facilities under this Contract.	

COVERAGE	LIMITS OF LIABILITY
Combined Single Limit	\$1,000,000
III. Workers' Compensation (applicable to the State of Washington)	
Per Occurrence	Statutory
Employer's Liability	\$1,000,000
Disease Each Employee	\$1,000,000
Disease Policy Limit	\$1,000,000
Each Claim	\$1,000,000
Annual Aggregate	\$2,000,000
IV. Pollution Legal Liability	
Each Claim	\$3,000,000
Annual Aggregate	\$6,000,000
V. Builders Risk	
Builder's "All Risk" Property Insurance Coverage to include personal property of others in the care, custody and control of the contractor. Coverage should be written for 100% of the completed value. For additions or repairs of existing building structures, coverage to include contractor's interest in improvements, repairs, additions, alterations to completed buildings and subject to items described in "a".	Contract Value

In addition to the coverage and limits listed above the Contractor's insurance must all contain the following:

- a. City Listed as Additional Insured. The City of Vancouver, its Agents, Representatives, Officers, Directors, Elected and Appointed Officials, and Employees must be named as additional insured. The required Additional Insured endorsements shall be at least as broad as ISO CG 20 10 11 85, or its equivalent CG 20 10 07 04 and CG 20 37 07 04 must be included with the Certificate of Insurance.
- b. Either the Commercial General Liability or the Worker's Compensation policy must be endorsed to include "Washington Stop Gap" insurance. The limits and aggregates referenced must apply to the Stop Gap coverage as well and must be indicated on the certificate.
- c. Commercial General Liability insurance shall be written on coverage forms at least as broad as ISO occurrence form CG 00 01, including but not limited to liability arising from premises, operations, stop gap liability, independent contractors, products-completed operations, personal and advertising injury, and liability assumed under an insured contract. There shall be no exclusion for liability arising from explosion, collapse or underground property damage. The Commercial General Liability insurance shall be endorsed to provide a per project general aggregate limit, using ISO form CG 25 03 05 09 or an equivalent endorsement.

- d. The City of Vancouver shall be listed on the Certificate as Certificate Holder.
 - e. Cover Trigger: The insurance must be written on an “occurrence” basis. This must be indicated on the Certificate.
 - f. Contractor shall ensure that each subcontractor of every tier obtains and maintains at a minimum the insurance coverages required for Commercial General Liability and Auto Liability. Upon request of the City, the Contractor shall provide evidence of such insurance.
 - g. The Contractor shall keep this insurance in force during the term of the Contract and for thirty (30) days after the Physical Completion date. The Contractor shall provide the City and all Additional Insured with written notice of any policy cancellation, within two business days of their receipt of such notice.
 - h. Failure on the part of the Contractor to maintain the insurance as required shall constitute a material breach of contract, upon which the City may, suspend work or terminate the contract.
 - i. All costs for insurance shall be incidental to and included in the unit or lump sum prices of the contract and no additional payment will be made.
- 8. CONTRACTOR’S BOND:** The Contractor agrees that before it undertakes performance of this Contract, it will file with the City a Performance Bond and a Payment Bond, in the forms prescribed by the City of Vancouver, in the full amount of the Contract price with a company authorized to do business in the State of Washington as a surety. The bonds shall comply with the laws of the State of Washington, especially with the provisions of Chapter 39.08 RCW.
- 9. DISPUTE RESOLUTION:** In the event of a dispute between the Parties which cannot be resolved by the contract managers, the Contractor and the City shall review such dispute and may attempt to resolve the dispute. Any controversy or claim arising out of or relating to this Contract or alleged breach of this Contract that cannot be resolved by the Parties within 30 days of receipt of written notice may be submitted to mediation. If the dispute cannot be resolved through mediation, either party may initiate litigation pursuant to the governing law and venue provisions of this Contract. The Parties agree to pay their own attorneys’ fees and expenses.
- 10. GOVERNING LAW/VENUE:** This Contract shall be deemed to have been executed and delivered within the State of Washington, and the rights and obligations of the parties hereunder shall be construed and enforced in accordance with, and governed by, the laws of the State of Washington without regard to the principles of conflict of laws. Any action or suit brought in connection with this Contract shall be brought in the Superior Court of Clark County, Washington.
- 11. EMPLOYMENT OF LABOR:** The Contractor agrees that all persons employed by the Contractor and by any of its subcontractor and any of their lower tier contractors in work performed pursuant to this Contract shall not be employed in excess of eight (8)

hours in any day, except as provided or allowed by Chapter 49.28 RCW and WAC 296.127 and any amendment thereto.

- 12. PAYMENT OF LABOR:** The Contractor agrees that all laborers, workers, or mechanics employed by it or by any subcontractor in the performance of this Contract will be paid not less than the prevailing wage rate for an hour's work, in accordance with the provisions of Chapter 39.12 RCW, and all rules and regulations promulgated pursuant thereto.

The prevailing wage rates in effect at the time of the bid submittal deadline shall apply for the duration of the project, no matter how long it lasts. However, if the Contract is awarded more than six (6) months after the bids were due, the prevailing wage rates in effect on the award date shall apply.

In case any dispute arises as to what the prevailing rate of wages for work of a similar nature are and such dispute cannot be adjusted by the parties involved, the matter shall be referred to the director of the Department of Labor and Industries of the State of Washington for arbitration, and the director's decision shall be final, conclusive and binding on all parties involved in the dispute.

- 13. PAYMENT TO THE CONTRACTOR:** Progress payments to the Contractor shall be made within 30 days of a fully executed Pay Estimate pending all compliance with all contractual requirements. A sum equal to 5% may be reserved and retained from monies earned by the Contractor in accordance with Chapter 60.28 RCW. The City reserves the right to require Contractor to correct any submitted or paid erroneous invoices according to the rates set forth herein. City and Contractor agree that any amount paid in error by City does not constitute a change in the agreed upon amount; Contractor agrees to issue a refund of any of any overages paid in error by the City.

Release of the retained percentage or the retainage bond shall be in accordance with Chapter 60.28 RCW. Every person performing labor or furnishing supplies toward the completion of said improvement of work shall have a lien upon said monies so reserved; provided, that such notice of the lien of such claimant shall be given in the manner provided in RCW 39.08.030 and within the time provided in Chapter 60.28 RCW as now existing and in accordance with any amendments that may hereafter be made thereto.

No payment shall be made to the Contract, however, until the Contractor and all subcontractors who have performed work shall have filed and received approval of a Statement of Intent to Pay Prevailing Wage as required by RCW 39.12.040 from the Washington State Department of Labor and Industries. Said Contractor and all subcontractors shall also keep accurate payroll records for three years from the date of acceptance as described in RCW 39.12.120. A Contractor and all subcontractors shall, file a copy of its certified payroll records using the Department of Labor and Industries online system on a monthly basis. A Contractor's noncompliance with this section shall constitute a violation of RCW 39.12.050.

14. INDEMNIFICATION: Contractor agrees to indemnify, defend, save and hold harmless the City, its officials, employees and agents from any and all liability, including but not limited to demands, claims, causes of action, suits or judgements, claims of copyright or patent infringement, including costs, attorney fees and expenses incurred in connection therewith, or whatsoever kind or nature, arising out of, or in connection with, or incident to, the performance of services by Contractor pursuant to this Contract.

In the event that any suit based on such a claim, demand, loss, damage, cost or cause of action is brought against the Contractor, the City retains the right to participate in said suit.

This indemnity and hold harmless shall include any claim made against the City by an employee of the Contractor or subcontractor or agent of the Contractor, even if Contractor is thus otherwise immune from liability pursuant to worker's compensation statute, Title 51 RCW. To the extent that such liability arises from the concurrent negligence of both the City and the Contractor, such cost, fees and expenses shall be shared between the City and the Contractor in proportion to their relative degrees of negligence. This indemnity and hold harmless shall NOT apply in the case where liability arises from the sole negligence of the City. The Contractor specifically acknowledges that the provisions contained herein have been mutually negotiated by the Parties and it is the intent of the Parties that Contractor provide the broadest scope of indemnity permitted by RCW 4.24.115.

15. OWNERSHIP OF RECORDS AND DOCUMENTS: Any and all work product prepared by the Contractor in the course of performing this Contract shall immediately become the property of the City. In consideration of the compensation provided for by this Contract, the Contractor hereby further assigns all copyright interests in such work product to the City. A copy may be retained by the Contractor. Previously owned intellectual property of Contractor or any third party, and any know-how, methodologies or processes used by Contractor to provide the services or project deliverables under this Contract shall remain property of the original City.

16. PUBLIC DISCLOSURE COMPLIANCE: The parties acknowledge that the City is an "agency" within the meaning of the Washington Public Records Act, Chapter 42.56 RCW, and that materials submitted by the Contractor to the City become public record. Such records may be subject to public disclosure, in whole or part and may be required to be released by the City in the event of a request for disclosure. In the event the City receives a public record request for any data or deliverable that is provided to the City and that is licensed from the Contractor, the City shall notify the Contractor of such request and withhold disclosure of such information for not less than five business days, to permit the Contractor to seek judicial protection of such information, provided that the Contractor shall be responsible for attorney fees and costs in such action and shall save and hold harmless the City from any costs, attorney fees or penalty assessment under Chapter 42.56 RCW for withholding or delaying public disclosure of such information.

17. COOPERATIVE PURCHASING: The Washington State interlocal Cooperation Act, Chapter 39.34 RCW, authorizes public agencies to cooperatively purchase goods and services if

all parties agree. By having executed this Agreement, the Contractor agrees that other public agencies may purchase goods and services under this solicitation or contract at their own cost and without the City incurring any financial or legal liability for such purchases. The City agrees to allow other public agencies to purchase goods and services under this solicitation or contract, provided that the City is not held financially or legally liable for purchases and that any public agency purchasing under solicitation or contract file a copy of this invitation and such contract in accordance with RCW 39.34.040.

18. AMENDMENTS: All changes to this Contract, including changes to the statement of work and compensation, must be made by written Change Order and/or Amendment and signed by all parties to this Contract.

19. AUTHORIZATION AND COMPLIANCE WITH THE LAW: The Contractor certifies that the person signing the Contract is legally authorized to enter into this binding Contract and that the Contractor shall fully comply with all relevant, federal, state and municipal laws, rules, regulations and policies.

20. CITY BUSINESS AND OCCUPATION LICENSE: The Contractor will be required to obtain a business license when contracting with the City unless allowable exemptions apply. The Contractor shall contact the State of Washington [Business License Service website](#) or by phone at 800-451-7985, or the [City's website](#) to determine whether a business license is required pursuant to the Vancouver Municipal Code (VMC) Chapter 5.04.

21. RELATION OF PARTIES: The Contractor, its subcontractors, agents and employees are independent contractors performing services for the City and are not employees of the City; shall not as a result of this Contract, accrue leave, retirement, insurance, bonding or any other benefits afforded to City employees; and, shall not have the authority to bind the City in any way except as may be specifically provided in the Statement of Work.

22. ASSIGNMENT: This Contract is binding on each party, its successors, assigns, and legal representatives and may not, under any circumstances, be assigned or transferred by either party without the other party's express written authorization.

23. TERMINATION FOR CONVENIENCE: The City, at its sole discretion, may terminate this Contract for convenience at any time for any reason deemed appropriate. Termination is effective immediately upon notice of termination given by the City.

In the event this Contract is terminated prior to the completion of Work, Contractor will only be paid for the Work completed at the time of termination of the Contract.

24. TERMINATION FOR CAUSE: In the event the Contractor is, or has been, in violation of the terms of this Contract, including the solicitation, the City reserves the right, upon written notice to the Contractor, to cancel, terminate or suspend this Contract in whole or in part for default. Termination shall be effected by serving a notice of termination on the Contractor setting forth the manner in which the Contractor is in default. The

Contractor will be paid only the contract price for services performed in accordance with the manner of performance set forth in the Contract.

If it is later determined by the City that the Contractor had an excusable reason for not performing, such as a strike, fire or flood, or events which are not the fault of or are beyond the control of the Contractor, the City after setting up a new delivery or performance schedule, may allow the Contractor to continue work or treat the termination as a termination for convenience.

- 25. OPPORTUNITY TO CURE:** The City at its sole discretion may in lieu of a termination allow the Contractor to cure the defect(s), by providing a "Notice to Cure" to Contractor setting forth the remedies sought by the City and the deadline to accomplish the remedies. If the Contractor fails to remedy to the City's satisfaction the breach or default of any of the terms, covenants, or conditions of this Contract within the time stated time, the City shall have the right to terminate the Contract without any further obligation to the Contractor. Any such termination for default shall not in any way operate to preclude the city from also pursuing all available remedies against the Contractor and its sureties for said breach or default, including but not limited to, termination of this Contract for convenience.
- 26. WAIVER AND REMEDIES:** City's failure to enforce the terms or conditions herein or to exercise any right or privilege, or the City's waiver of any breach hereunder shall not thereafter waive any other term, condition or privilege, whether of the same or similar type. Remedies under this Contract are cumulative; the use of one remedy shall not be taken to exclude or waive the right to use another.
- 27. ENTIRETY OF CONTRACT:** This Contract incorporates all the agreements, covenants and understanding between the parties hereto and are merged into this written Contract. No prior agreement or prior understanding, verbal or otherwise, of the parties or their agents shall be valid or enforceable unless set forth in this Contract.
- 28. USE OF CITY'S NAME:** Contractor may not use any of City's name, trademark, service marks, or logo in connection with the services contemplated by this Contract or otherwise without the prior written permission of City, which permission may be withheld for any or no reason and may be subject to certain conditions.
- 29. DEBARMENT:** The Contractor certifies that that it is not presently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from covered transactions by any Federal, State or local department or agency.
- 30. NON-DISCRIMINATION AND EQUAL EMPLOYMENT OPPORTUNITY:** During the term of this Contract, Contractor will not discriminate against any employee or applicant for employment in accordance with RCW Chapter 49.60, including, but not limited to creed, religion, race, color, age, sex, marital status, sexual orientation, sexual identity, pregnancy, military status, political ideology, ancestry, national origin, or the presence of any sensory, mental or physical disability, unless based upon a bona fide occupational qualification. The Contractor will take affirmative action to ensure that applicants and employees are treated fairly, without regard to their creed, religion, race, color, sex, national origin, or the presence of any sensory, mental or physical

disability. Such action shall include all terms and conditions of employment, compensation and benefits, including apprenticeship.

31. BINDING EFFECT: The provisions, covenants and conditions in this Contract bind the parties, their legal heirs, representatives, successors and assigns.

32. RATIFICATION: Acts taken pursuant to this Contract but prior to its effective date are hereby ratified and confirmed.

33. CONTRACT DOCUMENTS AND ORDER OF PRECEDENCE: The complete Contract includes these parts, all of which are incorporated herein by reference, and any inconsistency in the parts of the contract shall be resolved by following this order of precedence (e.g., 1 presiding over 2, 2 over 3, 3 over 4, and so forth):

1. Amendments to the Contract,
2. This Contract,
3. Contractor's Bid including all Addenda to the Solicitation,
4. Technical Specifications,
5. Select Technical Specifications
6. Contract Plan Set,
7. Supplemental Conditions to the EJCDC,
8. Standard General Conditions of the Construction Contract (EJCDC).

On the Contract Plans, Working Drawings and Standard Plans, figured dimensions shall take precedence over scaled dimensions.

Whenever reference is made in these Specifications or the Special Provisions to codes, rules, specifications and standards, the reference shall be construed to mean the code, rule, specification or standard that is in effect on the Invitation to Bid advertisement date, unless otherwise stated or as required by law.

If any part of the Contract requires Work that does not include a description for how the Work is to be performed, the Work shall be performed in accordance with standard trade practice(s). For purposes of the Contract, a standard trade practice is one having such regularity of observance in the trade as to justify an expectation that it will be observed by the Contractor in doing the Work.

34. NOTICES: All notices which are given or required to be given pursuant to this Contract shall be hand delivered, mailed postage paid or sent by electronic mail as follows:

For the City:
Anna Vogel
City of Vancouver
415 W 6th Street
P O Box 1995
Vancouver WA 98668-1995
anna.vogel@cityofvancouver.us

For the Contractor:
Contact Name
Company Name
Address
City State Zip
Email Address

The undersigned, as the authorized representatives of the City and Contractor respectively, agree to all of the terms and conditions contained in this Contract, as of the dates set forth below.

CITY OF VANCOUVER
A municipal corporation

CONTRACTOR:
Company Name

Lon Pluckhahn, City Manager

Signature

Date

Printed Name /Title

Attest:

Date

Natasha Ramras, City Clerk

Approved as to form:

Nena Cook, City Attorney

LABOR AND MATERIALS PAYMENT BOND

(NOTE: CONTRACTOR MUST USE THIS FORM, NOT A SURETY COMPANY FORM. MUST BE ACCOMPANIED BY A POWER OF ATTORNEY FOR THE SURETY'S OFFICER AUTHORIZED TO SIGN)
KNOW ALL MEN BY THESE PRESENTS:

We the Undersigned _____ as PRINCIPAL (Contractor) and _____ a corporation organized and existing under and by virtue of the laws of the state of _____, and duly authorized to do surety business in the state of Washington and named on the current list of approved surety companies acceptable on federal bonds and conforming with the underwriting limitations as published in the Authorized Insurance List in the State of Washington published by the Office of the Insurance Commissioner and which carries an "A" rating and is of the appropriate class for the bond amount as determined by Best's Rating System, as SURETY, hereby hold and firmly bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, unto CITY OF VANCOUVER, as OBLIGEE, in the sum of _____ Dollars (\$_____) in lawful money of the United States of America, for the payment of that sum for the use and benefit of claimants as defined below.

The condition of this obligation is such that whereas the PRINCIPAL entered into a contract with CITY OF VANCOUVER dated _____, 20____, which contract is hereunto annexed and made a part hereof, for accomplishment of all contract terms for the project described as follows:

ITB 26-19 Water Station 1 – Wellhouses 3B & 5B

NOW THEREFORE, if the PRINCIPAL shall promptly make payments to all persons, firms, subcontractors, corporations and/or others furnishing materials for or performing labor in the prosecution of the Work provided for in the aforesaid contract, and any authorized extension or modification thereof, including all amounts due for materials, equipment, mechanical repairs, transportation, tools and services consumed or used in connection with the performance of such Work, and for all labor performed in connection with such Work whether by subcontractor or otherwise, and all other requirements imposed by law, then this obligation shall become null and void; otherwise this obligation shall remain in full force and effect, subject, however, to the following condition:

The above-named PRINCIPAL and SURETY hereby jointly and severally agree that every claimant, who has not been paid in full, may sue on this bond for the use of such claimant, prosecute the suit to final judgment in for such sum or sums as may be justly due claimant, and have execution thereon. The OBLIGEE shall not be liable for the payment of any judgment, costs, expenses or attorneys' fees of any such suit.

PROVIDED, FURTHER, that SURETY for the value received, hereby stipulates and agrees that all changes, extensions of time, alterations to the terms of the contract or to Work to be performed thereunder or the Specifications accompanying the same shall be within the scope of the SURETY's undertaking on this bond, and SURETY does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the Work or to the Specifications. Any such change, extension of time, alteration or addition to the

terms of the contract or to the Work or to the Specifications shall automatically increase the obligation of the SURETY hereunder in a like amount, provided that the total of such increases shall not exceed twenty-five percent (25%) of the original amount of the obligation without the consent of the SURETY.

This obligation shall continue to bind the PRINCIPAL and SURETY, notwithstanding successive payments made hereunder, until the full amount of the obligation is exhausted, or if the full amount of the obligation is not exhausted and no claim is pending resolution, until such time as no further claims can be made pursuant to law with regard to the above-described project.

SURETY shall indemnify, defend, and protect the CITY OF VANCOUVER against any claim of direct or indirect loss resulting from the failure of the CONTRACTOR (or any of the employees, subcontractors or lower tier subcontractors of the CONTRACTOR) to pay all laborers, mechanics, subcontractors, lower tier subcontractors, material persons, or any other person who provides supplies or provisions for carrying out the work.

If more than one SURETY is on this bond, each SURETY hereby agrees that it is jointly and severally liable for all obligations of this bond.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20____.

SURETY

CONTRACTOR

By:_____

By*:_____

Title:_____

Title:_____

Street Address

Street Address

City, State ZIP

City, State ZIP

Phone Number

Phone Number

* Must be signed by president or vice-president of Contractor.

PERFORMANCE BOND

(NOTE: CONTRACTOR MUST USE THIS FORM, NOT A SURETY COMPANY FORM. MUST BE ACCOMPANIED BY A POWER OF ATTORNEY FOR THE SURETY'S OFFICER AUTHORIZED TO SIGN)
KNOW BY ALL MEN BY THESE PRESENTS:

We the undersigned _____ as
PRINCIPAL (hereinafter called CONTRACTOR), and _____
_____ a corporation organized and existing under and by virtue of the laws of the state of
_____ duly authorized to do surety business in the state of
Washington and named on the current list of approved surety companies acceptable on
federal bonds and conforming with the underwriting limitations as published in the
Authorized Insurance List in the State of Washington published by the Office of the Insurance
Commissioner and which carries an "A" rating and is of the appropriate class for the bond
amount as determined by Best's Rating System, as SURETY, hereby hold and firmly bind
ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally,
to pay to CITY OF VANCOUVER as OBLIGEE (hereinafter called CITY OF VANCOUVER), the amount
of _____ Dollars (\$_____
_____) in lawful money of the United States of America.

WHEREAS, the CONTRACTOR entered into a contract with CITY OF VANCOUVER dated
_____, 20____, which Contract is hereunto annexed and made a part hereof, for
accomplishment of the all contract terms for the project described as follows:

ITB 26-19 Water Station 1 – Wellhouses 3B & 5B

NOW, THEREFORE, the condition of this obligation is such that if the CONTRACTOR shall
promptly, truly and faithfully perform all the undertakings, covenants, terms, conditions, and
agreements of the aforesaid contract and having performed its obligations thereunder, then
this obligation shall be null and void; otherwise it shall remain in full force and effect.

Whenever CONTRACTOR shall be declared by CITY OF VANCOUVER to be in default under
the Contract Documents for the project described herein, the SURETY shall promptly remedy
the default by completing the project in accordance with the Contract Documents and the
project Specifications with a contractor approved by the CITY OF VANCOUVER. SURETY, for
value received, further stipulates and agrees that all changes, extensions of time, alterations,
or additions to the terms of the Contract or Specifications for the above described contract
are within the scope of the SURETY's undertaking on this bond, and SURETY hereby waives
notice of any such change, extension of time, alteration or addition to the terms of the contract
or to the Work or to the Specifications. Any such change, extension of time, alteration or
addition to the terms of the contract or to the Work or to the Specifications shall automatically
increase the obligation of the Surety hereunder in a like amount, provided that such increase
shall not exceed twenty-five percent (25%) of the original amount of the obligation without
the consent of the Surety.

This obligation shall continue to bind the PRINCIPAL and SURETY, notwithstanding
successive payments made hereunder, until the full amount of the obligation is exhausted.

SURETY shall indemnify, defend, and protect the CITY OF VANCOUVER against any claim of direct or indirect loss resulting from the failure of the CONTRACTOR (or any of the employees, subcontractors, or lower tier subcontractors of the CONTRACTOR) to faithfully perform the terms of the contract.

No right of action shall accrue on this bond to or for the use of any person or corporation other than CITY OF VANCOUVER or its heirs, executors, administrators, successors or assigns.

If more than one SURETY is on this bond, each SURETY hereby agrees that it is jointly and severally liable for obligations on this bond.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20____.

SURETY

CONTRACTOR

By:_____

By*: _____

Title:_____

Title:_____

Street Address

Street Address

City State ZIP

City State ZIP

Phone Number

Phone Number

* Must be signed by president or vice-president of Contractor.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



These General Conditions have been prepared for use with the Agreement Between Owner and Contractor for Construction Contract (EJCDC® C-520, Stipulated Sum, or C-525, Cost-Plus, 2013 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other.

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer has declined to address. A demand for money or services by a third party is not a Claim.
 11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
 12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.

13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.

33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.
37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.

47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.
48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. Intent of Certain Terms or Adjectives:
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. Day:
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. Defective:
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. Furnish, Install, Perform, Provide:
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.

- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor's Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner's Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make

corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.

1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

A. Reporting Discrepancies:

1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. Resolving Discrepancies:

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on

- extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the

Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.
- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

- A. Limitation on Use of Site and Other Areas:
 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold

harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
 - 1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 - 2. is of such a nature as to require a change in the Drawings or Specifications; or
 - 3. differs materially from that shown or indicated in the Contract Documents; or
 - 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
 - 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
 - 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.
- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. Possible Price and Times Adjustments:
1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.
- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.

- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 Insurance—General Provisions

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 Contractor's Insurance

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).
 - 4. Foreign voluntary worker compensation (if applicable).

- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.
- G. *Additional insureds:* The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance:* If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and

caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.

- I. *General provisions:* The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake;

volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.

3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).
 5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.
- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR’S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner’s written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 *“Or Equals”*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or “or equal” item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an “or equal” item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and

- 4) it is not objectionable to Owner.
- b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.
- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.

- c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and
 - 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.
- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.

- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.
- O. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors

of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

- A. Shop Drawing and Sample Submittal Requirements:
 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.
- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.
 1. Shop Drawings:
 - a. Contractor shall submit the number of copies required in the Specifications.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.
 2. Samples:
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
 3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has

complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.

5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.
8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or

8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A 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 such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.

- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 Other Work

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 Coordination

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 Legal Relationships

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption,

or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.
- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner

designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. Change Orders:
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives*: A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.
 - 3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).
- C. *Contractor's Fee:* When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
 - 1. a mutually acceptable fixed fee; or
 - 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due;

or seek other relief under the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.
- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 Claims

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer’s decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor’s knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.
 - 3. Owner and Contractor shall each pay one-half of the mediator’s fees and costs.
- E. *Partial Approval:* If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim:* If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results:* If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work:* The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included:* Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
 4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
 5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.
- C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.
- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such

acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.
- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15.

Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. Applications for Payments:
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. Review of Applications:
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
 3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or

- b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
- 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
- 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
- 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or
 - e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.
- D. Payment Becomes Due:
 - 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.
- E. Reductions in Payment by Owner:
 - 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;

- g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.
 3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. Application for Payment:
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.
 - 2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.
- B. **Engineer's Review of Application and Acceptance:**
1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.
- C. **Completion of Work:** The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.
- D. **Payment Becomes Due:** Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 1. correct the defective repairs to the Site or such other adjacent areas;
 2. correct such defective Work;
 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.

- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.

- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses, and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and

2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 2. agree with the other party to submit the dispute to another dispute resolution process; or
 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract as indicated below. All provisions that are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof. The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix “SC” added thereto.

SC-1.01. Renumber Paragraph 1.01.A.21 to 1.01.A.21.a. and add the following new paragraphs:

1.01.A.21.b. *Geotechnical Data Report (GDR)*—The factual report that collects and presents data regarding actual subsurface conditions at or adjacent to the Site, including Technical Data and other geotechnical data, prepared by or for Owner in support of the Geotechnical Baseline Report. The GDR’s content may include logs of borings, trenches, and other site investigations, recorded measurements of subsurface water levels, the results of field and laboratory testing, and descriptions of the investigative and testing programs. The GDR does not include an interpretation of the data. If opinions, or interpretive or speculative nonfactual comments or statements appear in a document that is labeled a GDR, such opinions, comments, or statements are not operative parts of the GDR and do not have contractual standing. Subject to that exception, the GDR is a Contract Document.

SC-1.01. Renumber Paragraph 1.01.A.38 to 1.01.A.38.a, and add the following new paragraphs:

1.01.A.38.b. *Specialist*—The term Specialist refers to a person, partnership, firm, or corporation of established reputation (or if newly organized, whose personnel have previously established a reputation in the same field), which is regularly engaged in, and which maintains a regular force of workers skilled in either (as applicable) manufacturing or fabricating items required by the Contract Documents, or otherwise performing Work required by the Contract Documents. Where the Specifications require the installation by a Specialist, that term shall also be deemed to mean either the manufacturer of the item, a person, partnership, firm, or corporation licensed by the manufacturer, or a person, partnership, firm, or corporation who will perform the Work under the manufacturer’s direct supervision.

1.01.A.38.c. *Standard Specifications*—Wherever in these Contract Documents reference is made to the Standard Specifications, said reference shall be understood as referring to the *City of Vancouver Engineering Services General Requirement and Details for the Design and Construction of Water, Sanitary Sewer and Surface Water Systems* (February 2019), which applicable parts are incorporated herein and made a part of these Documents by specific reference thereto. If requirements contained in the Standard Specifications are modified by or are in conflict with supplemental information in these Contract Documents, the requirements of these Contract Documents shall prevail.

SC-1.01. Add the following language at the end of Paragraph 1.01.A.40:

Substantial Completion is further defined as (i) that degree of completion of the Project's operating facilities or systems sufficient to provide Owner the full time, uninterrupted, and continuous beneficial operation of the Work; and (ii) required functional, performance and acceptance, or startup testing has been successfully demonstrated for components, devices, equipment, and instrumentation and control to the satisfaction of Engineer in accordance with the requirements of the Specifications.

SC-2.01 Delete Paragraph 2.01.B. and Paragraph 2.01.C. in their entirety and insert the following in their place:

2.01.B. Evidence of Contractor's Insurance: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies of insurance (including all endorsements, and identification of applicable self-insured retentions and deductibles) required to be provided by Contractor in Article 6. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

2.01.C. Evidence of Owner's Insurance: After receipt from Contractor of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner under Article 6 (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

SC-2.02. Delete Paragraph 2.02.A. in its entirety and insert the following new paragraph in its place:

2.02.A. Owner will furnish to Contractor four hard copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF).

Owner shall furnish to Contractor six copies of conformed Contract Documents

incorporating and integrating all Addenda and any amendments negotiated prior to the Effective Date of the Contract and one copy in electronic portable document format (PDF). Additional printed copies of the conformed Contract Documents will be furnished upon request at the cost of reproduction.

SC-3.01. Delete Paragraph 3.01.C in its entirety.

SC-3.01. Add the following new paragraph immediately after Paragraph 3.01.E:

3.01.F. Sections of Division 01, General Requirements of the Technical Specifications, govern the execution of the Work of all sections of the Specifications.

SC-4.01. Delete the third sentence of Paragraph 4.01.A in its entirety.

SC-4.03. Add the following new paragraphs immediately after Paragraph 4.03.A:

4.03.B. In accordance with Washington Administrative Code 332-120-030, Contractor shall search records and physical area of Site, including road or street resurfacing projects, for the purpose of locating and referencing any known or existing survey monuments.

4.03.C. In accordance with Washington Administration Code WAC 332-120-030, no survey monument shall be removed or destroyed before a permit is obtained from Washington's Department of Natural Resources.

4.03.D. If necessary, after completion of an activity that caused removal or destruction of a monument, the City surveyor will conduct remonumentation activities and file survey monumentation records in accordance with Washington Administrative Code 332-120-060.

SC-4.05. Add the following Paragraph 4.05.H:

4.05.H. Failure by the Contractor to timely submit a Change Proposal in accordance with this Article shall be deemed a complete waiver of any and all adjustments to Contract Times, Contract Price, and any other equitable or legal remedy related to any delays described in this Article. As a condition precedent to any right to submit a Claim under Article 12, Contractor shall provide proof of timely submitted Change Proposal as required by this Article.

SC-5.02. Add the following language to the end of Paragraph 5.02.A.1:

Contractor shall not enter upon nor use property not under Owner control until appropriate easements have been executed and a copy is on file at the Site.

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.B:

5.03.C. The following reports of explorations and tests of subsurface conditions at or adjacent to the Site are known to Owner:

5.03.C.1. Report dated April 2013 prepared by Shannon and Wilson, Inc, 3990 Collins Way Suite 100, Lake Oswego, Oregon 97035, entitled "Geotechnical Engineering Report, City of Vancouver Water Station No. 1, Detailed Seismic Analysis Project 100 pages." The Technical Data contained in such report upon whose accuracy Contractor may rely are concerning the borings and nature of the project site subsurface conditions.

5.03.D.1.a. None of the contents of such drawings is Technical Data on whose accuracy Contractor may rely.

5.03.E. Contractor may examine copies of reports and drawings identified in SC-5.03.C and SC-5.03.D that were not included with the Bidding Documents at during regular business hours, or may request copies from Owner.

SC-5.03 and SC-5.04. Delete Paragraph 5.03 and Paragraph 5.04 of the General Conditions in their entirety and replace with the following provisions:

5.03 Subsurface and Physical Conditions:

5.03.A. Reports and Drawings: The Supplementary Conditions hereby identify:

5.03.A.1. Those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site including Underground Facilities, and Technical Data contained in such drawings are:

5.03.A.1.a. Various drawings and information prepared by various entities over the past 75 years of the area development. All of which may not include all descriptions of subsurface features.

5.03.A.1.a.(1) None of the contents of such drawings is Technical Data on whose accuracy Contractor may rely.

5.03.B. Reliance by Contractor on Technical Data Authorized: Contractor may not rely upon the accuracy of the Technical Data contained in such reports and drawings, but such reports and drawings are not Contract Documents. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:

5.03.B.1. The completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

5.03.B.2. Other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

5.03.B.3. Any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.03.C. Geotechnical Investigations:

5.03.C.1. Geotechnical Data has been collected at the site. The following reports are available as information for the Contractor:

1) Report dated April 2013 prepared by Shannon and Wilson, Inc, 3990 Collins Way Suite 100, Lake Oswego, Oregon 97035, entitled "Geotechnical Engineering Report, City of Vancouver Water Station No. 1, Detailed Seismic Analysis Project 100 pages." The Technical Data contained in such report upon whose accuracy Contractor may rely are concerning the borings and nature of the project site subsurface conditions.

5.03.C.4. The available geotechnical information shall be used to assist in the administration of the Contract's differing site conditions clause at locations where subsurface conditions have been baselined. If a condition is shown in the documents, then only the information specific to that site area shall be used to determine whether there is a differing site condition; and no other indication of that condition in the Contract Documents or Technical Data, or of a condition that describes, quantifies, or measures a similar characteristic of the subsurface, shall be used for the differing site condition determination.

5.03.C.6. The descriptions of subsurface conditions provided in the geotechnical reports are based on geotechnical investigations, laboratory tests, interpretation, interpolation, extrapolation, and analyses. Neither Owner, Engineer, nor any geotechnical or other consultant warrants or guarantees that actual subsurface conditions will be as described in the documents, nor are the documents intended to warrant or guarantee the use of specific means or methods of construction.

5.03.C.7. The behavior of the ground during construction depends substantially upon the Contractor's selected means, methods, techniques, sequences, and procedures of construction.

5.03.C.8. The geotechnical information shall not reduce or relieve Contractor of its responsibility for the planning, selection, and implementation of safety precautions and programs incident to Contractor's means, methods, techniques, sequences, and procedures of construction, or to the Work.

SC-5.04 Differing Subsurface or Physical Conditions:

5.04.A. Notice: If Contractor believes that any subsurface condition that is uncovered or revealed at the Site:

5.04.A.1. Differs materially from conditions shown or indicated in the generalized geotechnical information; or

5.04.A.2. Differs materially from conditions shown or indicated in the geotechnical information is inapplicable; or

5.04.A.3. Differs materially from conditions shown or indicated in Contract Documents other than the geotechnical information, to the extent the documents are inapplicable; or

5.04.A.4. To the extent the geotechnical information are inapplicable, is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or

5.04.A.5. To the extent the geotechnical information is inapplicable, is of such a nature as to require a change on Drawings or Specifications; or

5.04.A.6. To the extent the geotechnical information is inapplicable, is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface conditions or performing any Work in connection therewith (except in an

emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such

condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

5.04.B. Engineer's Review: After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph SC-5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption or continuation of Work in connection with the subsurface or physical condition in question and the need for any change on Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.

5.04.C. Owner's Statement to Contractor Regarding Site Condition: After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption or continuation of Work in connection with such condition, indicating whether any change on Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.

5.04.D. Possible Price and Times Adjustments:

5.04.D.1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:

5.04.D.1.a. Such condition must fall within any one or more of the categories described in Paragraph SC-5.04.A;

5.04.D.1.b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03 of the General Conditions; and,

5.04.D.1.c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.

5.04.D.2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:

5.04.D.2.a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or

5.04.D.2.b. The existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or

5.04.D.2.c. Contractor failed to give the written notice as required by Paragraph SC-5.04.A.

5.04.D.3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.

5.04.D.4. Contractor must submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question. Failure by the Contractor to timely submit a Change Proposal in accordance with this Article shall be deemed a complete waiver of any and all adjustments to Contract Times, Contract Price, and any other equitable or legal remedy related to a changed or unknown physical condition described in this Article. As a condition precedent to any right to submit a Claim under Article 2, Contractor shall provide proof of timely submitted Change Proposal as required by this Article.

SC-5.05. Add the following Paragraph 5.05.E.4:

5.05.E.4. Failure by the Contractor to timely submit a Change Proposal in accordance with this Article shall be deemed a complete waiver of any and all adjustments to Contract Times, Contract Price, and any other equitable or legal remedy related to an Underground Facility described in this Article. As a condition precedent to any right to submit a Claim under Article 12, Contractor shall provide proof of timely submitted Change Proposal as required by this Article.

SC-6.01. Delete the first three sentences in Paragraph 6.01.A in their entirety and insert the following in their place:

6.01.A. Contractor shall furnish a combined performance and payment bond in the full amount of the Agreement, as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. This bond shall adhere to, at a minimum, the provisions included in the bond forms as made a part of the Contract, and shall remain in effect at least until 1 year after the final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents.

SC-6.02. Add the following new paragraph immediately after Paragraph 6.02.A:

6.02.A.1. Surety and insurance companies from which the bonds and insurance for this Project are purchased shall have an A.M. Best's rating of no less than A-V in addition to other requirements specified herein.

SC-6.02. Add the following new paragraph immediately following Paragraph 6.02.J:

6.02.K. The Contractor's and all subcontractors' insurance coverage shall be primary and non-contributory insurance as respects to the Owner's insurance, self-insurance, or insurance pool coverage.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.A.4:

6.03.A.5. The limits of liability for the insurance required by Paragraph 6.03 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

6.03.A.5.a. Workers' Compensation and related coverages under Paragraph 6.03.A.1 and Paragraph 6.03.A.3 of the General Conditions:

6.03.A.5.a.1. State: Statutory.

6.03.A.5.a.2. Applicable Federal (e.g., Longshoreman's):

Statutory. 6.03.A.5.a.5. Employer's Liability:

Bodily Injury, Each Accident: \$1,000,000.

Bodily Injury by Disease, Each Employee: \$1,000,000.

Bodily Injury/Disease Aggregate: \$1,000,000.

Foreign Voluntary Worker Compensation: Statutory.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.C.8:

6.03.C.9. Contractor's General Liability under Paragraph 6.03.B. and Paragraph 6.03.C of the General Conditions which shall eliminate the exclusion with respect to property under the care, custody and control of Contractor:

6.03.C.9.a. General Aggregate (Except Products – Completed Operations): \$1,000,000.

6.03.C.9.b. Products - Completed Operations Aggregate: \$2,000,000.

6.03.C.9.c. Personal and Advertising Injury (per person/Organization):
\$1,000,000.

6.03.C.9.d. Each Occurrence (Bodily Injury and Property Damage):
\$1,000,000.

6.03.C.9.e. Personal Injury Liability Coverage will include claims arising out of employment.

6.03.C.9.f. Exclusions for damage to property in Contractor's care, custody, or control will be eliminated.

6.03.C.9.g. Property Damage liability insurance will provide Explosion, Collapse, and Underground coverages where applicable.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.D:

6.03.D.1. Contractor's Automobile Liability:

6.03.D.1.a. Bodily Injury:

Each Person: \$1,000,000.

Each Accident: \$1,000,000.

6.03.D.1.b. Property Damage:

Each Accident: \$1,000,000.

6.03.D.1.a. Combined Single Limit of: \$1,000,000.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.E:

6.03.E.1. Excess or Umbrella Liability:

a) General Aggregate: \$15,000,000.

b) Each Occurrence: \$1,000,000.

SC-6.03. Add the following new paragraph immediately following Paragraph 6.03.F:

6.03.F.1. Pollution Liability:

a) General Aggregate:

\$6,000,000.

SC-6.03. Add the following language after Paragraph 6.03.G:

6.03.G.1. Include the following parties or entities as additional insured:

6.03.G.1.a. City of Vancouver, P.O. Box 1995 (415 W. 6th St.), Vancouver,
Washington 98668-1995.

SC-7.02. Add the following language to the end of Paragraph 7.02.B:

7.02.B.1. Contractor and Subcontractor regular working hours shall consist of between 7:00 a.m. and 6:00 p.m., on a regularly scheduled basis excluding Sundays and holidays. Overtime work is work in excess of eight (8) hours per day or as allowed per RCW 39.12.

7.02.B.2. Owner's Legal Holidays are:

- New Year's Day.
- Martin Luther King Day.
- President's (Washington's Birthday) Day.
- Memorial Day.
- Juneteenth Day.
- Independence Day.
- Labor Day.
- Veteran's Day.
- Thanksgiving Day.
- Day after Thanksgiving.
- Christmas Day.

If a holiday falls on a Saturday it will be observed on the preceding Friday. The Contractor shall not conduct work on these days without Owner's written consent.

SC-7.02. Add the following new paragraph immediately after Paragraph 7.02.B:

7.02.C. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer's services (including those of the Resident Project Representative, if any), Owner's representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

7.02.C.1. For purposes of administering the foregoing requirement, additional overtime costs are defined as work in excess of 8 hours per day, 40 hours per week.

SC-7.05. Add the following language at the end of Paragraph 7.05.D:

Reimbursement rates for Engineer or their officers, directors, members, partners, employees, agents, and other consultants and subcontractors for evaluation of proposed substitutes shall be on the basis established in Paragraph 15.01.E. of these Supplementary Conditions.

SC-7.06. Add the following language at the end of Paragraph 7.06.A:

Contractor shall perform a minimum of 30 percent of the awarded contract amount.

SC-7.08. Add the following new paragraphs immediately after Paragraph 7.08.A:

7.08.B. Owner has obtained an approved City of Vancouver Land Use Permit to allow construction of the project. Contractor shall obtain a copy of the Land Use documents, become familiar with them and adhere to the requirements which have been conditioned upon the project. A copy of the Land Use Permit is available from the Owner.

7.08.C. Owner will obtain and pay for the following construction permits and licenses, all other permits will be the requirement of the Contractor to obtain. The following permits will be obtained and paid by the Owner, the Contractor may be required to sign and obtain the permits:

7.08.B.1. City of Vancouver Building Permit.

7.08.B.2. City of Vancouver Trade Permits (Mechanical, Electrical, Plumbing).

7.08.D. A copy of each permit is available at Owner's office. Contractor shall examine the permits and conform to the requirements contained therein, including the

purchase of additional bonds or insurance as specified therein, and such requirements are hereby made a part of these Contract Documents as fully and completely as though the same were set forth herein. Failure to examine the permit(s) will not relieve Contractor from compliance with the requirements stated therein. Within

15 days after the date of signing the Agreement, Contractor shall confer with an agent of the permitting agency so that insurance requirements and similar matters can be arranged prior to the time set for that portion of the Work.

7.08.E. The following permit will be obtained and paid by the Owner. The Contractor will be responsible to adhere to the conditions of the permit, and also pay the annual permit renewal fee directly to Ecology for this permit, for the construction contract duration:

7.08.B.1. Washington State Department of Ecology, Construction Stormwater General Permit.

SC-7.12. Add the following new paragraph immediately after Paragraph 7.12.C:

7.12.C.1. The Owner does not have a safety program applicable to the

Work. SC-7.18. Add the following new paragraphs immediately after Paragraph 7.18.C:

7.18.D. For suits, actions, legal or administrative proceedings, Claims, demands, damages, losses, penalties, fines, costs, and expenses caused by or resulting from the concurrent negligence of Owner and Engineer, or Owner's or Engineer's agents or employees, and Contractor or Contractor's agents or employees, in situations where liability for damages arises from Claims of bodily injury to persons or damage to property, the preceding indemnity provision shall be valid and enforceable only to the extent of Contractor's negligence.

7.18.E. Contractor acknowledges that by entering into a Contract with Owner, Contractor has mutually negotiated the above indemnity provision with Owner.

7.18.F. Contractor's indemnity and defense obligations shall survive the termination or completion of the Work and remain in full force and effect until satisfied in full.

SC-8.02. Add the following new paragraph immediately following Paragraph 8.02.B:

8.02.C. Other work anticipated to be performed at the Site by others that is either directly or indirectly related to the scheduled performance of the Work under these Contract Documents is described in Section 01 31 13, Project Coordination.

SC-8.03 Add the following Paragraph 8.03.E:

8.03.E. Failure by the Contractor to timely submit a Change Proposal in accordance with this Article shall be deemed a complete waiver of any and all adjustments to

Contract Times, Contract Price, and any other equitable or legal remedy related to the events and occurrences described in this Article. As a condition precedent to any right to submit a Claim under Article 12, Contractor shall provide proof of timely submitted Change Proposal as required by this Article.

SC-9.13. Add the following new paragraph(s) immediately following Paragraph 9.12:

9.13. Owner As Resident Project Representative

9.13.A. Owner will furnish Project representation during the construction period. The duties, responsibilities, and limitations of authority specified for Engineer in Article 10, Engineer's Status During Construction, and elsewhere in the Contract Documents will be those of Owner.

SC-10.03. Add the following new paragraphs immediately after Paragraph 10.03.A:

10.03.B. Resident Project Representative (RPR) will be furnished by Owner. The responsibilities, authority, and limitations of the RPR are limited to those of Engineer in accordance with Paragraph 10.08 and as set forth elsewhere in the Contract Documents and are further limited and described below.

10.03.C. Responsibilities and Authority:

10.03.C.1. Schedules: Review and monitor Progress Schedule, Schedule of Submittals, and Schedule of Values prepared by Contractor and consult with Engineer concerning acceptability.

10.03.C.2. Conferences and Meetings: Conduct or attend meetings with Contractor, such as preconstruction conferences, progress meetings, Work conferences and other Project related meetings.

10.03.C.3. Liaison: (i) Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, and assist in understanding the intent of the Contract Documents; (ii) assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's onsite operations; (iii) assist in obtaining from Owner additional details or information when required for proper execution of the Work.

10.03.C.4. Interpretation of Contract Documents: Inform Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.

10.03.C.5. Submittals: Receive submittals that are furnished at the Site by Contractor, and notify Engineer of availability for examination. Advise Engineer and Contractor of the commencement of any Work or

arrival of

materials and equipment at Site, when recognized, requiring a Shop Drawing or Sample if the submittal has not been approved by Engineer.

10.03.C.6. Modifications: Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and provide recommendations to Engineer; transmit to Contractor, in writing decisions as issued by Engineer.

10.03.C.7. Review of Work and Rejection of Defective Work: (i) Conduct onsite observations of the Work in progress to assist Engineer in determining if the Work is, in general, proceeding in accordance with the Contract Documents; (ii) inform Engineer and Contractor whenever RPR believes that any Work is defective; (iii) advise Engineer whenever RPR believes that any Work will not produce a completed Project that conforms generally to the Contract Documents or will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged or does not meet the requirements of any inspection test, or approval required to be made; and advise Engineer of that part of the Work in progress that RPR believes should be corrected or rejected or uncovered for observation, or requires special testing, inspection, or approval.

10.03.C.8. Inspections, Tests, and System Startups: (i) Verify tests, equipment and systems startups and operating and maintenance training are conducted in the presence of appropriate personnel, and that Contractor maintains adequate records thereof; (ii) observe, record, and report to Engineer appropriate details relative to the test procedures and system startups; and (iii) accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the results of these inspections, and report to Engineer.

10.03.C.9. Records: (i) Maintain records for use in preparing Project documentation; (ii) keep a diary or log book recording pertinent Site conditions, activities, decisions and events; (iii) record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of Contractors, Subcontractors, and major Suppliers of materials and equipment.

10.03.C.10. Reports: (i) Furnish Engineer periodic reports of progress of the Work and of Contractor's compliance with the Progress Schedule and Schedule of Submittals; (ii) immediately notify Engineer of the occurrence of Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition; and (iii) assist Engineer in drafting proposed Change Orders, Work Change Directives, and Field Orders; obtain backup material from Contractor as appropriate.

10.03.C.11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the Schedule of Values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

10.03.C.12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify materials and equipment certificates and operation and maintenance manuals and other data required by Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents been delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.

10.03.C.13. Completion: (i) Participate in a Substantial Completion inspection; assist in determination of Substantial Completion and the preparation of lists of items to be completed or corrected; (ii) Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied; and (iii) observe whether items on final list have been completed or corrected, and make recommendations to Engineer concerning acceptance.

10.03.D. Limitations of Authority: Resident Project Representative will not:

10.03.D.1. Have authority to authorize a deviation from Contract Documents or substitution of materials or equipment, unless authorized by Engineer; or

10.03.D.2. Exceed the limitations of Engineer's authority as set forth in Contract Documents; or

10.03.D.3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's authorized representative; or

10.03.D.4. Advise on, issue directions relative to, or assume control over an aspect of the means, methods, techniques, sequences, or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents; or

10.03.D.5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor; or

10.03.D.6. Participate in specialized field or laboratory tests or inspections conducted offsite by others, except as specifically authorized by Engineer; or

10.03.D.7. Accept Shop Drawings or Samples from anyone other than Contractor; or

10.03.D.8. Authorize Owner to occupy the Project in whole or in part. SC-10.08. Add the following new paragraph immediately after Paragraph 10.08.E:

10.08.F. Contractors, Subcontractors, Suppliers, and others on the Project, or their sureties, shall maintain no direct action against Engineer, its officers, employees, affiliated corporations, and subcontractors, for any Claim arising out of, in connection with, or resulting from the engineering services performed. Only the Owner will be the beneficiary of any undertaking by Engineer.

SC-11.04. Add the following new paragraph immediately after Paragraph 11.04.C:

11.04.D. In the event Contractor submits request for additional compensation as a result of a change or differing Site conditions, or as a result of delays, acceleration, or loss of productivity, Owner reserves right, upon written request, to audit and inspect Contractor's books and records relating to the Project. Upon written request for an audit, Contractor shall make its books and records available within 14 days of request. Owner shall specifically designate identity of auditor. As part of audit, Contractor shall make available its books and records relating to the Project, including but not limited to Bidding Documents, cost reports, payroll records, material invoices, subcontracts, purchase orders, daily timesheets, and daily diaries. Audit shall be limited to those cost items which are sought by Contractor in a change order or claim submission to Owner.

SC-11.09. Add the following Article 11.09:

11.09.E. Failure by the Contractor to timely submit a Change Proposal in accordance with this Article shall be deemed a complete waiver of any and all adjustments to Contract Times, Contract Price, and any other equitable or legal remedy related directly or indirectly to the Work or this Agreement. As a condition precedent to any right to submit a Claim under Article 12, Contractor shall provide proof of timely submitted Change Proposal as required by this Article.

SC-12.01. Add the following to the end of Paragraph 12.01.B:

The Contractor agrees to waive any Claim for adjustments to the Contract Times, Contract Price, and any other legal or equitable relief related directly or indirectly to the Work or this Agreement if a timely Change Proposal for the claimed relief has not been previously submitted for the relief requested.

SC-12.01. Add the following to the end of Paragraph 12.01.D:

After the Owner has been given the time and opportunity to respond to the Contractor as provided in Article 12.01 mediation may be used upon mutual agreement of the Contractor and the Owner. When parties mutually agree to use mediation, the following conditions apply:

1. The cost of the mediation shall be shared equally by both parties with each party bearing its own preparation costs.
2. The mediation shall be conducted within the State of Washington at a time and place mutually agreeable.
3. The Contractor agrees that the participation in a mediation does not in any way waive the requirement that litigation proceedings must commence within 180 calendar days of final acceptance of the Contract, the same as other claims or causes of action.

SC-13.01. Delete Paragraph 13.01.B.5.c in its entirety and insert the following in its place:

13.01.B.5.c. Construction Equipment and Machinery:

13.01.B.5.c.(1) Rentals of construction equipment and machinery, and the parts thereof in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. Such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

13.01.B.5.c.(2) Costs for equipment and machinery owned by Contractor will be paid at a rate shown for such equipment in the Rental Rate Blue Book published by Equipment Watch. An hourly rate will be computed by dividing the monthly rates by 176. These computed rates will include all operating costs. Costs will include the time the equipment or machinery is in use on the changed Work and the costs of transportation, loading, unloading, assembly, dismantling, and removal when directly attributable to the changed Work. The cost of such equipment or machinery, or parts thereof, shall cease to accrue when the use thereof is no longer necessary for the changed Work. Equipment or machinery with a value of less than \$1,000 will be considered small tools.

SC-13.01. Add the following language to the end of Paragraph 13.01.B.5.h:

Express and courier services must be approved prior to use.

SC-13.01. Add the following language as Paragraph 13.01.C.6:

Time for the Project Manager and Superintendent shall be considered and excluded cost. Management and general supervisory work is considered to be a part of the markup allowance.

SC-14.02. Delete Paragraph 14.02.B in its entirety and insert the following in its place:

14.02.B. Contractor shall retain an independent testing laboratory or testing agency and shall be responsible for arranging and pay for specified tests, inspections, and approvals required for Owner's and Engineer's acceptance of the Work at the Site except:

14.02.B.1. Costs incurred in connection with tests or inspections

pursuant to Paragraph 14.02.C shall be paid for as provided in said paragraph; and

14.02.B.2. As otherwise specifically provided in the Contract

Documents. SC-14.02. Add the following language at the end of Paragraph 14.02.D:

Tests required by Contract Documents to be performed by Contractor that require test certificates be submitted to Owner or Engineer for acceptance shall be made by an independent testing laboratory or agency licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. In the event state license or certification is not required, testing laboratories or agencies shall meet the following applicable requirements:

14.02.D.6. Basic requirements of ASTM E329, "Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection" as applicable.

14.02.D.7. Calibrate testing equipment at reasonable intervals by devices of accuracy, traceable to the National Institute of Standards and Technology or accepted values of natural physical constants.

SC-15.01. Replace entire Paragraph 15.01.B.1 with the following:

Prior to submitting initial payment invoice, Contractor and its Subcontractors shall provide Owner with "Statement of Intent to Pay Prevailing Wages" as required by RCW 39.12.040. Contractor shall submit to Engineer, on the agreed date of each month, for review, an Application for Payment completed by the Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

SC-15.01. Delete Paragraph 15.01.D.1 in its entirety and insert the following in its place:

15.01.D.1. Following presentation of the Engineer accepted and Contractor signed Application for Payment, the Owner will have 10 days to review the document for approval. Thirty days following approval of the Application by the Owner the accepted amount will (subject to the provisions of Paragraph 15.01.E.) become due and when due will be paid by Owner to Contractor.

SC-15.01.E Delete the statement in 15.01.E.1.j. and replace it with the following:

15.01.E.1.j. *liquidated damages* have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, Physical Completion, or final completion of the Work;

SC-15.01.E Add the following new paragraph immediately after Paragraph 15.01.E.1.a.l:

15.01.E.1.m. Overtime worked by Contractor necessitating Engineer, and their officers, directors, members, partners, employees, agents, and other consultants and subcontractors of each, Resident Project Representative or Resident Project Representative's Site staff, if any, to work extraordinary overtime in accordance with Paragraph 7.02.C. of these Supplementary Conditions. For purposes of administering this requirement, additional extraordinary overtime costs are defined as exceeding 8 hours per day, 40 hours per week, unless otherwise agreed between Owner and Contractor.

SC-15.03.B. Add the following new subparagraph to Paragraph 15.03.B:

15.03.B.1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or retesting by Engineer, the cost of such re-inspection or retesting, including the cost of time, travel and living expenses, shall be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.

SC-15.04. Delete this Article in its entirety.

SC-15.06. Add the following new paragraph immediately after Paragraph 15.06.A.3:

15.06.A.4. On contracts for public works, final payment of the retained percentage will not be made until after Contractor has filed with Owner the affidavit required by RCW 39.12.040 certifying Contractor and its Subcontractors have paid not less than the prevailing rate of wages.

SC-15.06. Add the following new paragraph immediately after Paragraph 15.06.B.1:

15.06.B.2. Upon Owner's receipt of (i) Engineer's written recommendation of payment with Contractor's Final Application for Payment and accompanying documentation, and (ii) Engineer's written notice that the Work is acceptable subject to the provisions of Paragraph 14.09, Owner will notify the Department of Revenue of the completion of the Work under these Contract Documents. Provided the Department of Revenue certifies there are no taxes or penalties due and owing from Contractor, and there are no other known Claims or Liens against the retained funds, Owner will make payment to Contractor in accordance with Paragraph 14.07 subject to

the provisions of RCW 60.28.010. In the event unsatisfied Claims or Liens for taxes, material, labor, and other services are known to exist, an amount will be further withheld from the retainage sufficient to satisfy the settlement of such Claims and Liens, including attorney's fees incurred, and remainder will be released from escrow, or released from retained funds and paid to Contractor.

Final payment less retainage paid net 30 days after the payment application is approved. A 5 percent retainage will be required and will be held 45 days after completion of the work and final acceptance of the project by City Council.

Retainage shall be released in accordance with RCW 60.28.

SC-16.02 Owner May Terminate for Cause. Delete this Article in its entirety, termination shall be as stated in the Contract.

SC-16.03 Owner May Terminate for Convenience. Delete this Article in its entirety, termination shall be as stated in the Contract.

SC-17.02. Add the following new paragraphs immediately after Paragraph 17.01.

Prior to seeking claims resolution through litigation, the Contractor shall proceed in accordance with Article 12. The provisions of Article 12 must be complied with in full as a condition precedent to the Contractor's right to seek claim resolution through litigation.

Any claims or causes of action which the Contractor has against the Contracting Agency arising from the Contract shall be resolved, as prescribed herein.

The Contractor and the Owner mutually agree that those claims or causes of action, which are not resolved by mediation, shall be resolved through litigation.

For the convenience of the parties to the Contract, it is mutually agreed by the parties that any litigation shall be initiated within 180 calendar days from the

"acceptance date" described in Article 15. Litigation shall be deemed to be

initiated on the date the Contractor files a cause of action with the Superior Court of Washington for Clark County, or such other Superior Court of Washington as mutually agreed to in writing by the parties. The parties understand and agree that the Contractor's failure to initiate litigation within the time period provided shall be a complete bar to any such claims or causes of action.

SC-17.07 Attorneys' Fees.

17.07.A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

SC-18.04. Add the following new Paragraph 18.04.B:

18.04.B. Contractor agrees to limit any adjustment to the Contract Price for overhead, extended overhead, impacts, consequential damages, and all other items that are not specifically included in the Cost of the Work to the Contractor's Fee as provided under Article 11.04C. Contractor's recovery for all legal and equitable claims and recovery related directly or indirectly to the Work or this Agreement shall be limited exclusively to those adjustments to the Contract Price and Contract Times as specifically provided in this Agreement.

SC-18.09. Liquidated Damages - Add the following new section to Article 18:

18.09 Liquidated Damages

Time is of the essence of the Contract. Delays inconvenience the public and interfere with the operations of Public Works. Delays also cost tax payers undue sums of money adding time needed for administration, engineering, inspection, and supervision.

Because the Owner finds it impractical to calculate the actual cost of delays, the Owner has adopted the following formula to calculate liquidated damages for failure to complete the physical Work of a Contract on time.

Accordingly, the Contractor agrees:

1. To pay (according to the following formula) liquidated damages for each calendar day beyond the established completion date for Physical Completion, and
2. To authorize the Engineer to deduct these liquidated damages from any money due or coming due to the Contractor.

Liquidated Damages Formula

$$LD = \$3,000 \times T$$

Where:

LD = Liquidated Damages

T = Number of calendar days beyond the established completion date until physical completion.

Physical Completion Date is the day all Work is physically completed on the project. All documentation required by the Contract and required by law does not necessarily need to be furnished by the Contractor by this date

When the Contract Work has progressed to the extent that the Owner has full use and benefit of the facilities, both from an operation and safety standpoint, all the initial plantings are completed and only minor incidental Work, replacement of temporary substitute facilities, plant establishment periods, or correction of repair remains to physically complete the total Contract, the Engineer may determine the Contract Work is substantially complete. The Engineer will notify the Contractor in writing of the Substantial Completion Date. For overruns in Contract time occurring after the date so established for Substantial Completion, the formula for liquidated damages shown above will not apply and liquidated damages will be assessed on the basis of direct engineering and related costs assignable to the project until the actual Physical Completion Date of all the Contract Work. The Contractor shall complete the remaining Work as promptly as possible. Upon request by the Project Engineer, the Contractor shall furnish a written schedule for completing the physical Work on the Contract.

The Contractor is solely responsible to ensure all employed agents, subagents, and subcontractors working to complete the Work perform in a timely manner as necessary to meet the established completion date while working within the project constraints outlined in the Specifications.

Liquidated damages will not be assessed for any days for which and extension of time is granted. No deduction or payment of liquidated damages will in any degree release the Contractor from further obligations and liabilities to complete the entire Contract.

END OF SECTION

VOLUME 2 – TECHNICAL SPECIFICATIONS (CITY OF VANCOUVER)

DIVISION 1 – GENERAL REQUIREMENTS – City of Vancouver

01 11 00	Summary of Work.....
01 12 16.13	Construction Constraints
01 29 00	Payment Procedures
01 31 13	Project Coordination
01 31 19	Project Meetings
01 32 00	Construction Progress Documentation.....
01 33 00	Submittal Procedures.....
	Supplements:
	Submittal Transmittal/Source Approval (Owner's Form)
	Request to Sublet (Owner's Form)
	Request for Information (Owner's Form)
01 33 17	Anchorage and Bracing.....
01 42 13	Abbreviations and Acronyms
01 45 16.13	Contractor Quality Control.....
01 45 33	Special Inspection, Observation, and Testing.....
	Supplement:
	Contractor's Statement of Responsibility
01 50 00	Temporary Facilities and Controls.....
01 57 13	Temporary Erosion and Sediment Control.....
01 61 00	Common Product Requirements.....
	Supplement:
	Manufacturer's Field Service Report
01 64 00	Owner-Furnished Products
01 77 00	Closeout Procedures.....
01 78 23	Operation and Maintenance Data.....
	Supplement:
	Maintenance Summary Form
01 91 14	Equipment Testing and Facility Startup.....
	Supplement:
	Unit Process Startup Form
	Facility Performance Demonstration/Certification Form



**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

The completed Work will install two (2) new well house buildings around recently drilled municipal drinking water wells. The wells are within an existing City of Vancouver operating wellfield that must remain in operation throughout the project. The scope includes extending existing access, a structure, a vertical-turbine well pump and motors while connecting to the existing water, electrical and communications systems to make those new wells functional for the Water Station 1 Wellfield.

1.02 WORK NOT COVERED BY CONTRACT DOCUMENTS

Control System Integration will be conducted by the Owner's Integration Engineer. Contractor is to complete equipment & owner-furnished control panel installation while coordinating with the Owner for control system integration scheduling as the Project progresses.

1.03 Owner-Furnished Products

1. Well Control Panels – The City will have control panels fabricated and delivered for storage at Water Station 1 roughly by April 2026. Contractor responsible for panel installation in the new well house buildings with wiring terminated as shown in the plan set.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

**SECTION 01 12 1613
CONSTRUCTION CONSTRAINTS**

PART 1 GENERAL

1.01 INTRODUCTION

A. The Water Station 1 site produces clean drinking water for the community and is a secure facility with fencing and locked access points. The site will remain in operation during construction. The project constraints are defined below. The Contractor must adhere to these constraints, unless written authorization is provided by the City to alter them.

1.02 CONSTRUCTION CONSTRAINTS

A. The following constraints are associated with construction activities:

- 1) Existing Wells 4 and 11 shall remain available for service from May 1st to September 1st. Outside of that high-demand period, they can be out of service for no more than 10 calendar days consecutively and not more than 30 calendar days during this contract.
- 2) Contractor shall coordinate with the City to ensure Operators continue to have access to Water Station 1 existing facilities during the project.
- 3) Refer to Section 01 50 00, Temporary Facilities and Controls, for requirements related to site security and fencing.
- 4) Portable restrooms are acceptable for the Contractor's employees, but they will be required to be kept within a fenced area away from public access.
- 5) Engineer will perform programming of SCADA and PLC applications software for certain portions of Process Instrumentation and Control Subsystem (PICS).
 - a. Contractor shall coordinate work and provide an allowance for interruptions to the Work because of testing by Engineer of Engineer-developed applications software:
 - 1) During Functional Testing and Performance Testing, Contractor shall plan for interruption of testing of the Work to allow Engineer to investigate software problems, make software configuration changes, and conduct additional testing.
 - 2) Allowance for Interruptions: 3 days for each well house building.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Schedule of Values: Submit on form as approved by Owner.
2. Schedule of Estimated Progress Payments: Submit with initially acceptable Schedule of Values.
3. Application for Payment.
4. Final Application for Payment.

1.02 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values (**SOV**) for the Work to be performed under the Agreement. This SOV is expected to be itemized by the General Requirements and then each facility as a top heading, with a further breakdown of the activities within each facility or activity. The SOV shall be defined by activity level for each facility by trade and activity within the trade. As an example, for trenching, the SOV shall be itemized as a minimum to include safety, excavation, shoring, trench stabilization, materials (pipe, fittings, valves, valve cans), testing, disinfection, backfill, and restoration. Acceptance of the SOV is solely determined by the Owner.
- B. Upon request of Engineer, provide documentation to support the accuracy of the Schedule of Values.
- C. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form.
- D. Lump Sum Work:
1. Reflect specified cash and contingency allowances and alternates, as applicable.
 2. List bonds and insurance premiums, mobilization, demobilization, preliminary and detailed progress schedule preparation, equipment testing, facility startup, and contract closeout separately.
 3. Break down by Divisions 02 through Division 49 with appropriate subdivision of each Specification for each Project facility.
- E. An unbalanced or front-end loaded schedule will not be acceptable.
- F. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.
- G. Submit Schedule of Values, in a spreadsheet format compatible with latest version of Excel.

- H. Pursuant to RCW 39.04.180, trench safety systems are required to meet the Washington industrial safety and health act, Chapter 49.17 RCW for any excavation exceeding 4 feet of depth and listed on the bid proposal as a separate item. Payment for 'Trench Safety System' shall be made at the unit Contract price per linear foot of those sections of trench which are actually mechanically shored or over excavated specifically for the sole purpose of providing a safe work environment for workers. Any bid item for trench safety less than \$3.00 per linear foot will be unilaterally changed to read \$3.00 per linear foot, item extensions will be adjusted accordingly and be reflected in the total bid price for award purposes.

1.03 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.
- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.04 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form as provided by Owner with each detailed Application for Payment and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized Contractor representative.
- B. Use detailed Application for Payment Form suitable to/or provided by Owner.
- C. Include accepted Schedule of Values for each schedule or portion of Lump Sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.
- D. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by Engineer.
- E. Preparation:
 - 1. Round values to nearest dollar.
 - 2. Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by Engineer.

1.05 MEASUREMENT-GENERAL

- A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to

tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.

- B. Whenever pay quantities of material are determined by weight, material shall be weighed on scales furnished by Contractor and certified accurate by state agency responsible. Weight or load slip shall be obtained from weigher and delivered to Owner's representative at point of delivery of material.
- C. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.
- D. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Engineer. Each vehicle shall bear a plainly legible identification mark.
- E. Materials that are specified for measurement by the cubic yard measured in the vehicle shall be hauled in vehicles of such type and size that actual contents may be readily and accurately determined. Unless all vehicles are of uniform capacity, each vehicle must bear a plainly legible identification mark indicating its water level capacity. Vehicles shall be loaded to at least their water level capacity. Loads hauled in vehicles not meeting above requirements or loads of a quantity less than the capacity of the vehicle, measured after being leveled off as above provided, will be subject to rejection, and no compensation will be allowed for such material.
- F. Quantities Based on Profile Elevations: Existing ground profiles shown on Drawings were taken from a topographic map drawn with contour intervals of 1 foot.
- G. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of 1 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.

1.06 PAYMENT

- A. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.

1.07 PAYMENT PROCESS

- A. Refer to the General Conditions and Supplemental Conditions of the Contract Documents for payment process.

1.08 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

- A. Payment will not be made for following:

1. Loading, hauling, and disposing of rejected material.
2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
4. Material not unloaded from transporting vehicle.
5. Defective Work not accepted by Owner.
6. Material remaining on hand after completion of Work.

1.09 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless Shop Drawings and preliminary operation and maintenance data is acceptable to Engineer. Invoices for materials, location of materials stored, and a release of liens for the equipment must be provided prior to payment. Payment for Materials on Hand will only be for the materials that can be inventoried by the Owner.
- B. Final Payment: Will be made only for products incorporated in Work; remaining products, for which partial payments have been made, shall revert to Contractor unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.10 PARTIAL PAYMENT FOR UNDELIVERED, PROJECT-SPECIFIC MANUFACTURED OR FABRICATED EQUIPMENT

- A. Notwithstanding above provisions, partial payments for undelivered (not yet delivered to Site or not stored in the vicinity of Site) products specifically manufactured for this Project, excluding off the shelf or catalog items, will be made for products listed below when all following conditions exist:
 1. Partial payment request is supported by written acknowledgment from Suppliers that invoice requirements have been met.
 2. Equipment is adequately insured, maintained, stored, and protected by appropriate security measures.
 3. Each equipment item is clearly marked and segregated from other items to permit inventory and accountability.
 4. Authorization has been provided for access to storage Site for Engineer and Owner.
 5. Equipment meets applicable Specifications of these Contract Documents.
- B. Payment of 15 percent of manufacturer's quoted price for undelivered, Project-specific manufactured equipment will be considered following Shop Drawing approval.
- C. Failure of Contractor to continue compliance with above requirements shall give cause for Owner to withhold payments made for such equipment from future partial

payments.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 31 13
PROJECT COORDINATION

PART 1 GENERAL

1.01 RELATED WORK AT SITE

A. General:

1. Coordinate the work of these Contract Documents with work of others as specified in General Conditions.

B. Applications Software Development:

1. Owner will perform programming of SCADA applications software for certain portions of Process Instrumentation and Control Subsystem (PICS).
2. Coordination and allowance for interruptions to the Work because of testing by Engineer of Engineer-developed applications software:
 - a. During Functional Testing and Performance Testing, Contractor shall plan for interruption of testing of the Work to allow Owner to investigate software problems, make software configuration changes, and conduct additional testing.
 - b. Allowance for Interruptions to Contractor's Schedule: 6 days with a minimum of three-weeks advance scheduling to allow the City SCADA team to implement software related to existing and new instrumentation and control for the well operation.

1.02 OWNER-FURNISHED PRODUCTS

- A. Refer to Section 01 64 00, Owner-Furnished Products.**

1.03 WORK CONSTRAINTS

- A. Refer to Section 01 12 16.13, Construction Constraints.**

1.04 OVERALL WORK RESTRICTIONS

- A. Contractor shall account for the following special construction requirements for scheduling, estimating and performing the Work:**

1. The work is located inside the City's fenced water facility. Neighborhood residents utilize the area outside the fence as a recreational area.
2. Work Hours: 7:00 a.m. to 6:00 p.m. Monday through Friday. For Work outside those hours, Contractor shall obtain both the required permits and written approval from the approving agencies.
3. The work area is within a City water supply facility. Fuel storage on site shall be limited to 500 gallons, provided the containers are double wall containment tanks. Any spill to the ground of materials shall immediately be reported to the Engineer and Water

Operations. The spill shall be immediately contained/removed.

4. Any vehicle that in the Owner's Representative's opinion is leaking fluids, is not in good mechanical condition, or is a potential hazard to the public or the well field, will not be allowed onsite and shall be removed immediately.

5. Concrete washout activities will not be allowed at the Site, unless authorized by the Owner in writing.

6. Contractor shall adhere to the conditions set forth in the Construction Permits for this Project. No washing, screening or crushing of rock is permitted onsite.

1.05 FACILITY OPERATIONS

A. Continuous operation of Owner's facilities is of critical importance. Schedule and conduct activities to existing facilities to operate continuously, unless otherwise specified.

B. Do not close lines, open or close valves, or take other action which would affect the operation of existing systems, except as specifically required by the Contract Documents and after authorization by Owner and Engineer. Such authorization will be considered within 48 hours after receipt of Contractor's written request.

C. Do not proceed with Work affecting a facility's operation without obtaining Owner's and Engineer's advance approval of the need for and duration of

1.06 TEMPORARY DISTURBANCE AREAS

A. Disturbance Areas: The disturbance areas are shown on Drawings. These disturbance areas are highly prescriptive and shall be required to be observed by the Contractor in performing the work. Before any ground disturbance occurs, construction limit fencing and tree protection fencing shall be installed. The limits shall be observed at all times for all construction activities. The Contractor shall not perform work outside of the defined disturbance areas.

B. Tree Protection Fences: Tree Protection Fences shall be installed around all trees to remain before any construction activity commences. Tree protection fences require the Owner's inspection and approval before construction commences.

C. Erosion Control Facilities:

1. Temporary erosion control shall be installed before work commences. The temporary erosion control measures shall be maintained throughout the work duration and until establishment of permanent erosion measures have been installed and are preventing erosion. Temporary erosion control measures shall be employed before commencing on any new work area.

2. Erosion and sediment control requires Owner's Representative approval.

D. Stormwater Facilities, Temporary and Permanent:

1. Temporary stormwater control facilities shall remain in place and functional until permanent stormwater facilities are constructed and operational.

2. Temporary stormwater facilities shall be installed before ground

disturbance activities commence.

1.07 CONSTRUCTION PHOTOGRAPHS

A. General:

1. Photographically document all phases of the Project including preconstruction, monthly construction progress, and post-construction.
2. Engineer shall have right to select subject matter and vantage point from which photographs are to be taken.
3. Digital Images: No post-session electronic editing of images is allowed. Stored image shall be actual image as captured without cropping.
4. All images described shall be submitted to the City prior to final completion of the project as an informational submittal.

1.08 UNDERGROUND UTILITY LOCATION SERVICES, ONSITE AND OFFSITE

A. Owner's Responsibilities: The underground facilities in the area of Work are owned by the City. The City will locate the facilities to the best of the City's available knowledge as required by law when the Contractor submits a locate request through 'Call before you Dig' and 811. Any Work extending beyond the limits of the site where utilities owned are owned by other agencies shall be located by others.

B. Contractor's Responsibilities:

1. Submit locate request prior to excavation as required by law.
2. Maintain painted locates, flag and stake as needed for construction during the course of the Work.
3. This would include underground utilities, including electrical, water pipes, stormwater pipes, sewer pipes, telecom, and fiber optic, and other types of utilities located on the project site. These could be City owned facilities or facilities owned by other utilities.

1.09 REFERENCE POINTS AND SURVEYS

A. Owner's Responsibilities:

1. The existing building perimeter serves as a benchmark elevation.

B. Contractor's Responsibilities:

1. Provide additional survey and layout required to conduct the Work.
2. Check and establish exact location of existing facilities prior to excavation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CUTTING, FITTING, AND PATCHING

- A. Cut, fit, adjust, or patch Work and work of others, including excavation and backfill as required, to make Work complete.
- B. Refinish surfaces to provide an even finish.
 - 1. Refinish continuous surfaces to nearest intersection.
 - 2. Refinish entire assemblies.
 - 3. Finish restored surfaces to such planes, shapes, and textures that no transition between existing work and the Work is evident in finished surfaces.
- C. Restore existing work, Underground Facilities, and surfaces that are to remain in completed Work including piping, conduit, and other utilities as specified and as shown on Drawings.
- D. Make restorations with new materials and appropriate methods as specified for new Work of similar nature; if not specified, use recommended practice of manufacturer or appropriate trade association.
- E. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces and fill voids.
- F. Remove specimens of installed Work for testing when requested by Engineer.

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART I GENERAL

1.02 GENERAL

- A. Contractor shall provide for physical arrangements for meetings throughout progress of the Work. Contractor shall prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.

1.03 PRECONSTRUCTION CONFERENCE

- A. A preconstruction meeting shall be held, in accordance with Article 2.04 of the General Conditions. The Owner will schedule and conduct the meeting. Contractor and appropriate staff, subcontractors, etc., are expected to attend the meeting.
- B. Contractor shall be prepared to discuss the following subjects, as a minimum:
 - 1. Required schedules.
 - 2. Status of Bonds and insurance.
 - 3. Sequencing of critical path work items.
 - 4. Project changes and clarification procedures.
 - 5. Use of Site, access, office and storage areas, security and temporary facilities.
 - 6. Major product delivery and priorities.
 - 7. Contractor's safety plan and representative.
 - 8. Emergency Plan for Water Operations: Determine action plan if an accidental shutdown were to occur. Contractor to be informed City contact and plan for Contractor's role in resolving problem and creating solution to maintain operations.
- C. Attendees will include:

1. Owner's representatives.
2. Contractor's office representative.
3. Contractor's resident superintendent.
4. Contractor's quality control representative.
5. Subcontractors' representatives whom Contractor may desire or Engineer may request to attend.
6. Engineer's representatives.
7. Contractor's erosion control specialist.
8. Others as appropriate.

1.04 PRELIMINARY SCHEDULES REVIEW MEETING

- A. As set forth in General Conditions and Section 01 32 00, Construction Progress Documentation.

1.05 PROGRESS MEETINGS

- A. Owner will schedule regular progress meetings at Site, conducted weekly to review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.
- B. Attendees will include:
 1. Owner's representative(s), as appropriate.
 2. Contractor, Subcontractors, and Suppliers, as appropriate.
 3. Others as appropriate.

1.06 QUALITY CONTROL MEETINGS

1.07 PROCESS INSTRUMENTATION AND CONTROL SYSTEMS (PICS)
COORDINATION MEETINGS

- A. As work progresses to involve PICS work, the Engineer will schedule meetings at Site, conducted bi-weekly to review specific requirements of PICS work, when the work is being accomplished.
- B. Attendees will include:
 1. Contractor.

2. Owner.
3. PICS Subcontractor/Installer.
4. Integration Engineer's representatives.
5. Manufacturer's representatives, as appropriate.

1.08 COORDINATION MEETINGS

- A. Hold coordination meetings as required by the progress of the Work. The purpose of the coordination meetings is to discuss preparatory work issues, quality control issues, safety issues, facility shutdown and start-up issues, and coordination with work of this Contract. Provide all necessary documentation and information required for the meeting.
- B. Before any shutdown or restart of existing facilities can occur, a coordination meeting must be held between the Owner, Engineer, Operations Staff, and Contractor.
- C. Contractor shall attend and arrange for such subcontractor's representatives as may be needed to attend, pending subject matter. The Engineer and any other interested party, such as public utility, local government representatives, and suppliers when needed, will also attend.
- D. Hold the meetings at the Project Site unless otherwise agreed by the Engineer.

1.09 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene at Site prior to commencing the Work of that section.
- B. Require attendance of entities directly affecting, or affected by, the Work of that section.
- C. Notify Engineer 7 days in advance of meeting date.
- D. Provide suggested agenda to Engineer to include reviewing conditions of installation, preparation and installation or application procedures, and coordination with related Work and work of others.

1.10 FACILITY STARTUP MEETINGS

- A. Schedule and attend facility startup meetings. The first of such meetings shall be held prior to submitting Facility Startup Plan, as specified in Section 01 91 14, Equipment Testing and Facility Startup, and shall include preliminary discussions regarding such plan.
- B. Agenda items shall include, but not be limited to, content of Facility Startup Plan, coordination needed between various parties in attendance, and potential problems associated with startup.
- C. Attendees will include:
 - 1. Contractor.
 - 2. Contractor's designated quality control representative.
 - 3. Subcontractors and equipment manufacturer's representatives whom Contractor deems to be directly involved in facility startup.
 - 4. Engineer's representatives.
 - 5. Owner's operations personnel.
 - 6. Others as required by Contract Documents or as deemed necessary by Contractor or Owner.

1.11 OTHER MEETINGS

- A. In accordance with Contract Documents and as may be required by Owner and Engineer.

PART 2 PRODUCTS (NOT USED)
PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Preliminary Progress Schedule: Submit within 15 days of Effective Date of the Contract, and not less than 7 days prior to preconstruction conference. Contractor shall include the logic outlined in Section 01 12 16.13, Construction Constraints, within the preliminary progress schedule.
2. Detailed Progress Schedule:
 - a. Submit initial Detailed Progress Schedule within 45 days after Effective Date of the Agreement, including the logic outlined in Section 01 12 16.13, Construction Constraints.
 - b. Submit an Updated Progress Schedule at each update, in accordance with Article Detailed Progress Schedule.
3. Submit with Each Progress Schedule Submission:
 - a. Contractor's certification that Progress Schedule submission is actual schedule being utilized for execution of the Work.
 - b. Electronic file from Owner approved software program.
 - c. Progress Schedule: Four legible hardcopies.
 - d. Narrative Progress Report: Same number of copies as specified for Progress Schedule.
4. Prior to final payment, submit a final Updated Progress Schedule.

1.02 PRELIMINARY PROGRESS SCHEDULE

- A. In addition to basic requirements outlined in General Conditions, show a detailed schedule, beginning with Notice to Proceed, through Final Completion, which includes the logic of Section 01 12 16.13, Construction Constraints.
- B. Contractor is advised to order the well motor and electrical equipment early. These have recently been long lead items and the Contractor should coordinate with their supplier to acquire these products early so as not to cause a scheduling constraint to their work.
- C. Show activities including, but not limited to the following:
 1. Notice to Proceed.
 2. Permits.
 3. Submittals, with review time. Contractor may use Schedule of Submittals specified in Section 01 33 00, Submittal Procedures.
 4. Early procurement activities for long lead equipment and materials.
 5. Initial Site work.
 6. Earthwork.

7. Field Office Setup.
8. Specified Work sequences and construction constraints.
9. Contract Milestone and Completion Dates.
10. Owner-furnished products delivery dates or ranges of dates.
11. Major structural, mechanical, equipment, electrical, architectural work.
12. Coordination of instrumentation and control work.
13. System startup summary.
14. Project close-out summary.
15. Demobilization summary.

- D. Update Preliminary Progress Schedule monthly as part of progress payment process. Failure to do so may result in the Owner withholding all or part of the monthly progress payment until the Progress Schedule is updated in a manner acceptable to Engineer.
- E. Format: As selected by the Owner.

1.03 DETAILED PROGRESS SCHEDULE

- A. In addition to requirements of General Conditions, submit Detailed Progress Schedule beginning with Notice to Proceed and continuing through Final Completion.
- B. Show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by Contractor.
- C. When accepted by Owner, Detailed Progress Schedule will replace Preliminary Progress Schedule and become Baseline Schedule. Subsequent revisions will be considered as Updated Progress Schedules.
- D. Update monthly to reflect actual progress and occurrences to date, including weather delays.

1.04 PROGRESS SCHEDULE-BAR CHART

- A. General: Comprehensive bar chart schedule, generally as outlined in Associated General Contractors of America (AGC) 580, "Construction Project Planning and Scheduling Guidelines." If a conflict occurs between the AGC publication and this Specification, this Specification shall govern.
- B. Format:
 1. Provide electronic and four hardcopies (size appropriate to read).
 2. Title Block: Show name of project and Owner, date submitted, revision or update number, and name of scheduler.
 3. Identify horizontally, across the top of the schedule, the time frame by year, month, and day.
 4. Identify each activity with a unique number and a brief description of the Work associated with that activity.

5. Legend: Describe standard and special symbols used.

C. Contents:

1. Identify, in chronological order, those activities reasonably required to complete the Work, including as applicable, but not limited to:
 - a. Obtaining permits, submittals for early product procurement, and long lead time items.
 - b. Mobilization and other preliminary activities.
 - c. Initial Site work.
 - d. Specified Work sequences, including the logic of Section 01 12 16.13, Construction Constraints, and Milestones, including Substantial Completion date(s).
 - e. Subcontract Work.
 - f. Major equipment design, fabrication, factory testing, and delivery dates.
 - g. Delivery dates for Owner-furnished products, as specified.
 - h. Each facility separated into:
 - 1) Presite Work requirements.
 - 2) Sitework.
 - 3) Concrete Placement Work.
 - 4) Structural steel Work.
 - 5) Equipment Work.
 - 6) Mechanical Work.
 - 7) Electrical Work.
 - 8) Instrumentation and control Work.
 - 9) Coordination with Owner provided Integration Engineering.
 - 10) Other important Work for each major facility.
 - 11) Facilities, equipment and system startup and test activities.
 - 12) Project closeout and cleanup.
 - 13) Demobilization.

1.05 PROGRESS OF THE WORK

A. Updated Progress Schedule shall reflect:

1. Progress of Work to within 5 working days prior to submission.
2. Approved changes in Work scope and activities modified since submission.
3. Delays in Submittals or resubmittals, deliveries, or Work.
4. Adjusted or modified sequences of Work.
5. Other identifiable changes.
6. Revised projections of progress and completion.
7. Report of changed logic.

B. Produce detailed subschedules during Project, upon request of Owner, to further define critical portions of the Work such as facility shutdowns.

C. If Contractor fails to complete activity by its latest scheduled completion date and this Failure is anticipated to extend Contract Times (or Milestones), Contractor shall, within 7 days of such failure, submit a written statement as to how Contractor intends to correct nonperformance and return to acceptable current Progress

Schedule. Actions by Contractor to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.

- D. Owner may order Contractor to increase plant, equipment, labor force or working hours if Contractor fails to:
 - 1. Complete a Milestone activity by its completion date.
 - 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to Owner.

1.06 NARRATIVE PROGRESS REPORT

A. Format:

- 1. Organize same as Progress Schedule.
- 2. Identify, on a cover letter, reporting period, date submitted, and name of author of report.
- 3. Contents:
 - a. Number of days worked over the period, work force on hand, construction equipment on hand (including utility vehicles such as pickup trucks, maintenance vehicles, stake trucks).
 - b. General progress of Work, including a listing of activities started and completed over the reporting period, mobilization/demobilization of subcontractors, and major milestones achieved.
 - c. Contractor's plan for management of Site (e.g., lay down and staging areas, construction traffic), utilization of construction equipment, buildup of trade labor, and identification of potential Contract changes.
 - d. Identification of new activities and sequences as a result of executed Contract changes.
 - e. Documentation of weather conditions over the reporting period, and any resulting impacts to the work.
 - f. Description of actual or potential delays, including related causes, and the steps taken or anticipated to mitigate their impact.
 - g. Changes to activity logic.
 - h. Changes to the critical path.
 - i. Identification of, and accompanying reason for, any activities added or deleted since the last report.
 - j. Steps taken to recover the schedule from Contractor-caused delays.

1.07 SCHEDULE ACCEPTANCE

A. Owner's acceptance will demonstrate agreement that:

- 1. Proposed schedule is accepted with respect to:
 - a. Contract Times, including Final Completion and all intermediate Milestones are within the specified times.
 - b. Specified Work sequences and constraints are shown as specified.
 - c. Specified Owner-furnished Equipment or Material arrival dates, or range of dates, are included.

- d. Access restrictions are accurately reflected.
- e. Startup and testing times are as specified.
- f. Submittal review times are as specified.
- g. Startup testing duration is as specified and timing is acceptable.
2. In all other respects, Owner's acceptance of Contractor's schedule indicates that, in Engineer's judgement, schedule represents reasonable plan for constructing Project in accordance with the Contract Documents. Owner's review will not make any change in Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change, unless Contractor has explicitly called the nonconformance to Owner's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Project in accordance with the Contract Documents.

B. Unacceptable Preliminary Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process, during which time Contractor shall update schedule on a monthly basis to reflect actual progress and occurrences to date.

C. Unacceptable Detailed Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process.

- D. Narrative Report: All changes to activity duration and sequences, including addition or deletion of activities subsequent to Owner's acceptance of Baseline Progress Schedule, shall be delineated in Narrative Report current with proposed Updated Progress Schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Shop Drawings: Shop Drawings are Drawings, diagrams, schedules, and other data specifically prepared for the Work by the Contractor, a Subcontractor at any tier, manufacturer, and supplier or distributor, to illustrate some portion of the Work.
- B. Product Data: Product data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- C. Samples: Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.
- D. Submittals: Submittals are documents required by the Contract to be submitted to the Owner for review. The following is the list of the types of submittals used in the Contract Documents:
 - 1. Action Submittal: Written and graphic information submitted by Contractor that requires Engineer's approval.
 - 2. Deferred Submittal: Information necessary to comply with the 2015 IBC Section 107.3.4.1 as submitted by Contractor for portions of design that require permitting agency approval prior to installation of that portion of the Work, along with Engineer's review documentation that submittal has been found to be in general conformance with Project's design.
 - 3. Informational Submittal: Information submitted by Contractor that requires Engineer's review and determination that submitted information is in accordance with the Conditions of the Contract.

1.02 PROCEDURES

- A. Direct submittals to Owner at the following, unless specified otherwise:
 - 1. Via Owner's Project Coordinator, which will be provided at preconstruction conference.
- B. Electronic Submittals: Submittals shall, unless specifically accepted, be made in electronic format.
 - 1. Each submittal shall be an electronic file in Adobe Acrobat Portable Document Format (PDF). Use the latest version available at time of execution of the Agreement, and seven hard copies provided.
 - 2. Each product under each specification section will have its

- own submittal.
3. Electronic files that contain more than 10 pages in PDF format shall contain internal bookmarking from an index page to the major sections of the document.
 4. PDF files shall be set to open "Bookmarks and Page" view.
 5. Add general information to each PDF file, including title, subject, author, and keywords.
 6. PDF files shall be set up to print legibly at 8-1/2-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch. No other paper sizes will be accepted.
 7. Submit new, complete electronic files/hardcopies for each resubmittal.
 8. Include a copy of the Owner Approved Transmittal of Contractor's Submittal form, a sample copy is located at end of this section, with each electronic file.
 9. Engineer will reject submittal that is not electronically submitted, unless specifically accepted.
 10. Provide Engineer with authorization to reproduce and distribute each file as many times as necessary for Project documentation.
 11. Detailed procedures for handling electronic submittals will be discussed at the preconstruction conference.

C. Transmittal of Submittal:

1. Contractor shall:
 - a. Review each submittal and check for compliance with Contract Documents.
 - b. Upon review of the submittal, stamp each submittal with uniform approval stamp indicating review has been conducted by the Contractor for compliance with the Specifications, before submitting to Owner specified representative.
 - 1) Stamp to include Project name, submittal number, Specification number, Contractor's reviewer name, date of Contractor's approval, and statement certifying submittal has been reviewed, checked, and approved for compliance with Contract Document.
 - 2) Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
2. Complete, sign, and transmit with each submittal package, one Transmittal of Contractor's Submittal form, sample as attached at end of this section.
3. Identify each submittal with the following:
 - a. Numbering and Tracking System:
 - 1) Sequentially number each submittal.
 - 2) Resubmission of submittal shall have original number with sequential numeric suffix.
 - b. Specification section and paragraph to which submittal applies.
 - c. Project title and Engineer's project number.
 - d. Date of transmittal.

- e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
- 4. Identify and describe each deviation or variation from Contract Documents.
- D. Format:
 - 1. Do not provide Shop Drawings that are reproductions of the Contract Documents.
 - 2. Package submittal information by individual specification section. Do not combine different specification sections together in submittal package, unless otherwise directed in specification.
 - 3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
 - 4. Index with labeled tab dividers in orderly manner.
- E. Timeliness: Schedule and submit in accordance Schedule of Submittals, and requirements of individual specification sections.
- F. Processing Time:
 - 1. Time for review shall commence on Engineer's receipt of submittal.
 - 2. Engineer will act upon Contractor's submittal and transmit response to Contractor no later than 30 days after receipt, unless otherwise specified.
 - 3. Resubmittals will be subject to same review time.
 - 4. No adjustment of Contract Times or Price will be allowed as a result of delays in progress of Work caused by rejection and subsequent resubmittals, or review of agencies having jurisdiction (AHJ) which may require review. As the Owner does not control, nor will be held liable to a specific duration of time for AHJ review, Contractor will be responsible to oversee and coordinate to expedite AHJ review to maintain schedule.
- G. Resubmittals: Clearly identify each correction or change made.
- H. Incomplete Submittals:
 - 1. Engineer will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
 - 2. When any of the following are missing, submittal will be deemed incomplete:
 - a. Contractor's review stamp; completed and signed.
 - b. Transmittal of Contractor's Submittal completed and signed.
 - c. Insufficient number of paper copies, where required.
- I. Submittals Not Required by Contract Documents: Will not be reviewed and will be returned stamped "Not Subject to Review."

1.03 ACTION SUBMITTALS

- A. Prepare and submit Action Submittals required by individual specification sections.
- B. Shop Drawings:
 - 1. Provide transmittal of Shop Drawings and other submittals by individual specification section. Do not include multiple specification sections within a single transmittal.
 - 2. Identify and Indicate:
 - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - b. Equipment and Component Title: Identical to title shown on Drawings.
 - c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - d. Project-specific information drawn accurately to scale.
 - 3. Manufacturer's standard schematic drawings and diagrams as follows:
 - a. Modify to delete information that is not applicable to the Work.
 - b. Supplement standard information to provide information specifically applicable to the Work.
 - 4. Product Data: Provide as specified in individual specifications.
 - 5. Deferred Submittal: See Drawings for list of deferred submittals.
 - a. Contractor-design drawings and product data related to permanent construction.
 - 1) Written and graphic information.
 - 2) Drawings.
 - 3) Cut sheets.
 - 4) Data sheets.
 - 5) Action item submittals requested in individual specification section.
 - b. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage, submit required supporting data and drawings for review and acceptance by Engineer. Documentation of review and approval provided on Engineer's comment form, along with completed submittal, shall be filed with permitting agency by the Owner and approved by permitting agency prior to installation.
 - 6. Foreign Manufacturers:
 - a. When proposed, include the following:
 - 1) Names and addresses of at least two companies that maintain technical service representatives that reside close to the Project.
 - 2) Complete list of spare parts and accessories for each piece of equipment.
- C. Samples:
 - 1. Copies: Two unless otherwise specified in individual specifications.
 - 2. Preparation: Mount, display or package Samples in manner specified to

facilitate review of quality. Attach label on unexposed side that includes the following:

- a. Manufacturer name.
 - b. Model number.
 - c. Material.
 - d. Sample source.
3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
4. Full-Size Samples:
 - a. Size as indicated in individual specification section.
 - b. Prepared from same materials to be used for the Work.
 - c. Cured and finished in manner specified.
 - d. Physically identical with product proposed for use.

D. Action Submittal Dispositions:

1. Engineer will review, comment, stamp, and distribute as noted:
 - a. No Exceptions Taken (Approved):
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal.
 - 2) Distribution: Electronic, with distribution as agreed.
 - b. Note Markings (Approved as Noted):
 - 1) Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - 2) Distribution: Electronic, with distribution as agreed.
 - c. Comments Attached, Resubmit (Partial Approval, Resubmit as Noted):
 - 1) Make corrections or obtain missing portions, and resubmit.
 - 2) Except for portions indicated, Contractor may begin to incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - 3) Distribution: Electronic, with distribution as agreed.
 - d. Rejected (Revise and Resubmit):
 - 1) Contractor may not incorporate product(s) or implement Work covered by submittal.
 - 2) Distribution: Electronic, with distribution as agreed.

1.04 INFORMATIONAL SUBMITTALS

A. General:

1. Refer to individual specification sections for specific submittal requirements.
2. Engineer will review each submittal. If submittal meets conditions of the Contract, Engineer will forward copy to appropriate parties. If Engineer determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Engineer will return with review

comments to Owner for distribution, and require that submittal be corrected and resubmitted.

B. Certificates:

1. General:

- a. Provide notarized statement that includes signature of entity responsible for preparing certification.
- b. Signed by officer or other individual authorized to sign documents on behalf of that entity.

2. Welding: In accordance with individual specification sections.

3. Installer: Prepare written statements on manufacturer's letterhead certifying installer complies with requirements as specified in individual specification section.

4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual specification sections.

6. Manufacturer's Certificate of Compliance: In accordance with Section 01 61 00, Common Product Requirements.

C. Construction Photographs and Video: In accordance with Section 01 31 13, Project Coordination, and as may otherwise be required in Contract Documents.

D. Closeout Submittals: In accordance with Section 01 77 00, Closeout Procedures.

E. Contractor-Design Data (Related to Temporary Construction):

1. Written and graphic information.
2. List of assumptions.
3. List of performance and design criteria.
4. Summary of loads or load diagram, if applicable.
5. Calculations.
6. List of applicable codes and regulations.
7. Name and version of software.
8. Information requested in individual specification section.

F. Deferred Submittals: See Drawings for list of deferred submittals.

1. Contractor-Design Data Related to Permanent Construction:

- a. List of assumptions.
- b. List of performance and design criteria.
- c. Summary of loads or load diagram, if applicable.
- d. Calculations.
- e. List of applicable codes and regulations.
- f. Name and version of design software.

- g. Factory test results.
 - h. Informational submittals requested in individual specification section.
 - i. Sealed by an Engineer registered in the State of Washington, as required.
2. Prior to installation of indicated structural or nonstructural element, equipment, distribution system, or component or its anchorage submit calculations and test results of Contractor- designed components for review by Engineer. Documentation of review and indication of compliance with general design intent and project criteria provided on Engineer's comment form as meets conditions of the Contract along with completed submittal, shall be filed with permitting agency by Owner and approved by permitting agency prior to installation.
- G. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual specification section.
- H. Operation and Maintenance Data: As required in Section 01 78 23, Operation and Maintenance Data.
- I. Quality Control Documentation: As required in Section 01 45 16.13, Contractor Quality Control.
- J. Schedules:
1. A preliminary list of Submittals expected on the Project is to be provided at the preconstruction conference.
 2. Schedule of Submittals: Prepare separately or in combination with Progress Schedule as specified in Section 01 32 00, Construction Progress Documentation.
 - a. Show for each, at a minimum, the following:
 - 1) Specification section number.
 - 2) Identification by numbering and tracking system.
 - 3) Estimated date of submission to Engineer, including reviewing and processing time.
 - b. On a monthly basis, submit updated Schedule of Submittals to Engineer if changes have occurred or resubmittals are required.
 3. Progress Schedules: In accordance with Section 01 32 00, Construction Progress Documentation.
- K. Special Guarantee: Supplier's written guarantee as required in individual specification sections.
- L. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty

Subcontractor, trade, Specialist, consultant, installer, and other professionals.

M. Submittals Required by Laws, Regulations, and Governing Agencies:

1. Promptly submit notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
2. Transmit to Engineer for Owner's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.

N. Test, Evaluation, and Inspection Reports:

1. General: Shall contain signature of person responsible for test or report.
2. Factory:
 - a. Identification of product and specification section, type of inspection or test with referenced standard or code.
 - b. Date of test, Project title and number, and name and signature of authorized person.
 - c. Test results.
 - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - e. Provide interpretation of test results, when requested by Engineer.
 - f. Other items as identified in individual specification sections.
3. Field:
 - a. As a minimum, include the following:
 - 1) Project title and number.
 - 2) Date and time.
 - 3) Record of temperature and weather conditions.
 - 4) Identification of product and specification section.
 - 5) Type and location of test, Sample, or inspection, including referenced standard or code.
 - 6) Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
 - 7) If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - 8) Provide interpretation of test results, when requested by Engineer.
 - 9) Other items as identified in individual specification sections.

1.05 SUPPLEMENTS

- A. The supplements listed below, following "End of Section," are a part of this Specification.
1. Submittal Transmittal/Source Approval
 2. Request to Sublet

3. Request for Information

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SUPPLEMENTS:

CONSTRUCTION FORMS TO FOLLOW ARE FOR REFERENCE. THE OWNER WILL PROVIDE THE FORMS TO THE CONTRACTOR IN DIGITAL FORMAT UPON REQUEST.

[illegible]

Contractor _____ Project File _____ Project Inspector _____ Other _____



REQUEST TO SUBLET WORK

**PUBLIC WORKS CONSTRUCTION SERVICES
PO BOX 1995
Vancouver, WA 98668-1995**

PROJECT:			CONTRACT #:
PRIME CONTRACTOR:			PHONE #:
ADDRESS:			
CITY:	STATE:	ZIP:	REQUEST #:

APPROVAL IS REQUESTED TO SUBLET THE FOLLOWING WORK TO:

☐ SUBCONTRACTOR ☐ LOWER TIER SUBCONTRACTOR ☐ DBE

If Lower Tier Sub, Subcontractor's Name:		Sub contract Amount:	
FIRM NAME:			UBI No:
ADDRESS:			PHONE #:
CITY:	STATE:	ZIP:	ESTIMATED START DATE:
			EST WORKING DAYS:

WORK TO SUBLET			
ITEM	PARTIAL	ITEM DESCRIPTION	AMOUNT
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
			\$ 0.00
Total:			\$ 0.00

I understand and will insure that the Subcontractor will comply fully with the plans and specifications under which this work is being performed.

CONTRACTOR'S SIGNATURE: _____ DATE: _____

THIS AREA FOR CONSTRUCTION SERVICES ONLY

PERCENT OF TOTAL CONTRACT:	
THIS REQUEST:	0.00 %
PREVIOUS REQUEST:	0.00 %
SUBLET TO DATE:	0.00 %

REMARKS:

RECOMMENDED FOR APPROVAL:

PROJECT ENGINEER: _____ DATE: _____



REQUEST FOR INFORMATION

Project Name
Project Number

Contractor Name

No.: _____

Reference Spec.: _____

Reference Dwg.: _____

Description (attachment as required):

By: _____
Date: _____

Response (attachments as required):

By: _____
Date: _____

Contractor Project File Project Inspector Other

SECTION 01 33 17
ANCHORAGE AND BRACING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for anchorage and bracing of equipment, distribution systems, and other nonstructural components required in accordance with the ICC 2021 International Building Code (IBC), for seismic, wind, gravity, soil, operational loads.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Institute of Steel Construction (AISC) 360, Specification for Structural Steel Buildings.
 - 2. American Society of Civil Engineers (ASCE): ASCE 7, Minimum Design Loads for Buildings and Other Structures.
 - 3. International Code Council (ICC): International Building Code (IBC).

1.03 DEFINITIONS

- A. Authority Having Jurisdiction (AHJ): Permitting building agency; may be a federal, state, local, or other regional department, or individual including building official, fire chief, fire marshal, chief of a fire prevention bureau, labor department, or health department, electrical inspector; or others having statutory authority. AHJ may be Owner when authorized to be self-permitting by governmental permitting agency or when no governmental agency has authority.
- B. Designated Seismic System: Architectural, electrical, and mechanical system or their components for which component importance factor is greater than 1.0.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

- A. General:
 - 1. Contractor to provide anchorage and bracing systems designed and stamped by a qualified professional engineer registered in the State of Washington.
 - 2. Design anchorage and bracing of architectural, mechanical, and electrical components and systems in accordance with this section, unless a design is specifically provided within Contract Documents or where exempted hereinafter.
 - 3. Design attachments, braces, and anchors for equipment, components, and distribution systems to structure for gravity, seismic, wind, and operational loading.
 - 4. Piping and ductwork, whether exempt or not exempt for this section, shall be anchored and braced in a manner to provide adequate separation so that lateral

or vertical displacement does not result in damage or failure to architectural, mechanical, or electrical equipment.

5. Architectural Components: Includes, but are not limited to, nonstructural walls and elements, partitions, cladding and veneer, access flooring, signs, cabinets, suspended ceilings, and glass in glazed curtain walls and partitions.
6. Provide supplementary framing where required to transfer anchorage and bracing loads to structure.
7. Adjust equipment pad sizes or provide additional anchorage confinement reinforcing to provide required anchorage capacities.
8. For components exempted from design requirements of this section, provide bolted, welded, or otherwise positively fastened attachments to supporting structure.
9. Design Anchorage and Bracing for:
 - a. Equipment and components that weigh more than 400 pounds and have center of mass located 4 feet or less above adjacent finished floor.
 - b. Equipment weighing more than 20 pounds that has center of mass located more than 4 feet above adjacent finished floor.
 - c. Mechanical and electrical components that are not provided with flexible connections between components and associated ductwork, piping, or conduit.
 - d. Distribution systems that weigh more than 5 pounds per foot that have center of mass located more than 4 feet above adjacent finished floor.

B. Design Loads:

1. Gravity: Design anchorage and bracing for self-weight and superimposed loads on components and equipment.
2. Wind: Design anchorage and bracing for wind criteria provided on General Structural Notes on Drawings for exposed architectural components and exterior and wind-exposed mechanical and electrical equipment. Alternately, manufacturer certification may be provided for components such as roofing and flashing to verify attachments meet Project-specific design criteria.
3. Operational:
 - a. For loading supplied by equipment manufacturer for IBC required load cases.
 - b. Loads may include equipment vibration, torque, thermal effects, effects of internal contents (weight and sloshing), water hammer, and other load-inducing conditions.
 - c. Locate braces to minimize vibration to or movement of structure.
 - d. For vibrating loads, use anchors meeting requirements of Section 05 50 00, Miscellaneous Metalwork or Section 05 05 19, Post- Installed Anchors in Concrete, for anchors with designated capacities for vibratory loading per manufacturer's ICC-ES report.

4. Seismic:
 - a. In accordance with 2021 IBC, Section 1613, and Chapter 13 of ASCE 7.
 - b. Design anchorage and bracing for design criteria listed on General Structural Notes on Drawings.
 - c. Design seismic attachments, braces, and anchorages for parts or elements of architectural, mechanical, and electrical systems in accordance with provisions of IBC and Site-specific seismic criteria, noted on General Structural Notes on Drawings.
 - d. Design forces for anchors in concrete or masonry shall be in accordance with ASCE 7, Section 13.4.2 as applicable for Project Seismic Design Category.

C. Seismic Design Requirements:

1. Nonstructural Components: Design as non-building structures for components with weights greater than or equal to 25 percent of effective seismic weight of overall structure.
2. Analyze local region of body of nonstructural component for load transfer of anchorage attachment if component I_p is equal to 1.5 as noted on Structural Notes, Design Criteria.
 - a. Refer to Section 01 45 33, Special Inspection, Observation, and Testing, for minimum list of designated components that have seismic certification requirements.
3. The following are exempt from requirements for provision of seismic anchorages and bracing, in addition to those items specifically exempted in ASCE 7, Part 13.5 for architectural components and Part 13.6 for electrical and mechanical equipment:
 - a. Furniture, except storage cabinets and bookshelves over 6 feet tall.
 - b. Temporary or movable equipment.
4. Support drawings and calculations for electrical distribution components shall be provided if any of the following conditions apply:
 - a. Conduit diameter is greater than 2.5-inch trade size.
 - b. Total weight of bus duct, cable tray, or conduit supported by trapeze assemblies exceeds 10 pounds per foot.
 - c. Supports are cantilevered up from floor.
 - d. Supports include bracing to limit deflection and are constructed as rigid welded frames.
 - e. Attachments utilize spot welds, plug welds, or minimum size welds as defined by AISC.
5. Existing components, systems, and equipment in their final condition that are modified by Project requirements and are not exempted by above paragraph shall require same anchorage and bracing drawing and calculation submittals as new equipment. Field verify existing conditions.
6. Other seismic design and detailing requirements identified in ASCE 7, Chapter 13 are required to be provided for new and modified or noted architectural, mechanical and electrical components, systems, or equipment.

1.05 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:

- a. List of architectural, mechanical, and electrical equipment requiring Contractor-designed anchorage and bracing, unless specifically exempted.
- b. Manufacturers' engineered seismic hardware product data.
- c. Seismic attachment assemblies' drawings; include connection hardware, braces, and anchors or anchor bolts for nonexempt components, equipment, and systems.
- d. Drawings for seismic attachment assemblies include connection hardware, braces, and anchors (or anchor bolts) for modified, nonexempt existing components, equipment, and systems where a combination of new and existing systems or components' final condition would require anchorage or bracing under this specification for new equipment.
- e. Submittal will be rejected if proposed anchorage method would create an overstressed condition of supporting member. Revise anchorages and strengthening of structural support so there is no overstressed condition.

B. Informational Submittals:

1. Anchorage and Bracing Calculations: For attachments, braces, and anchorages, include IBC and Project-specific criteria as noted on General Structural Notes on Drawings, in addition to manufacturer's specific criteria used for design; sealed by a civil or structural engineer registered in the State of Washington.
2. Manufacturer's hardware installation requirements.

C. Deferred Submittals:

1. Submitted seismic anchorage drawings and calculations are identified as IBC deferred submittals and will be submitted to and accepted by AHJ prior to installation of component, equipment or distribution system.
2. Submit deferred action submittals such as shop drawings with supporting deferred informational submittals such as calculations no less than 4 weeks in advance of installation of component, equipment or distribution system to be anchored to structure.

1.06 SOURCE QUALITY CONTROL

- A. Contractor and supplier responsibilities to accommodate Owner-furnished shop fabrication related special inspections and testing are provided in Project's Statement of Special Inspections on Drawings and Section 01 45 33, Special Inspection, Observation, and Testing.
- B. All other specified, regulatory required, or repair verification inspection and testing that are not listed in Statement of Special Inspections, are to be provided by Contractor and shall meet requirements of Section 01 45 16.13, Contractor

Quality Control.

PART 2 PRODUCTS

2.01 GENERAL

- A. Design and construct attachments and supports transferring seismic and nonseismic loads to structure of materials and products suitable for application and in accordance with design criteria shown on Drawings and nationally recognized standards.
- B. Provide anchor bolts for anchorage of equipment to concrete or masonry in accordance with Section 05 50 00, Miscellaneous Metalwork. Provide anchor bolts of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- C. Provide post-installed concrete and masonry anchors for anchorage of equipment to concrete or masonry in accordance with Section 05 05 19, Post- Installed Anchors in Concrete. Provide post-installed anchors of the size, minimum embedment, and spacing designated in calculations submitted by Contractor and accepted by Engineer.
- D. Do not use powder-actuated fasteners or sleeve anchors for seismic attachments and anchorage where resistance to tension loads is required. Do not use expansion anchors, other than undercut anchors, for nonvibration isolated mechanical equipment rated over 10 hp.

PART 3 EXECUTION

3.01 GENERAL

- A. Make attachments, bracing, and anchorage in such a manner that component lateral force is transferred to lateral force resisting system of structure through a complete load path.
- B. Overall seismic anchorage system shall provide restraint in all directions, including vertical, for each component or system so anchored.
- C. Components mounted on vibration isolation systems shall have snubbers in each horizontal direction and vertical restraints where required to resist overturning.
- D. Anchor piping in such a manner as to ensure piping system has adequate flexibility and expansion capabilities at flexible connections and expansion joints.
 - 1. Piping and ductwork suspended more than 12 inches below supporting structure shall be braced for seismic effects to avoid significant bending of hangers and their attachments, unless high- or limited-deformability piping is used per ASCE 7, Section 13.6.8 or HVAC ducts have a cross-

sectional area of less than 6 square feet or weigh 17 pounds per foot or less.

- E. Anchor tall and narrow equipment such as motor control centers and telemetry equipment at base and within 12 inches from top of equipment, unless approved otherwise by Engineer.
- F. Do not attach architectural, mechanical, or electrical components to more than one element of a building structure at a single restraint location where such elements may respond differently during a seismic event. Do not make such attachments across building expansion and contraction joints.

3.02 INSTALLATION

- A. Do not install components or their anchorages or restraints prior to review and acceptance by Engineer and AHJ.
- B. Notify Engineer upon completion of installation of seismic restraints in accordance with Section 01 45 33, Special Inspection, Observation, and Testing.

3.03 FIELD QUALITY CONTROL

- A. In accordance with Section 05 50 00, Miscellaneous Metalwork, and Section 05 05 19, Post-Installed Anchors in Concrete.
- B. Owner-Furnished Quality Assurance, in accordance with IBC Chapter 17 requirements, is provided in Statement of Special Inspections Plan on Drawings. Contractor responsibilities and related information are included in Section 01 45 33, Special Inspection, Observation, and Testing.
- C. Provide any other specified, regulatory required, or required repair verification inspection and testing that is not listed in Statement of Special Inspections in accordance with Section 01 45 16.13, Contractor Quality Control.

END OF SECTION

SECTION 01 42 13
ABBREVIATIONS AND ACRONYMS

PART 1 GENERAL

1.01 REFERENCE TO STANDARDS AND SPECIFICATIONS OF TECHNICAL SOCIETIES

- A. Reference to standards and specifications of technical societies and reporting and resolving discrepancies associated therewith shall be as provided in Article 3 of the General Conditions, and as may otherwise be required herein and in the individual specification sections.
- B. Work specified by reference to published standard or specification of government agency, technical association, trade association, professional society or institute, testing agency, or other organization shall meet requirements or surpass minimum standards of quality for materials and workmanship established by designated standard or specification.
- C. Where so specified, products or workmanship shall also meet or exceed additional prescriptive or performance requirements included within Contract Documents to establish a higher or more stringent standard of quality than required by referenced standard.
- D. Where two or more standards are specified to establish quality, product and workmanship shall meet or exceed requirements of most stringent.
- E. Where both a standard and a brand name are specified for a product in Contract Documents, proprietary product named shall meet or exceed requirements of specified reference standard.
- F. Copies of standards and specifications of technical societies:
 - 1. Copies of applicable referenced standards have not been bound in these Contract Documents.
 - 2. Where copies of standards are needed by Contractor, obtain a copy or copies directly from publication source and maintain in an orderly manner at the Site as Work Site records, available to Contractor's personnel, Subcontractors, Owner, and Engineer.

1.02 ABBREVIATIONS

- A. Abbreviations for trade organizations and government agencies: Following is a list of construction industry organizations and government agencies to which references may be made in the Contract Documents, with abbreviations used.

1.	AA	Aluminum Association
2.	AABC	Associated Air Balance Council
3.	AAMA	American Architectural Manufacturers Association
4.	AASHTO	American Association of State Highway and Transportation Officials
5.	ABMA	American Bearing Manufacturers' Association
6.	ACI	American Concrete Institute
7.	AEIC	Association of Edison Illuminating Companies
8.	AGA	American Gas Association
9.	AGMA	American Gear Manufacturers' Association
10.	AI	Asphalt Institute
11.	AISC	American Institute of Steel Construction
12.	AISI	American Iron and Steel Institute
13.	AITC	American Institute of Timber Construction
14.	ALS	American Lumber Standards
15.	AMCA	Air Movement and Control Association
16.	ANSI	American National Standards Institute
17.	APA	APA-The Engineered Wood Association
18.	API	American Petroleum Institute
19.	APWA	American Public Works Association
20.	AHRI	Air-Conditioning, Heating, and Refrigeration Institute
21.	ASA	Acoustical Society of America
22.	ASABE	American Society of Agricultural and Biological Engineers
23.	ASCE	American Society of Civil Engineers
24.	ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
25.	ASME	American Society of Mechanical Engineers
26.	ASNT	American Society for Nondestructive Testing
27.	ASSE	American Society of Sanitary Engineering
28.	ASTM	ASTM International
29.	AWI	Architectural Woodwork Institute
30.	AWPA	American Wood Preservers' Association
31.	AWPI	American Wood Preservers' Institute
32.	AWS	American Welding Society

33.	AWWA	American Water Works Association
34.	BHMA	Builders Hardware Manufacturers' Association
35.	CBM	Certified Ballast Manufacturer
36.	CDA	Copper Development Association
37.	CGA	Compressed Gas Association
38.	CISPI	Cast Iron Soil Pipe Institute
39.	CMAA	Crane Manufacturers' Association of America
40.	CRSI	Concrete Reinforcing Steel Institute
41.	Cs	Commercial Standard
42.	CSA	Canadian Standards Association
43.	CSI	Construction Specifications Institute
44.	DIPRA	Ductile Iron Pipe Research Association
45.	EIA	Electronic Industries Alliance
46.	EJCDC	Engineers Joint Contract Documents' Committee
47.	ETL	Electrical Test Laboratories
48.	FAA	Federal Aviation Administration
49.	FCC	Federal Communications Commission
50.	FDA	Food and Drug Administration
51.	FEMA	Federal Emergency Management Agency
52.	FIPS	Federal Information Processing Standards
53.	FM	FM Global
54.	Fed. Spec.	Federal Specifications (FAA Specifications)
55.	FS	Federal Specifications and Standards (Technical Specifications)
56.	GA	Gypsum Association
57.	GANA	Glass Association of North America
58.	HI	Hydraulic Institute
59.	HMI	Hoist Manufacturers' Institute
60.	IBC	International Building Code
61.	ICBO	International Conference of Building Officials
62.	ICC	International Code Council
63.	ICEA	Insulated Cable Engineers' Association
64.	IFC	International Fire Code
65.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
66.	IESNA	Illuminating Engineering Society of North America
67.	IFI	Industrial Fasteners Institute
68.	IGMA	Insulating Glass Manufacturer's Alliance
69.	IMC	International Mechanical Code
71.	INDA	Association of the Nonwoven Fabrics Industry

72.	IPC	International Plumbing Code
73.	ISA	International Society of Automation
74.	ISO	International Organization for Standardization
75.	TTL	Independent Testing Laboratory
76.	JJC	Joint Industry Conferences of Hydraulic Manufacturers
77.	MIA	Marble Institute of America
78.	MIL	Military Specifications
79.	MMA	Monorail Manufacturers' Association
80.	MSS	Manufacturer's Standardization Society
81.	NAAMM	National Association of Architectural Metal Manufacturers
82.	NACE	NACE International
83.	NBGQA	National Building Granite Quarries Association
84.	NEBB	National Environmental Balancing Bureau
85.	NEC	National Electrical Code
86.	NECA	National Electrical Contractor's Association
87.	NEMA	National Electrical Manufacturers' Association
88.	NESC	National Electrical Safety Code
89.	NETA	InterNational Electrical Testing Association
90.	NFPA	National Fire Protection Association
91.	NHLA	National Hardwood Lumber Association
92.	NICET	National Institute for Certification in Engineering Technologies
93.	NIST	National Institute of Standards and Technology
94.	NRCA	National Roofing Contractors Association
95.	NRTL	Nationally Recognized Testing Laboratories
96.	NSF	NSF International
97.	NSPE	National Society of Professional Engineers
98.	NTMA	National Terrazzo and Mosaic Association
99.	NWWDA	National Wood Window and Door Association
100.	OSHA	Occupational Safety and Health Act (both Federal and State)
101.	PCI	Precast/Prestressed Concrete Institute
102.	PEI	Porcelain Enamel Institute
103.	PPI	Plastic Pipe Institute
104.	PS	Product Standards Section-U.S. Department of Commerce
105.	RMA	Rubber Manufacturers' Association
106.	RUS	Rural Utilities Service
107.	SAE	SAE International
108.	SDI	Steel Door Institute
109.	SJI	Steel Joist Institute

- 110. SMACNA Sheet Metal and Air Conditioning Contractors
National Association
- 111. SPI Society of the Plastics Industry
- 112. SSPC The Society for Protective Coatings
- 113. STI/SPFA Steel Tank Institute/Steel Plate Fabricators
Association
- 114. SWI Steel Window Institute
- 115. TEMA Tubular Exchanger Manufacturers' Association
- 116. TCA Tile Council of North America
- 117. TIA Telecommunications Industry Association
- 118. UBC Uniform Building Code
- 119. UFC Uniform Fire Code
- 120. UL Underwriters Laboratories
- 121. UMC Uniform Mechanical Code
- 122. USBR U.S. Bureau of Reclamation
- 123. WCLIB West Coast Lumber Inspection Bureau
- 124. WI Wood Institute
- 125. WWPA Western Wood Products Association

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 45 16.13
CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. ASTM International (ASTM):
 - a. D3740, Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
 - b. E329, Use in the Evaluation of Testing and Inspection Agencies as Used in Construction.

1.02 DEFINITIONS

- A. Contractor Quality Control (CQC): The means by which Contractor ensures that the construction, to include that performed by subcontractors and suppliers, complies with the requirements of the Contract.

1.03 SUBMITTALS

- A. Informational Submittals:
 - 1. CQC Plan: Submit, not later than 30 days after receipt of Notice to Proceed.
 - 1. CQC Report: Submit, weekly, an original and one copy in report form.

1.04 OWNER'S QUALITY ASSURANCE

- A. All Work is subject to Owner's quality assurance inspection and testing at all locations and at all reasonable times before acceptance to ensure strict compliance with the terms of the Contract Documents.
- B. Owner's quality assurance inspections and tests are for the sole benefit of Owner and do not:
 - 1. Relieve Contractor of responsibility for providing adequate quality control measures.
 - 2. Relieve Contractor of responsibility for damage to or loss of the material before acceptance.
 - 3. Constitute or imply acceptance.
 - 4. Affect the continuing rights of Owner after acceptance of the completed Work.
- C. The presence or absence of a quality assurance inspector does not relieve Contractor from any Contract requirement.
- D. Promptly furnish all facilities, labor, and material reasonably needed for performing such safe and convenient inspections and tests as may be required by Engineer.

- E. Owner may charge Contractor for any additional cost of inspection or test when Work is not ready at the time specified by Contractor for inspection or test, or when prior rejection makes re-inspection or retest necessary. Quality assurance inspections and tests will be performed in a manner that will not unnecessarily delay the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Maintain an adequate inspection system and perform such inspections as will ensure that the Work conforms to the Contract Documents.
- B. Maintain complete inspection records and make them available at all times to Owner and Engineer.
- C. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product that complies with the Contract Documents. The system shall cover all construction and demolition operations, both onsite and offsite, including Work by subcontractors, fabricators, suppliers and purchasing agents, and shall be keyed to the proposed construction sequence.

3.02 COORDINATION MEETING

- A. After the Preconstruction Conference, but before start of construction, and prior to acceptance of the CQC Plan, schedule a meeting with Engineer and Owner to discuss the quality control system to be used by the Contractor.
- B. Develop a mutual understanding of the system details, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite Work, and the interrelationship of Contractor's management and control with the Owner's Quality Assurance.
- C. There may be occasions when subsequent conferences may be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures that may require corrective action by Contractor.

3.03 CONTRACTOR QUALITY CONTROL PLAN

- A. General:
 - 1. Plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used.
 - 2. An interim plan for the first 30 days of operation will be considered.
 - 3. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of Work to be started.

4. Work outside of the features of Work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of Work to be started.

B. Content:

1. Plan shall cover the intended CQC organization for the entire Contract and shall include the following, as a minimum:
 - a. Organization: Description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three-phase control system (see Paragraph QC Phasing) for all aspects of the Work specified.
 - b. CQC Staff: The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a QC function.
 - c. Letters of Authority: A copy of a letter to the CQC System Manager signed by an authorized official of the firm, describing the responsibilities and delegating sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop Work which is not in compliance with the Contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters will also be furnished to Owner.
 - d. Submittals: Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers and purchasing agents.
 - e. Testing: Control, verification and acceptance testing procedures for each specific test to include the test name, frequency, specification paragraph containing the test requirements, the personnel and laboratory responsible for each type of test, and an estimate of the number of tests required.
 - f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests, including documentation.
 - g. Procedures for tracking deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.
 - h. Reporting procedures, including proposed reporting formats; include a copy of the CQC report form.
- C. Acceptance of Plans: Acceptance of the Contractor's basic and addendum CQC plans is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. Owner reserves the right to require Contractor to make changes in the CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Notification of Changes: After acceptance of the CQC plan, Contractor shall notify Engineer, in writing, a minimum of 7 calendar days prior to any proposed change. Proposed changes are subject to acceptance by Engineer.

3.04 CONTRACTOR QUALITY CONTROL REPORT

- A. As a minimum, prepare a CQC report for every 7 calendar days. Account for all days throughout the life of the Contract. Reports shall be signed and dated by CQC System Manager. Include copies of test reports and copies of reports prepared by QC staff.
- B. Maintain current records of quality control operations, activities, and tests performed, including the Work of subcontractors and suppliers.
- C. Records shall be on an acceptable form and shall be a complete description of inspections, the results of inspections, daily activities, tests, and other items, including but not limited to the following:
 - 1. Contractor/subcontractor and their areas of responsibility.
 - 2. Operating plant/equipment with hours worked, idle, or down for repair.
 - 3. Work performed today, giving location, description, and by whom. When a network schedule is used, identify each phase of Work performed each day by activity number.
 - 4. Test and/or control activities performed with results and references to specifications/plan requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
 - 5. Material received with statement as to its acceptability and storage.
 - 6. Identify submittals reviewed, with Contract reference, by whom, and action taken.
 - 7. Offsite surveillance activities, including actions taken.
 - 8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
 - 9. List instructions given/received and conflicts in Drawings and/or Specifications.
 - 10. Contractor's verification statement.
 - 11. Indicate a description of trades working on the Project; the number of personnel working; weather conditions encountered; and any delays encountered.
 - 12. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in file work and workmanship comply with the Contract.

3.05 SUBMITTAL QUALITY CONTROL

- A. Submittals shall be as specified in Section 01 33 00, Submittal Procedures. The CQC organization shall be responsible for certifying that all submittals are in compliance with the Contract requirements. Owner will furnish copies of test report forms upon request by Contractor. Contractor may use other forms as approved.

3.06 TESTING QUALITY CONTROL

- A. Testing Procedure:
 - 1. Perform tests specified or required to verify that control measures are adequate to provide a product which conforms to Contract requirements. Perform the

following activities and record the following data:

- a. Verify testing procedures comply with contract requirements.
- b. Verify facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Documentation:
 - 1) Record results of all tests taken, both passing and failing, on the CQC report for the date taken.
 - 2) Include specification paragraph reference, location where tests were taken, and the sequential control number identifying the test.
 - 3) Actual test reports may be submitted later, if approved by Engineer, with a reference to the test number and date taken.
 - 4) Provide directly to Engineer an information copy of tests performed by an offsite or commercial test facility. Test results shall be signed by an engineer registered in the state where the tests are performed.
 - 5) Failure to submit timely test reports, as stated, may result in nonpayment for related Work performed and disapproval of the test facility for this Contract.

- B. Testing Laboratories: Laboratory facilities, including personnel and equipment, utilized for testing soils, concrete, asphalt and steel shall meet criteria detailed in ASTM D3740 and ASTM E329, and be accredited by the American Association of Laboratory Accreditation (AALA), National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO), or other approved national accreditation authority. Personnel performing concrete testing shall be certified by the American Concrete Institute (ACI).

3.07 COMPLETION INSPECTION

- A. CQC System Manager shall conduct an inspection of the Work at the completion of all Work or any milestone established by a completion time stated in the Contract.
- B. Punchlist:
1. CQC System Manager shall develop a punchlist of items which do not conform to the Contract requirements.
 2. Include punchlist in the CQC report, indicating the estimated date by which the deficiencies will be corrected.
 3. CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Owner.
 4. These inspections and any deficiency corrections required will be accomplished within the time stated for completion of the entire Work or any particular increment thereof if the Project is divided into increments by separate completion dates.

END OF SECTION

SECTION 01 45 33
SPECIAL INSPECTION, OBSERVATION, AND TESTING

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers requirements for Special Inspection, Observation, and Testing required in accordance with Chapter 17 of the 2021 International Building Code and is in addition to and supplements requirements included in Statement of Special Inspections (Plan) shown on Drawings.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Society of Civil Engineers (ASCE): 7-10 Minimum Design Loads for Buildings and Other Structures.
 2. International Code Council (ICC):
 - a. 2021 International Building Code (IBC).
 - b. Evaluation Service (ICC-ES) Reports and Legacy Reports.

1.03 DEFINITIONS

- A. Agencies and Personnel:
1. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved.
 2. Registered Design Professional in Responsible Charge: An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the Project is to be constructed.
 3. Special Inspector: Qualified person employed by Owner who will demonstrate competence to the satisfaction of the building official for inspection of a particular type of construction or operation requiring Special Inspection.
- B. Special Inspection :
1. Special Inspection: Inspection required of materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved Contract Documents and referenced standards.
 2. Special Inspection, Continuous: Full-time observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work is being performed.
 3. Special Inspection, Periodic: Part-time or intermittent observation of work requiring Special Inspection by an approved Special Inspector who is present in the area where the Work has been or is being performed, and at the completion of the Work.

C. Structural Systems and Components:

1. Diaphragm: Component of structural lateral load resisting system consisting of roof, floor, or other membrane or bracing system acting to transfer lateral forces to vertical resisting elements of structure.
2. Drag Strut or Collector: Component of structural lateral load resisting system consisting of a diaphragm or shear wall element that collects and transfers diaphragm shear forces to vertical force-resisting elements or distributes forces within diaphragm or shear wall.
3. Seismic-Force-Resisting System: That part of structural lateral load resisting system that has been considered in the design to provide required resistance to seismic forces identified on Drawings.
4. Shear Wall: Component of structural lateral load resisting system consisting of a wall designed to resist lateral forces parallel to the plane of the wall. Unless noted otherwise on Drawings, load-bearing walls with direct in-plane connections to roof and floors shall be considered to be shear walls.
5. Wind Force Resisting System: That part of the structural system that has been considered in the design to provide required resistance to wind forces identified on Drawings.

D. Nonstructural Components :

1. Architectural Component Supports: Structural members or assemblies of members which transmit loads and forces from architectural systems or components to the structure, including braces, frames, struts, and attachments.
2. Electrical Component Supports: Structural members or assemblies which transmit loads and forces from electrical equipment to the structure , including braces, frames, legs, pedestals, and tethers, as well as elements forged or cast as part of component for anchorage.
3. Mechanical Component Supports: Structural members or assemblies which transmit loads and forces from mechanical equipment to the structure, including braces, frames, skirts, legs, saddles, pedestals, snubbers, and tethers, as well as elements forged or cast as part of component for anchorage.

E. Professional Observation:

1. Does not include or waive responsibility for required Special Inspection or inspections by building official.
2. Requirements are indicated on Statement of Special Inspections (Plan) provided on Drawings.
3. Geotechnical Observation: Visual observation of selected subgrade bearing surfaces by a registered design professional for general conformance to Contract Documents.
4. Structural Observation: Visual observation of structural system(s) by a registered design professional for general conformance to Contract Documents.
5. Statement of Special Inspections (Plan): Detailed written procedure contained on Drawings establishing systems and components subject to Special Inspection Observation, and Testing during construction, type and frequency of testing,

extent and duration of Special Inspection, and reports to be completed and distributed by Special Inspector.

1.04 SUBMITTALS

A. Informational Submittals:

1. Contractor's Statement of Responsibility: Form shall be completed by each contractor responsible for construction of main seismic-force-resisting system, and seismic-resisting component listed in Statement of Special Inspections (Plan). Refer to Article Supplement located at end of section.

1.05 STATEMENT OF SPECIAL INSPECTIONS (PLAN) REQUIREMENTS

A. Designated Systems for Inspection:

1. Seismic-force-resisting systems designated under IBC Section 1705 and subject to Special Inspection under Section 1707: See Drawings for basic lateral load resisting systems for each structure and other designated seismic systems.
2. Wind-force-resisting systems designated under IBC Section 1705: Roof cladding.
3. Architectural, Mechanical, and Electrical Components subject to Special Inspection and testing under IBC Section 1705 for Seismic Resistance as listed in Table below:

Architectural, Mechanical, and Electrical Components designated under IBC Section 1705		
Mechanical and Electrical Components Require Certification of Compliance for Seismic Testing or Analysis under IBC Section 1705.13.3		
Facility	Component	Component Importance Factor, IP
<i>N/A</i>	<i>N/A</i>	<i>N/A</i>

B. Statement of Special Inspections (Plan):

1. As included in Drawings and in support of the building permit application, the Project specific plan was prepared by the registered design professional in responsible charge. The following identifies elements of the inspection, observation, and testing program to be followed in construction of the Work:
 - a. Designated seismic systems and main seismic force resisting systems and components that are subject to Special Inspection and Structural Observation for lateral load resistance.
 - b. Special Inspection and testing required by IBC Section 1704 and Section 1708, and other applicable sections and referenced standards therein.
 - c. Type and frequency of Special Inspection required.
 - d. Type and frequency of testing required.
 - e. Required frequency and distribution of testing and Special Inspection

- reports to be distributed by Special Inspector to Engineer, Contractor, building official, and Owner.
- f. Geotechnical Observation to be Performed: Required frequency and distribution of Geotechnical Observation reports by registered design professional to Contractor, building official, and Owner.
 - g. Structural Observations to be Performed: Required frequency and distribution of Structural Observation reports by registered design professional to Contractor, building official, and Owner.
- C. Special Inspection and associated testing of shop fabrication and field construction will be performed by an approved accredited independent agency. Owner will secure and pay for the services of the agency to perform Special Inspection and associated testing.
- D. Owner's plan for code required Special Inspection with associated testing and Professional Observation, as provided in Statement of Special Inspections (Plan) on Drawings and further provided in this section, is for the sole benefit of Owner and does not:
- 1. Relieve Contractor of responsibility for providing adequate quality control measures.
 - 2. Relieve Contractor of responsibility for damage to or loss of material before acceptance.
 - 3. Constitute or imply acceptance.
 - 4. Affect continuing rights of Owner after acceptance of completed Work.
- E. The presence or absence of code required Special Inspector and Professional Observer does not relieve Contractor from Contract requirements.
- F. Contractor is responsible for additional costs associated with Special Inspection and Testing and Observation when Work is not ready at time identified by Contractor, and Special Inspectors and Professional Observer are on Site but not able to provide contracted services.
- G. Contractor is responsible for associated costs for additional Special Inspection and Testing and Professional Observation by Special Inspectors and Professional Observers required due to rejection of materials of in place Work that cannot be made compliant to Contract Document without additional Site visits or testing.

PART 2 PRODUCTS(NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Provide access to shop or Site for Special Inspection and Testing and Professional Observation.
- B. Notify Engineer in advance of required Special Inspection and Professional Observation no later than 2 business days prior to date of Special Inspection and

Professional Observation.

- C. When required by Registered Design Professional, provide access for mechanical and electrical component inspections for those items requiring certification.
- D. Materials and systems, inclusive, shall be inspected during placement where Continuous Special Inspection is required.
- E. Materials and systems shall be inspected during or at completion of their placement where Periodic Special Inspection is allowed.
 - 1. Periodic Special Inspection shall be performed so that Work inspected after, but not during, its placement can be corrected prior to other related Work proceeding and covering inspected Work.
 - 2. Periodic Special Inspection does not allow sampling of a portion of the Work. All Work shall be inspected.

3.02 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is a part of this Specification:
 - 1. Contractor's Statement of Responsibility.

END OF SECTION

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

(Project)

(Name of Contracting Company)

(Business Address)

()

(Telephone)

()

(Fax)

I, (We) hereby certify that I am (we are) aware of the Special Inspection and Testing, Professional Observation requirements contained in Contract Documents for this Project for components including architectural, mechanical, and electrical components, as listed Statement of Special Inspections (Plan) on Drawings, and that:

1. I, (We) are responsible for implementation of the Statement of Special Inspections (Plan) for the construction of the following systems:

Facility	Lateral Force-Resisting System
Well House Buildings	Special Reinforced Masonry Shear Walls

2. Control of this Work will be exercised to obtain conformance with the Contract Documents approved by the building official.
3. Procedures to be used for exercising control of the Work, the method and frequency of reporting, and distribution of reports required under the Statement of Special Inspections (Plan) for this Project are attached.
4. I, (We) will provide 48-hour notification to Engineer and approved agency as required for structural tests and Special Inspection for this Project.
5. The following person is hereby identified as exercising control over the requirements of this section for the Work designated above:

Name: _____

Qualifications: _____

(Print name and official title of person signing this form)

Signed by: _____

Date: _____

Project Name: _____

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. American Nursery and Landscape Association (ANLA): American Standards for Nursery Stock.
 2. Federal Emergency Management Agency (FEMA).
 3. National Fire Prevention Association (NFPA): 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.
 4. Telecommunications Industry Association (TIA): 568-C, Commercial Building Telecommunications Cabling Standard.
 5. U.S. Department of Agriculture (USDA): Urban Hydrology for Small Watersheds.
 6. U.S. Weather Bureau: Rainfall-Frequency Atlas of the U.S. for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years.

1.02 SUBMITTALS

- A. Informational Submittals:
1. Copies of permits and approvals for construction as required by Laws and Regulations and governing agencies.
 2. Temporary Utility Submittals: Water supply and distribution plans.
 3. Temporary Construction Submittals:
 - a. Parking area plans.
 - b. Contractor's field office, storage yard, and storage building plans including gravel surfaced area.
 - c. Fencing and protective barrier locations and details.
 - d. Engineer's field office plans.
 - e. Staging area location plan.
 - f. Traffic and Pedestrian Control and Routing Plans: As specified herein, and proposed revisions thereto.
 - g. Plan for maintaining operations of existing plant.

1.03 MOBILIZATION

- A. Mobilization shall include, but not be limited to, these principal items:
1. Obtaining required permits.
 2. Moving Contractor's field office and equipment required for first month operations onto Site.
 3. Installing temporary construction power, wiring, and lighting facilities.
 4. Providing onsite communication facilities, including telephones as required.
 5. Providing onsite sanitary facilities and potable water facilities as specified and

- as required by Laws and Regulations, and governing agencies.
- 6. Arranging for and erection of Contractor's work and storage yard.
- 7. Posting OSHA required notices and establishing safety programs and procedures.
- 8. Having Contractor's superintendent at Site full time.

- B. Use area designated for Contractor's temporary facilities as shown on Drawings for use by Contractor for duration of Project.

1.04 PROTECTION OF WORK AND PROPERTY

- A. Comply with Owner's safety rules while on Owner's property.
- B. Keep Owner informed of serious onsite accidents and related claims.
- C. Use of Explosives: No blasting or use of explosives will be allowed onsite.

1.05 VEHICULAR TRAFFIC

- A. Traffic Control Plan: Adhere to the traffic control plan presented by the Contract Documents and finalized/prepared by the Contractor and then reviewed and accepted by Engineer. Changes to this plan shall be made only by written approval of Engineer. Secure approvals for necessary changes so as not to delay progress of the Work.
- B. Traffic Routing Plan: Show sequences of construction affecting use of roadways, time required for each phase of the Work, provisions for decking over excavations and phasing of operations to provide necessary access, and plans for signing, barricading, and striping to provide passages for pedestrians and vehicles.

PART 2 PRODUCTS

2.01 PROJECT REPRESENTATIVE'S FIELD OFFICE – Not Applicable

2.02 PROJECT SIGNS – Not Applicable

PART3 EXECUTION

3.01 PROJECT REPRESENTATIVE'S FIELD OFFICE – Not Applicable

3.02 TEMPORARY UTILITIES

- A. Power:
 - 1. Make arrangements to obtain and pay for electrical power used until final payment and acceptance of the project by Owner, unless otherwise recommended by Engineer at Substantial Completion.
 - 2. Determine type and amount available and make arrangements for obtaining temporary electric power service, metering equipment, and pay costs for

electric power used during Contract period, except for portions of the Work designated in writing by Engineer as substantially complete.

3. Cost of electric power will be borne by Contractor for the construction purposes and site trailers.

B. Lighting: Provide temporary lighting to meet applicable safety requirements to allow erection, application, or installation of materials and equipment, and observation or inspection of the Work.

C. Heating, Cooling, and Ventilating: Utilize existing building systems.

- 1) Provide as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for installation of materials, and to protect materials, equipment, and finishes from damage because of temperature or humidity. Costs for temporary heat shall be borne by Contractor responsible for completing work.
- 2) Provide adequate forced air ventilation of enclosed areas to cure installed materials, to dispense humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.
- 3) Pay costs of installation, maintenance, operation, removal, and fuel consumed.
- 4) Provide portable unit heaters, complete with controls, oil- or gas- fired, and suitably vented to outside as required for protection of health and property.

D. Water:

- 1) Hydrant Water:
 - a. Contractor to comply with City of Vancouver "Temporary Access to Water from Hydrants Policy."
 - b. Use only special hydrant-operating wrenches to open hydrants. Make certain hydrant valve is open full, since cracking valve causes damage to hydrant. Repair damaged hydrants and notify appropriate agency as quickly as possible. Hydrants shall be completely accessible to fire department at all times.
 - c. If needed, include costs to connect and transport water to construction areas in Contract Price.
 - d. No new hydrants will be installed.
- 2) Furnish and install temporary piping and facilities to transport water to the Work.
- 3) Contractor shall bear costs of necessary water for Project use.
- 4) Provide means to prevent water used for testing from flowing back into source pipeline.

E. Sanitary and Personnel Facilities: Provide and maintain facilities within fenced areas for Contractor's employees, Subcontractors, and other onsite employers' employees. Service, clean, and maintain facilities and enclosures.

F. Fire Protection: Furnish and maintain on Site adequate firefighting equipment capable of extinguishing incipient fires. Comply with applicable parts of NFPA 241.

3.03 PROTECTION OF WORK AND PROPERTY

A. General

1. No residence or business shall be cut off from vehicular traffic for a period exceeding 1 / 2 hour, unless special arrangements have been made with both the Owner and effected property owner.
2. Maintain in continuous service existing oil and gas pipelines, underground power, telephone or communication cable, water mains, irrigation lines, sewers, poles and overhead power, and other utilities encountered along line of the Work, unless other arrangements satisfactory to owners of said utilities have been made.
3. Where completion of the Work requires temporary or permanent removal or relocation of existing utility, coordinate activities with owner of said utility and perform work to their satisfaction.
4. Protect, shore, brace, support, and maintain underground pipes, conduits, drains, and other underground utility construction uncovered or otherwise affected by construction operations.
5. Keep fire hydrants and water control valves free from obstruction and available for use at all times.
6. In areas where Contractor's operations are adjacent to or near a utility, such as gas, telephone, television; electric power, water, sewer, or irrigation system, and such operations may cause damage or inconvenience, suspend operations until arrangements necessary for protection have been made by Contractor.
7. Notify property owners and utility offices that may be affected by construction operation at least 2 days in advance. Before exposing a utility, obtain utility owner's permission. Should service of utility be interrupted due to Contractor's operation, notify proper authority immediately. Cooperate with said authority in restoring service as promptly as possible and bear costs incurred.
8. Do not impair operation of existing sewer system. Prevent construction material, pavement, concrete, earth, volatile and corrosive wastes, and other debris from entering sewers, pump stations, or other sewer structures.
9. Maintain original Site drainage wherever possible.

B. Site Security:

- 1) Upon commencing construction work, the Contractor assumes responsibility for site security of the operating facilities and construction site. Contractor will be responsible to maintain control of the site, preventing the public from entering the fenced areas and buildings. Contractor shall erect a temporary security fence to protect public from construction activities (including trenching for pipelines and ductbanks) and existing facilities. Maintain fence throughout construction period. Obtain Engineer's written permission before removal of temporary security fencing.
- 2) Provide and maintain additional temporary security fences as necessary to protect the Work and Contractor-furnished products not yet installed.

C. Barricades and Lights:

- 1) Provide as required in sufficient quantity to safeguard public and the Work.
- 2) Provide as necessary to prevent unauthorized entry to construction areas and affected roads, inside and outside of fenced area, and as required to ensure public safety and the safety of Contractor's employees, other employer's employees, and others who may be affected by the Work.
- 3) Protect existing facilities and adjacent properties from potential damage.
- 4) Locate work areas to enable access by facility operators.
- 5) Protect streets, roads, highways, and other public thoroughfares that are closed to traffic by effective barricades with acceptable warning signs.
- 6) Locate barricades at the nearest intersecting public thoroughfare on each side of blocked section.
- 7) Illuminate barricades and obstructions with warning lights from sunset to sunrise.
- 8) Provide at obstructions, such as material piles and equipment.
- 9) Use to alert general public of construction hazards, which would include surface irregularities, unramped walkways, grade changes, and trenches or excavations in roadways and in other public access areas.

D. Trees and Plantings :

1. Protect from damage and preserve trees, shrubs, and other plants outside limits of the Work and within limits of the Work, which are designated on Drawings to remain undisturbed.
 - a. Where practical, tunnel beneath trees when on or near line of trench.
 - b. Employ hand excavation as necessary to prevent tree injury.
 - c. Do not stockpile materials or permit traffic within drip lines of trees.
 - d. Provide and maintain temporary barricades around trees.
 - e. Water vegetation as necessary to maintain health.
 - f. Cover temporarily exposed roots with wet burlap, and keep burlap moist until soil is replaced around roots.
 - g. No trees, except those specifically shown on Drawings to be removed, shall be removed without written approval of Engineer.
 - h. Dispose of removed trees in a legal manner off the Site.
2. Balling and burlapping of trees indicated for replacement shall conform to recommended specifications set forth in the American Standards for Nursery Stock, published by American Nursery and Landscape Association. Balls shall be firm and intact and made-balls will not be accepted. Handle ball and burlap trees by ball and not by top.
3. In event of damage to bark, trunks, limbs, or roots of plants that are not designated for removal, treat damage by corrective pruning, bark tracing, application of a heavy coating of tree paint, and other accepted horticultural and tree surgery practices.
4. Replace each plant that dies as a result of construction activities.

E. Existing Structures: Replace items removed in their original location and a condition equal to or better than original.

- F. Waterways: Keep ditches, culverts, and natural drainages continuously free of construction materials and debris.
- G. Dewatering: Construct, maintain, and operate cofferdams, channels, flume drains, sumps, pumps, or other temporary diversion and protection works. Furnish materials required, install, maintain, and operate necessary pumping and other equipment for the environmentally safe removal and disposal of water from the various parts of the Work. Maintain foundations and parts of the Work free from water.

3.04 TEMPORARY CONTROLS

A. Air Pollution Control:

- 1) Minimize air pollution from construction operations.
- 2) Burning of waste materials, rubbish, or other debris will not be permitted on or adjacent to Site.
- 3) Conduct operations of dumping and removing rock to minimize dust production. Give unpaved streets, roads, detours, or haul roads used in construction area a dust-preventive treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
- 4) Provide and maintain temporary dust-tight partitions, bulkheads, or other protective devices during construction to permit normal operation of existing facilities. Construct partitions of plywood, insulating board, plastic sheets, or similar material. Construct partitions in such a manner that dust and dirt from demolition and cutting will not enter other parts of existing building or facilities. Remove temporary partitions as soon as need no longer exists.

B. Noise Control:

- 1) Provide acoustical barriers so noise emanating from tools or equipment will not exceed legal noise levels.
- 2) Noise Control Ordinance: Contractor shall meet the requirements of the City of Vancouver Municipal Code (VMC).
- 3) Noise Control Plan: Propose plan to mitigate construction noise and to comply with noise control ordinances, including method of construction, equipment to be used, and acoustical treatments.

C. Water Pollution Control:

- 1) Divert sanitary sewage and nonstorm waste flow interfering with construction and requiring diversion to sanitary sewers. Do not cause or permit action to occur which would cause an overflow to existing waterway.
- 2) Prior to commencing excavation and construction, obtain Engineer's agreement with detailed plans showing procedures intended to handle and dispose of sewage, groundwater, and dewatering pump discharges.
- 3) Comply with Section 01 57 13, Temporary Erosion and Sediment Control, for stormwater flow and surface runoff.

- 4) Do not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is prohibited. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

- D. Erosion, Sediment, and Flood Control: Provide, maintain, and operate temporary facilities as specified in Section 01 57 13, Temporary Erosion and Sediment Control, to control erosion and sediment releases, and to protect the Work and existing facilities from flooding during construction period.

3.05 STORAGE YARDS AND BUILDINGS

- A. Temporary Storage and Staging Yards: Construct temporary storage yards for storage of products that are not subject to damage by weather conditions. Provide security fencing as necessary.
- B. Temporary Storage Buildings:
 - 1) Provide environmental control systems that meet recommendations of manufacturers of equipment and materials stored.
 - 2) Arrange or partition to provide security of contents and ready access for inspection and inventory.
 - 3) Store combustible materials (paints, solvents, fuels) in a well-ventilated and remote building meeting safety standards.
 - 4) No buildings shall be placed along fencing adjacent to neighboring homes.

3.06 ACCESS ROADS

- A. Construct access roads as shown and within easements, rights-of-way, or Project limits.
- B. Maintain drainage ways. Install and maintain culverts to allow water to flow beneath access roads. Provide corrosion-resistant culvert pipe of adequate strength to resist construction loads.
- C. Provide gravel, crushed rock, or other stabilization material to permit access by all motor vehicles at all times.
- D. Maintain road grade and crown to eliminate potholes, rutting, and other irregularities that restrict access.
- E. Where access road crosses existing fences, install and maintain gates.
- F. Upon completion of construction, restore ground surface disturbed by access road construction to original grade.

3.07 PARKING AREAS

- A. Control Contractor's workforce vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or

construction operations.

3.08 VEHICULAR TRAFFIC

- A. Comply with Laws and Regulations regarding closing or restricting use of public streets or highways. No public or private road shall be closed, except by written permission of proper authority. Ensure the least possible obstruction to traffic and normal commercial pursuits.
- B. Conduct the Work to interfere as little as possible with public travel, whether vehicular or pedestrian.
- C. Whenever it is necessary to cross, close, or obstruct roads, driveways, and walks, whether public or private, provide and maintain suitable and safe bridges, detours, or other temporary expedients for accommodation of public and private travel.
- D. Road Closures: Maintain satisfactory means of exit for persons residing or having occasion to transact business along route of the Work. If it is necessary to close off roadway or alley providing sole vehicular access to property for periods greater than 2 hours, provide written notice to each owner so affected 3 days prior to such closure. In such cases, closings of up to 4 hours may be allowed. Closures of up to 10 hours may be allowed if a week's written notice is given and undue hardship does not result.
- E. Maintenance of traffic is not required if Contractor obtains written permission from Owner and tenant of private property, or from authority having jurisdiction over public property involved, to obstruct traffic at designated point.
- F. In making street or driveway crossings, do not block more than one-half the street/driveway at a time. Whenever possible, widen shoulder on opposite side to facilitate traffic flow or provide detour directions. Provide temporary surfacing on shoulders as necessary.
- G. Maintain top of backfilled trenches before they are paved, to allow normal vehicular traffic to pass over. Provide temporary access driveways where required. Cleanup operations shall follow immediately behind backfilling.
- H. When flaggers and guards are required by regulation or when deemed necessary for safety, furnish them with approved orange wearing apparel and other regulation traffic control devices.
- I. Provide snow removal to facilitate normal vehicular traffic on public or private roads affected by construction. Perform snow removal promptly and efficiently by means of suitable equipment whenever necessary for safety, and as may be directed by proper authority.
- J. Notify fire department and police department before closing street or portion thereof. Notify said departments when streets are again passable for emergency vehicles. Do not block off emergency vehicle access to consecutive arterial

crossings or dead-end streets, in excess of 300 linear feet, without written permission from fire department. Conduct operations with the least interference to fire equipment access, and at no time prevent such access. Furnish Contractor's night emergency telephone numbers to police department.

K. Temporary Bridges:

1. Construct temporary bridges at points where maintenance of traffic across pipeline or ductbank construction is necessary.
2. Bridges erected over private roads and driveways shall be adequate for service to which they will be subjected.
3. Maintain bridges in place as long as conditions of the Work require their use for safety of public, except that when necessary for proper prosecution of the Work in immediate vicinity of bridge. Bridge may be relocated or temporarily removed for such period as Engineer may permit.

L. Contractor is responsible to develop traffic control plans and obtain Owner approval as necessary for the Project.

3.09 CLEANING DURING CONSTRUCTION

- A. In accordance with General Conditions, as may be specified in other specification sections, and as required herein.
- B. Wet down exterior surfaces prior to sweeping to prevent blowing of dust and debris. At least weekly, sweep floors (basins, tunnels, platforms, walkways, roof surfaces), and pick up and dispose of debris.
- C. Provide approved containers for collection and disposal of waste materials, debris, and rubbish. At least weekly, dispose of such waste materials, debris, and rubbish offsite.

END OF SECTION

SECTION 01 57 13
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. This section covers Work to implement structural and nonstructural Best Management Practices (BMP) to control soil erosion by wind or water and keep eroded sediments and other construction-generated pollutants from moving off project sites. Requirements described in this specification and shown on Drawings are part of the project Temporary Erosion and Sediment Control Plan (TESC Plan) and are the minimum for all project construction sites and conditions. This specification covers all project activities, including material sources, disposal sites, and offsite mitigation areas unless specific project activities are excluded elsewhere in this specification or in other Contract Documents controlling the Work.
- B. Temporary erosion and sedimentation control is covered by this section.
- C. Other Regulations: A local government erosion and sediment control permit may apply and some local agency requirements may be more stringent than this specification. Adequate erosion and sediment control is essential for complying with the federal Endangered Species Act where construction runoff enters waters inhabited by protected species.

1.02 REFERENCES

- A. Activities shall conform to the 2005 Western Washington Stormwater Management Manual, the Standard Specifications, the City of Vancouver Permit, and Drawings. In the event of a conflict, the more stringent requirement shall apply.
- B. The following is a list of standards that may be referenced in this section:
 - 1. American Association of State Highway and Transportation Officials (AASHTO): M252, Standard Specification for Corrugated Polyethylene Drainage Pipe.
 - 2. ASTM International (ASTM):
 - a. D638, Standard Test Method for Tensile Properties of Plastics.
 - b. D2974, Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.
 - c. D3776/D3776M, Standard Test Methods for Mass Per Unit Area (Weight) of Fabric.
 - d. D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 - e. D4397, Standard Specification for Polyethylene Sheeting for

- Construction, Industrial, and Agricultural Applications.
- f. D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- g. D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- h. D4632/D4632M, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- i. D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile
- j. D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50- mm Probe.
- k. D6459, Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Hillslopes from Rainfall-Induced Erosion.
- l. D6460, Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Performance in Protecting Earthen Channels from Stormwater-Induced Erosion.
- m. D6475, Standard Test Method for Measuring Mass Per Unit Area of Erosion Control Blankets.
- n. D7322, Standard Test Method for Determination of Rolled Erosion Control Product (RECP) Ability to Encourage Seed Germination and Plant Growth Under Bench-Scale Conditions.
- o. D7367, Standard Test Method for Determining Water Holding Capacity of Fiber Mulches for Hydraulic Planting.
- 3. North American Weed Management Association (NAWMA).
- 4. Rainfall Data: Washington Department of Transportation Hydraulics Manual, M23-03.03, 2010.
- 5. U.S. Department of Agriculture, Natural Resources Conservation Service: *Urban Hydrology for Small Watersheds*; 1986. Technical Release 55.
- 6. U.S. Environmental Protection Agency:
 - a. Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, 2007. EPA-833-R-06-004.
 - b. National Menu of BMPs, 2012.

1.03 SYSTEM DESCRIPTION

A. Erosion and Sediment Control:

1. Provide, maintain, and operate temporary facilities to control erosion and sediment releases during construction period.
2. Design erosion and sediment controls to handle peak runoff resulting from the 25-year, 24-hour storm event based on the Washington Department of Transportation, Hydraulics Manual.
3. Size temporary stormwater conveyances based on procedures presented in the Washington Department of Transportation, Hydraulics Manual.

B. Erosion and Sediment Control (ESC) Lead:

1. Identify the ESC Lead at the preconstruction conference and in the TESC Plan. The ESC Lead shall have certification in construction site erosion and sediment control from a course approved by Owner.
2. The ESC Lead shall implement the TESC Plan, including, but not limited to:
 - a. Installing and maintaining all temporary erosion and sediment control Best Management Practices (BMPs) included in the TESC Plan to assure continued performance of their intended function. Damaged or inadequate TESC BMPs shall be corrected immediately.
 - b. Updating TESC Plan to reflect current field conditions.
 - c. Terminating TESC Plan.
3. When a TESC Plan is included in the Contract Plans, ESC Lead shall also inspect all areas disturbed by construction activities, all onsite erosion and sediment control BMPs, all stormwater discharge points, and all temporarily stabilized inactive sites per schedule in the Construction Stormwater Discharge Permit(s) or as directed by Engineer. Complete erosion and sediment control inspection form provided by water resource agency or Owner for each inspection and submit a copy to Engineer no later than end of the next working day following inspection.

C. Personnel Training:

1. Prior to commencement of construction, applicable personnel must have an understanding of the erosion control requirements and their specific responsibilities. At a minimum, personnel must be trained to understand the following as it relates to the scope of their job duties:
 - a. The location of all stormwater controls and how to maintain them.
 - b. Procedures for complying with the pollution prevention requirements.
 - c. Procedures for conducting inspections, recording findings, and taking corrective action.

D. Temporary Erosion and Sediment Control Plan (Stormwater Pollution Prevention Plan):

1. A schematic TESC Plan is furnished as part of the Drawings. This initial TESC Plan, provides the minimum required erosion control BMPs and may be used as the basis of the construction TESC Plan. Additional or revised erosion and sediment control features, not shown on the initial TESC Plan, shall be added by the Contractor depending on the Contractor's methods of operation and schedule.
2. For each phase of the scheduled work, indicate on the TESC Plan all the BMPs proposed and installed for erosion and sediment control to minimize clearing, stabilize exposed soil, divert or temporarily store flows, limit runoff from exposed areas, and filter transported sediment. Include all temporary slopes, constructed for staging or other reasons, which may not have been identified in the original Contract plans. Refer to the Western Washington Stormwater Management Manual.
3. In addition to temporary erosion control during construction, the TESC Plan shall address how permanent erosion control shall be provided.
4. Some TESC Plan required elements typically required by NPDES permits:

- a. Narrative Site Description:
 - 1) Nature of construction activity planned for the Site.
 - 2) Estimates of total site area and the areas of the Site expected to be disturbed.
 - 3) Soil types found onsite and their erosion potential.
 - 4) The types of fill materials to be used.
 - 5) Timetable for sequence of major construction events.
- b. Site Map:
 - 1) All areas of development.
 - 2) Drainage patterns.
 - 3) Areas of soil disturbance, including pre-development and post-development elevation contours.
 - 4) Areas used for storage of soils or wastes.
 - 5) Areas where vegetative practices are to be implemented.
 - 6) Location of all erosion and sediment control BMP or structures.
 - 7) Location of all impervious structures and surfaces after project is completed.
 - 8) Springs, wetlands, and other surface waters located onsite.
 - 9) Boundaries of the 100-year floodplain, if determined.
 - 10) Ordinary High Water line, if determined.
 - 11) Location of storm drainage outfalls to receiving waters, if applicable.
 - 12) Details of sediment and erosion controls.
 - 13) Details of detention ponds, storm drain piping, inflow and outflow details.
- c. Required BMPs and Procedures for Erosion Prevention, Runoff Control, and Sediment Control:
 - 1) Construction entrances and parking areas.
 - 2) Unpaved site roads such as haul roads.
 - 3) Hauling saturated soils from the Site.
 - 4) Water washed from concrete trucks.
 - 5) Correct installation of erosion and sediment control BMPs.
 - 6) Prompt maintenance and repair of BMPs.
 - 7) Clearing and grading practices to minimize area of exposed soil throughout life of the Project.
 - 8) Schedule of phased clearing operations to limit soils to what can be stabilized.
 - 9) Vegetative practices, including preservation of existing vegetation, seeding, mulching, and buffer strips.
 - 10) Preventing erosion of exposed areas.
 - 11) Diverting flows from exposed slopes.
 - 12) Limiting runoff from exposed areas.
 - 13) Limiting sediment transport within work sites and keeping it from moving off of project areas.
 - 14) Perimeter controls for all clearing and grubbing, both planned and installed.

- 15) Additional controls for wet season work and temporary work suspensions.
 - 16) Sensitive areas such as wetlands.
 - 17) Tree Protection Fencing.
 - 18) Offsite material source and waste areas.
 - 19) Dust.
 - 20) Emergency materials stockpiled onsite.
 - 21) Storing flows and filtering sediment.
 - 22) Soil stockpiles.
5. Contractor's construction TESC Plan and implementation schedules must be prepared by a competent individual. Furnish a signed copy of the TESC Plan with individual's name, title, state certifications, and employing firm if different than Contractor's firm.
 6. Do not begin any Site activities that have potential to cause erosion or sediment movement until the TESC Plan and implementation schedules are approved by Engineer.
 7. Keep a copy of the approved TESC Plan with updated changes onsite during all construction activities. During inactive periods longer than 7 calendar days, keep the TESC Plan onsite or provide a copy to Engineer to retain.
 8. Continually update the TESC Plan and schedules as needed for unexpected storm or other events to ensure that sediment-laden water does not leave the construction site. Add approved changes to the TESC Plan no later than 24 hours after implementation.
- E. Install clearing limit fence along the Site as shown on Drawings and as instructed by Engineer. Space posts and attach fence fabric to posts as shown on Drawings. Do not fasten fence to trees. Throughout the life of the Project, preserve and protect delineated area, acting immediately to repair or restore any fencing damaged or removed.
- F. Preventing erosion, and controlling runoff, sedimentation, and nonstormwater pollution, requires Contractor to perform temporary Work items including, but not limited to:
1. Providing ditches, berms, culverts, and other measures to control surface water.
 2. Building dams, settling basins, energy dissipaters, and other measures, to control downstream flows.
 3. Controlling underground water found during construction.
 4. Covering or otherwise protecting slopes until permanent erosion control measures are working.
- G. To the degree possible, coordinate this temporary Work with permanent drainage and erosion control work the Contract requires.
- H. Engineer may require additional temporary control measures if it appears pollution or erosion may result from weather, nature of materials, or progress on the Work.

- I. When natural elements rut or erode the slope, restore and repair damage with eroded material where possible, and remove and dispose of any remaining material found in ditches and culverts. When Engineer orders replacement with additional or other materials, unit Contract prices will cover quantities needed.
- J. Install all sediment control devices including, but not limited to, sediment ponds, perimeter silt fencing, or other sediment trapping BMPs prior to any ground disturbing activity. Do not expose more erodible earth than necessary during clearing, grubbing, excavation, borrow, or fill activities without written approval by Engineer. Engineer may increase or decrease the limits based on project conditions. Erodible earth is defined as any surface where soils, grindings, or other materials may be capable of being displaced and transported by rain, wind, or surface water runoff. Cover inactive areas of erodible earth, whether at final grade or not, within specified time period (see [NPDES] Erosion and Sediment Control Permit), using an approved soil covering practice. Phase clearing and grading to maximum extent practical to prevent exposed inactive areas from becoming a source of erosion.
- K. Water Management:
 - 1. Manage site water in accordance with the conditions of the waste discharge permit from a local permitting authority. If site water management is not subject to permit, manage as follows:
 - a. Process Water:
 - 1) Do not discharge high pH process water or wastewater (nonstormwater) that is generated onsite, including water generated during concrete grinding, rubblizing, washout, and hydrodemolition activities, to jurisdictional waters, including wetlands. Offsite disposal of concrete process water is subject to approval of Engineer.
 - 2) Treat all water generated onsite from construction or washing activities that is more turbid than site runoff separately until turbidity is the same or less than site runoff, and then it may be combined with site runoff and treated as described above. Treated water may be infiltrated upon approval of Engineer.
 - b. Offsite Water: Prior to disruption of normal watercourse, intercept offsite stormwater and pipe it either through or around the Project Site. This water shall not be combined with onsite stormwater. Discharge offsite water at its preconstruction outfall point preventing an increase in erosion below the site. Submit proposed method for performing this Work for Engineer's approval.
- L. Dispersion/Infiltration: Convey water only to dispersion or infiltration areas designated in the TESC Plan or to sites approved by Engineer. Water shall be conveyed to designated dispersion areas at a rate such that, when runoff leaves the area and enters jurisdictional waters, turbidity

standards are achieved. Convey water to designated infiltration areas at a rate that does not produce surface runoff.

M. Pollution Control:

1. Use BMPs to prevent or minimize stormwater exposure to pollutants from spills; vehicle and equipment fueling, maintenance, and storage; other cleaning and maintenance activities and waste handling activities. These pollutants include fuel, hydraulic fluid, and other oils from vehicles and machinery, as well as debris, leftover paints, solvents, and glues from construction operations. Implement the following BMPs when applicable:
 - a. Written spill prevention and response procedures.
 - b. Employee training on spill prevention and proper disposal procedures.
 - c. Spill kits in all vehicles.
 - d. Regular maintenance schedule for vehicles and machinery.
 - e. Material delivery and storage controls.
 - f. Training and signage.
 - g. Covered storage areas for waste and supplies.

N. If Engineer orders the Work suspended, continue to control erosion, pollution, and runoff during the shutdown.

O. Nothing in this section shall relieve Contractor from complying with other Contract requirements.

1.04 SUBMITTALS

A. Informational Submittals:

1. Either adopt or modify the TESC Plan. Provide a schedule for TESC Plan implementation and incorporate it into Contractor's progress schedule. Obtain Engineer's approval of the TESC Plan and schedule before any Work begins.
2. Modified TESC Plans shall meet all requirements of the applicable jurisdictions.
3. The TESC Plan shall cover all areas that may be affected inside and outside the limits of the Project (including all Owner-provided sources, disposal sites, and haul roads, and all nearby land, streams, and other bodies of water).
4. Allow at least 5 working days for Engineer to review any original or revised TESC Plan. Failure to approve all or part of any such Plan shall not make Owner liable to Contractor for any Work delays.

PART 2 PRODUCTS

2.01 EROSION CONTROL BLANKET (MATTING), BIODEGRADABLE

- A. Temporary erosion control blanket shall be made of natural plant fibers. Supply independent test results meeting the

following:

Properties	ASTM Test Method	Requirements
Protecting Slopes from Rainfall-Induced Erosion	D6459: Test in one soil type; Soil tested shall be sandy loam as defined by the NRCS Soil Texture Triangle	Maximum C factor of 0.15 using Revised Universal Soil Loss Equation (RUSLE)
Dry Weight per Unit Area	D6475	0.36 lb./sq. yd. minimum
Performance in Protecting Earthen Channels from Stormwater-Induced Erosion	D6460: Test in one soil type; Soil tested shall be sandy loam as defined by the NRCS Soil Texture Triangle	1.0 lb./sq. ft. minimum
Seed Germination Enhancement	D7322	200 percent minimum
Netting, if present, shall be biodegradable with a life span not to exceed 1 year.		

2.02 GEOTEXTILE

- A. Geotextiles shall consist only of long chain polymeric fibers or yarns formed into a stable network such that the fibers or yarns retain their position relative to each other during handling, placement, and design service life. At least 95 percent by weight of the material shall be polyolefins or polyesters. The material shall be free from defects or tears. Geotextile shall also be free of any treatment or coating, which might adversely alter its hydraulic or physical properties after installation.

2.03 CLEARING LIMIT AND TREE PROTECTION FENCE

- A. High Visibility Fence: UV stabilized, orange, high-density polyethylene or polypropylene mesh.
- B. Height: 4 feet minimum.
- C. Support Posts: Wood or steel with sufficient strength and durability to support the fence through the life of the Project.
 - 1. Minimum post burial depth is 2 feet.
 - 2. Maximum post spacing is 8 feet.

2.04 INLET PROTECTION -- As shown on Drawings.

2.05 MULCH

- A. Short-Term: Provide independent test results documenting that the mulch meets the

requirements in Table 1, Short-Term Mulch Test Requirements.

Table I Short-Term Mulch Test Requirements		
Properties	ASTM Test Method	Requirements
Performance in Protecting Earthen Channels from Rainfall-Induced Erosion	ASTM D6459: Test in one soil type; Soil tested shall be sandy loam as defined by the National Resources Conservation Service (NRCS) Soil Texture Triangle	C Factor = 0.15 maximum using Revised Universal Soil Loss Equation (RUSLE)

- B. Moderate-Term: Within 48 hours of application, the Moderate-Term Mulch shall bond with soil surface to create a continuous, absorbent, flexible, erosion-resistant blanket that allows for seed germination and plant growth and conforms to the requirements in Table 2, Moderate-Term Mulch Test Requirements. Provide test results documenting that the mulch meets the requirements in Table 2, Moderate-Term Mulch Test Requirements. Supply independent test results.

Table 2 Moderate-Term Mulch Test Requirements		
Properties	ASTM Test Method	Requirements
Performance in Protecting Slopes from Rainfall-Induced Erosion	ASTM D6459: Test in one soil type; Soil tested shall be sandy loam as defined by the NRCS Soil Texture Triangle	C Factor = 0.05 maximum using Revised Universal Soil Loss Equation (RUSLE)

- C. Long-Term:
1. Provide Long-Term Mulch with demonstrated ability:
 - a. To adhere to soil and create a blanket-like mass within 2 hours of application.
 - b. To bond with the soil surface to create a continuous, porous, absorbent, and flexible erosion-resistant blanket that allows for seed germination and plant growth.
 - c. To conform to the requirements in Table 3, Long-Term Mulch Test Requirements.
 - d. Provide test results documenting that mulch meets requirements in Table 3, Long-Term Mulch Test Requirements. Supply independent test results.

Table 3 Long-Term Mulch Test Requirements		
Properties	ASTM Test Method	Requirements
Performance in Protecting Slopes from Rainfall-Induced Erosion	ASTM D6459: Test in one soil type; Soil tested shall be sandy loam as defined by the NRCS Soil Texture Triangle	C Factor = 0.01 maximum using Revised Universal Soil Loss Equation (RUSLE)

2.06 OUTLET PROTECTION

- A. Size riprap or quarry spall to resist movement under design flows. Install at least 12 inches deep. Provide riprap or quarry spall material free of extraneous material.

2.07 PLASTIC COVERING

- A. Clear plastic meeting requirements of ASTM 04397 for polyethylene sheeting having a minimum thickness of 6 mils.

2.08 SEEDING – Not Applicable

2.09 SILT (SEDIMENT) FENCE

- A. Geotextile: As specified in Article Geotextile.
- B. Welded wire fabric, 14-gauge minimum with 2-inch by 2-inch mesh or Standard chain link fencing.
- C. Support Posts: As recommended by manufacturer of geotextile.
- D. Fasteners: Heavy-duty wire staples at least 1-inch long, tie wires, or hog rings, as recommended by manufacturer of geotextile.

2.10 STABILIZED CONSTRUCTION ENTRANCE – Not Applicable

- A. Construct a pad from quarry spall stone 4 inches to 8 inches in size, placed at least 12 inches deep and not less than 100 feet long.
- B. Provide aggregate free of extraneous materials that may cause or contribute to track out.
- C. Place separation geotextile under the rock to prevent fine sediment from pumping up into the rock pad. See Article Geotextile for required geotextile properties.
- D. Use of constructed or constructed/manufactured steel plates with ribs (such as, shaker/rumble plates or corrugated steel plates) for entrance/exit access is allowable.

2.11 STRAW BALE BARRIER AND STRAW MULCH

A. Straw:

1. Air dried condition free of noxious weeds, seeds, and other materials detrimental to plant life. Hay is not acceptable. Provide weed-free documentation:
 - a. Certified Weed Free Straw using North American Weed Management Association (NAWMA) standards.
 - b. Provide documentation that material is steam or heat treated to kill seeds.
 - c. Provide U.S. or state's Department of Agriculture laboratory test reports, dated within 90 days prior to date of application, showing there are no viable seeds in the straw.

B. Straw Mulch: Suitable for spreading with mulch blower equipment.

C. Posts for Straw Bales: 2-inch by 2-inch untreated wood or commercially manufactured metal posts.

2.12 STREET CLEANING

- A. Use self-propelled pickup street sweeper(s). Mechanical broom sweepers are not allowed where environmental concerns exist about storm water pollution or air quality.

2.13 TACKIFIERS

- A. Biodegradable Hydraulically Applied Erosion Control Products (HECPs) in a dry condition, free of noxious weeds, seeds, chemical printing ink, germination inhibitors, herbicide residue, chlorine bleach, rock, metal, plastic, and other materials detrimental to plant life. Up to 5 percent by weight may be photodegradable material.
- B. Suitable for spreading with a hydroseeder.
- C. Furnish HECPs premixed by the manufacturer. Under no circumstances will field mixing of additives or components be acceptable.
- D. Provide test results, dated within 3 years prior to the date of application, from an independent, accredited laboratory, as approved by Engineer, showing that the product meets the HECP requirements.

2.14 TIRE WHEEL WASH FACILITY

- A. Specified by Contractor with approval of Engineer. Wheel wash facilities should have a non-erosive base, and a small grade change to allow sediment to flow to low side of pond to help prevent re-suspension of sediment. A drainpipe should be installed at low side of pond to allow for cleaning and refilling. Pond should

be deep enough to hold 14 inches of water after displacement.

PART 3 EXECUTION

3.01 PREPARATION

- A. Engineer's acceptance of the TESC Plan is required prior to starting earth disturbing activities.
- B. Include proposed stockpile areas and installation of temporary erosion control devices, ditches, or other facilities in Work phasing plans.
- C. Areas designated for Contractor's use during Project may be temporarily developed as specified to provide working, staging, and administrative areas. Include control of sediment from these areas in the TESC Plan.
- D. Erosion Control Blanket (Matting), Biodegradable: Temporary Erosion Control Blankets are used as an erosion prevention device and to enhance establishment of vegetation. Install erosion control blankets according to manufacturer's recommendations.
 - 1. Erosion control blankets with an open area of 60 percent or greater may be installed prior to seeding and fertilizing. Install blankets with less than 60 percent open space immediately following seeding and fertilizing operation.
 - 2. Select erosion control blanket material for an area based on the intended function; slope or ditch stabilization and Site-specific factors including soil, slope gradient, rainfall, and flow exposure. Do not use erosion Control Blankets on slopes or in ditches that exceed manufacturer's recommendations.
- E. Clearing Limit and Tree Protection Fence: Install fence in accordance with Drawings.
- F. Inlet Protection: Install inlet protection below or above, or as a prefabricated cover at each inlet grate, as shown on Drawings. Install inlet protection devices prior to beginning clearing, grubbing or earthwork activities. Geotextile fabric used in prefabricated inlet protection devices must meet or exceed the requirements for Moderate Survivability and minimum filtration properties. When depth of accumulated sediment and debris reaches approximately one-half the height of an internal device or one-third the height of external device (or less when so specified by the manufacturers) or as designated by Engineer, remove deposits and stabilize onsite.
 - 1. Below Inlet Grate:
 - a. Prefabricated units specifically designed for inlet protection.
 - b. Must remain securely attached to drainage structure when fully loaded with sediment and debris or at the maximum level of sediment and debris specified by manufacturer.
 - 2. Above Inlet Grate:
 - a. Devices may be silt fence, sandbags, or prefabricated units specifically designed for inlet protection.

- b. Must remain securely in place around drainage structure under all conditions.
 - 3. Inlet Grate Cover:
 - a. Prefabricated units specifically designed for inlet protection and:
 - 1) Be a sewn geotextile fabric unit fitted to individual grate and completely enclosing grate.
 - 2) Have built-in lifting devices to allow manual access of stormwater system.
 - 3) Use an orange monofilament geotextile fabric.
 - b. Check dams or functionally equivalent devices may be used as inlet protection devices with approval of Engineer.
- G. Mulch: Furnish, haul, and evenly apply at rates indicated and spread on seeded areas within 48 hours after seeding unless otherwise specified.
 - 1. Distribute straw mulch material with an approved mulch spreader that uses forced air to blow mulch material on seeded areas.
 - 2. Apply wood strand mulch by hand or by straw blower on seeded areas.
 - 3. Hydraulically apply Short-Term Mulch at the rate of 2,500 pounds per acre. May be applied in one lift.
 - 4. Hydraulically apply Moderate-Term Mulch and Long-Term Mulch at the rate of 3,500 pounds per acre with no more than 2,000 pounds applied in any single lift. Mulch may be applied with seed and fertilizer in moist climates. In dry climates, apply seed and fertilizer in a single application followed by mulch application. Provide mulch suitable for application with a hydroseeder.
 - 5. Cover temporary seed applied outside application windows established in Section 32 92 00, Turf and Grasses, with a mulch containing either Moderate-Term Mulch or Long-Term Mulch, as designated by Engineer.
 - 6. Mulch areas not accessible by mulching equipment by approved hand methods.
- H. Outlet Protection: Provide outlet protection to prevent scour at outlets of ponds, pipes, ditches, or other conveyances.
- I. Plastic Covering: Use clear plastic covering to promote seed germination when seeding is performed outside of specified dates or where hydroseeding and erosion control matting have not controlled erosion. Use black plastic covering for stockpiles or other areas where vegetative growth is unwanted.
 - 1. Place plastic with at least a 12-inch overlap of all seams, and seams taped or weighed down full length and aligned parallel to direction of drainage.
 - 2. Install and maintain plastic cover to prevent water from cutting under the plastic and to prevent cover from blowing open in the wind. Maintain plastic tightly in place by using sandbags on ropes with a maximum 10-foot grid spacing in all directions.
- J. Silt (Sediment) Fence:
 - 1. Silt fence shall be installed in accordance with Drawings. Fasten wire mesh securely to upslope side of post and extend wire into the trench behind the

- fence.
2. Attach geotextile to posts and support system using staples, wire, or in accordance with manufacturer's recommendations. Geotextile shall be sewn together at the point of manufacture, or at a location approved by Engineer, to form geotextile lengths as required.
 3. Provide wood or steel support posts at sewn seams and overlaps and as shown on Drawings and necessary to support fence.
 4. Wood Posts: Minimum dimensions of 2-inch by 2-inch by the minimum length shown on Drawings.
 5. Steel Posts: Minimum weight of 0.90 pounds per foot.
 6. When sediment deposits reach approximately one-third the height of the silt fence, remove and stabilize deposits.
- K. Stabilized Construction Entrance: Construct temporary stabilized construction entrance in accordance with Drawings, prior to beginning any clearing, grubbing, earthwork, or excavation. When stabilized entrance no longer prevents track out of sediment or debris, either rehabilitate existing entrance to original condition or construct a new entrance.
- L. Street Cleaning: Use self-propelled pickup street sweepers whenever required by Engineer to prevent transport of sediment and other debris off Project Site. Provide street sweepers designed and operated to meet air quality standards. Street washing with water will require approval by Engineer. Intentional washing of sediment into storm sewers or drainage ways must not occur. Vacuuming or dry sweeping and material pickup must be used to cleanup released sediments.
- M. Tackifiers: Mix and apply tackifier in accordance with manufacturer's recommendations. If applied with a hydroseeder, add Short-Term Mulch as a tracer at a rate of 125 pounds to 250 pounds per acre to visibly aid uniform application.

3.02 MAINTENANCE

- A. The ESCP measures described in this specification are minimum requirements for anticipated Site conditions. During the construction period, upgrade these measures as needed to comply with all applicable local, state, and federal erosion and sediment control regulations.
- B. Maintain erosion and sediment control BMPs so they properly perform their function until Engineer determines they are no longer needed.
- C. Construction activities must avoid or minimize excavation and creation of bare ground during wet weather.
- D. The intentional washing of sediment into storm sewers or drainage ways must not occur. Vacuuming or dry sweeping and material pickup must be used to

cleanup released sediments.

- E. Inspect BMPs as directed by Engineer.
- F. Complete an inspection report within 24 hours of an inspection. Each inspection report shall be signed and identify corrective actions. Document that corrective actions are performed within 7 days of identification. Keep a copy of all inspection reports at the Site or at an easily accessible location.
- G. Unless otherwise specified, remove deposits before the depth of accumulated sediment and debris reaches approximately height of BMP. Dispose of debris or contaminated sediment at approved locations. Clean sediments may be stabilized onsite using BMPs as approved by Engineer.
- H. Silt (Sediment) Fence: Remove trapped sediment before it reaches one- third of the above ground fence height and before fence removal.
- I. Other Sediment Barriers (such as biobags): Remove sediment before it reaches 2 inches depth above ground height and before BMP removal.
- J. Catch Basins: Clean before retention capacity has been reduced by 50 percent.
- K. Initiate repair or replacement of damaged erosion and sediment control BMPs immediately, and work completed by end of next work day. Significant replacement or repair must be completed within 7 days, unless infeasible.
- L. Within 24 hours, remediate any significant sediment that has left construction site. Investigate cause of the sediment release and implement steps to prevent a recurrence of discharge within same 24 hours. Perform in-stream cleanup of sediment according to applicable regulations.
- M. At end of each work day, stabilize or cover soil stockpiles or implement other BMPs to prevent discharges to surface waters or conveyance systems leading to surface waters.
- N. Temporarily stabilize soils at end of shift before holidays and weekends, if needed. Ensure soils are stable during rain events at all times of year.
- O. Initiate stabilization by no later than end of next work day after construction work in an area has stopped permanently or temporarily.
- P. Within 14 days of initiating stabilization or as specified in permit, either seed or plant stabilized area; or apply nonvegetative measures and cover all areas of exposed soil. Seed dry areas as soon as Site conditions allow. Ensure that vegetation covers at least 70 percent of stabilized area. In areas where Contractor's activities have compromised erosion control functions of existing grasses, overseed existing grass. Nonvegetative measures may include blown straw and a tackifier, loose straw, or an adequate covering of compost mulch.

Complete initial stabilization within 7 days if storm water discharges to surface waters impaired for sediment or nutrients, or high quality waters.

- Q. Provide permanent erosion control measures on all exposed areas. Do not remove temporary sediment control practices until permanent vegetation or other cover of exposed areas is established. However, do remove all temporary erosion control measures as exposed areas become stabilized, unless doing so conflicts with local requirements. Properly dispose of construction materials and waste, including sediment retained by temporary BMPs.

3.03 EMERGENCY MATERIALS

- A. Provide, stockpile, and protect the following emergency erosion and sediment control materials on the Project Site for unknown weather or erosion conditions. Emergency materials are in addition to other erosion control materials required to implement and maintain the TESC Plan. Replenish emergency materials as they are used. Remove all unused emergency materials from the Project Site at completion of the Project.

Item	Quantity
Silt (sediment) fence	100 ft.
Plastic sheeting	260 sq. ft.
Erosion Control Matting	600 sq. ft.
Rope	1,000 ft.
Sand bags (empty, to be filled as needed)	50
Straw bales	10
Biofilter bags (with stakes)	10

Inflatable pipe plugs	One for each size of pipe
Water pump and hose	One

3.04 REMOVAL

- A. When Engineer determines that an erosion control BMP is no longer required, remove BMP and all associated hardware from the Project limits. When materials are biodegradable, Engineer may approve leaving temporary BMP in place.
- B. Permanently stabilize all bare and disturbed soil after removal of erosion and sediment control BMPs. Dress sediment deposits remaining after BMPs have been removed to conform to existing grade. Prepare and seed graded area. If installation and use of erosion control BMPs have compacted or otherwise rendered soil

inhospitable to plant growth, such as construction entrances, take measures to rehabilitate soil to facilitate plant growth. This may include, but is not limited to, ripping the soil, incorporating soil amendments, or seeding with specified seed.

END OF SECTION

SECTION 01 61 00
COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

A. Products:

1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project.
2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.02 DESIGN REQUIREMENTS

A. Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of latest edition of International Building Code (IBC) by International Code Council, as amended by the State of Washington and the City of Vancouver, Washington.

1. See "General Structural Notes" sheets on Drawings for design criteria requirement for loadings including wind, seismic, soil properties, groundwater table, deflection, settlement, and related design parameters.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Altitude: Provide materials and equipment suitable for installation and operation under rated conditions at 250 feet above sea level.
- B. Provide equipment and devices installed outdoors or in unheated enclosures capable of continuous operation within an ambient temperature range of 0 degrees F to 110 degrees F.

1.04 PREPARATION FOR SHIPMENT

- A. When practical, factory assemble products. Mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.

- B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:
 - 1. Furnish as required by individual specifications.
 - 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
 - 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently displayed on each package, the following:
 - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 - 4. Deliver materials to Site or location defined by Engineer. Notify Engineer upon arrival for transfer of materials.
 - 5. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Engineer.
- D. Request a minimum 7-day advance notice of shipment from manufacturer. Upon receipt of manufacturer's advance notice of shipment, promptly notify Engineer of anticipated date and place of arrival.
- E. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual specification sections.

1.05 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for

completeness and evidence of damage during shipment.

- D. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.06 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds provided in accordance with Section 01 50 00, Temporary Facilities and Controls. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- B. Manufacturer's instructions for material requiring special handling, storage, or protection shall be provided prior to delivery of material.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to ensure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- D. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulate against moisture, water, and dust damage. Connect and operate continuously space heaters furnished in electrical equipment.
- E. Store fabricated products above ground on blocking or skids, and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
- F. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- G. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings when no longer needed.
- H. Hazardous Materials: Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.
- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.
- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Authority Having Jurisdiction (AHJ):
 - 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
 - 2. Materials and equipment manufactured within the scope of standards published by UL shall conform to those standards and shall have an applied UL listing mark.

J. Equipment Finish:

1. Provide manufacturer's standard finish and color, except where specific color is indicated.
2. If manufacturer has no standard color, provide equipment with finish as approved by Engineer.

K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.

L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.

M. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.02 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance Specifications.

B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible; oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.

4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed, notify Owner and Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

3.02 INSTALLATION

- A. Contractor-Furnished Materials and Sources:
 1. Unless otherwise specified in the Contract, the Contractor shall:
 - a. Acquire and furnish, at its own expense, all products and materials required for the Work from suppliers or sources of its own choosing.
 - b. Acquire and furnish, at its own expense, access to and the use of all material sources.
 - c. Acquire and furnish, at its own expense, upon request, any and all permits from federal, state, and local agencies necessary to use any source for materials.
- B. Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- C. No shimming between machined surfaces is allowed.
- D. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.

- E. Repaint painted surfaces that are damaged prior to equipment acceptance.
- F. Do not cut or notch any structural member or building surface without specific approval of Engineer.
- G. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at Site, available for review at all times.
- H. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.03 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.04 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

3.05 SUPPLEMENT

- A. The supplement listed below, following "End of Section," is part of this Specification.
 - 1. Manufacturer's Certificate of Compliance.

**MANUFACTURER'S CERTIFICATE OF
COMPLIANCE**

OWNER: City of Vancouver

PRODUCT, MATERIAL, OR SERVICE

PROJECT NAME: WS1 New Wellhouses SUBMITTED: _____

Comments: _____

I hereby certify that the above-referenced product, material, or service called for by the Contract for the named Project will be furnished in accordance with all applicable requirements. I further certify that the product, material, or service are of the quality specified and conform in all respects with the Contract requirements, and are in the quantity shown.

Date of Execution _____ 20

Manufacturer: _____

Manufacturer's Authorized Representative (*print*): _____
(Authorized Signature) _____

SECTION 01 64 00
OWNER-FURNISHED PRODUCTS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Seller: The party under separate contract with Owner to furnish the products or special services specified herein.

1.02 OWNER-FURNISHED PRODUCTS

- A. Well Control Panels: Contractor to install as per Plans and Specifications.

1.03 INFORMATION FURNISHED BY OWNER

- A. Shop Drawings related to Owner-furnished products will be made available for Contractor's use in performing the work under this section.
- B. Manufacturer's installation, operation, and maintenance instructions for Owner-furnished products will be made available.

1.04 TRANSFER OF PRODUCTS

- A. Items will be furnished f.o.b. at the Project Site.
- B. Upon delivery, conduct with Owner or Engineer a joint inspection for the purpose of identifying product, general verification of quantities, and observation of apparent condition. Such inspection will not be construed as final or as receipt of any product that, as a result of subsequent inspections and tests, are determined to be nonconforming.
- C. Damaged or incomplete products to be returned for replacement will not be unloaded, except as necessary to expedite return shipment. Owner will submit claims for transportation damage and expedite replacement of damaged, defective, or deficient items.
- D. Indicate signed acceptance of delivery on a copy of the invoice.

1.05 UNLOADING, STORAGE, MAINTENANCE, AND INSURANCE

- A. Subsequent to transfer, Contractor shall have complete responsibility for unloading Owner-furnished products. Unload product in accordance with manufacturers' instructions, or as specified.
- B. Store, protect, and maintain product to prevent damage until final acceptance of completed work. Damage to or loss of products after date of transfer to Contractor shall be repaired to original condition, or replaced with new identical products, at the discretion of Engineer.

- C. Maintain complete inventory of all Owner-furnished products after their transfer to Contractor.
- D. Upon transfer, receipt, and control of the equipment, Contractor shall include the items within their insurance coverage until acceptance of the fully functioning equipment as a part of the facilities has occurred as if the Contractor had purchased the equipment. Evidence of Insurance coverage shall be provided to Owner.
 - 1. The Values of the Equipment/Products Are:
 - a. Instrumentation and Control Panel: \$15,000 each.

1.06 SCHEDULING AND SEQUENCING

- A. Include sequencing constraints specified herein as part of Progress Schedule.
- B. Owner will keep Contractor informed of probable delivery date changes.
- C. Owner will confirm delivery date with Contractor 10 days prior to scheduled delivery, and within 24 hours of expected delivery time.

1.07 EXTRA MATERIALS

- A. Unless otherwise specified, Owner will take acceptance of, and be responsible for storing associated extra materials and special tools upon delivery.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in conformance with Owner-furnished product Shop Drawings and installation instructions.
- B. Provide all interconnecting structures, equipment, piping, electrical and instrumentation work, finish painting, and appurtenances. to achieve a complete and functional system.
- C. Provide foundation pads for Owner-furnished products as shown. Verify exact dimensions and configuration of all pads, including penetrations, with Owner-furnished product Shop Drawings.
- D. Anchor Bolts:
 - 1. Where required, provide anchor bolts, fasteners, washers, and templates needed for installation of Owner-furnished equipment.
 - 2. Size and locate anchor bolts in accordance with Owner-furnished information or product Shop Drawings and installation instructions.

- E. Mechanical and electrical equipment shall be properly aligned, plumb and level, with no stresses on connecting piping or conduit.
- F. Verify operability and safety of electrical system needed to operate equipment. Check electrical system for continuity, phasing, grounding, and proper functions.
- G. Verify operability and safety of electrical system needed to operate equipment. Check electrical system for continuity, phasing, grounding and proper function.
- H. Wall-Mounted PLC Panel:
 - 1. Mount new PLC panel on wall.
 - 2. Install wire labels and terminate wiring as shown on Shop Drawings.

3.02 FIELD FINISHING

- A. Provide the following:
 - 1. Touch up or repair damage to coatings resulting from unloading, storage, installation, testing, and startup.
 - 2. If finish coats are damaged extensively after transfer, completely repaint.
 - 3. Touch up, repair, or complete repainting shall match color of original paint, and shall be fully compatible with applied primers and finish.

3.03 PRODUCT PROTECTION

- A. Immediately after installation, lubricate components in accordance with manufacturer's instructions.
- B. Follow manufacturer's instructions for protection and maintenance during storage, after installation but prior to testing and startup, and after startup but prior to acceptance.
- C. Furnish incidental supplies including lubricants, cleaning fluids, and similar products as needed for protecting and maintaining the Owner- furnished products.

END OF SECTION

**SECTION 01 77 00
CLOSEOUT PROCEDURES**

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Submit prior to application for final payment.
 - a. Record Documents: As required in General Conditions.
 - b. Approved Shop Drawings and Samples: As required in the General Conditions.
 - c. Special bonds, Special Guarantees, and Service Agreements.
 - d. Consent of Surety to Final Payment: As required in General Conditions.
 - e. Releases or Waivers of Liens and Claims: As required in General Conditions.
 - f. Releases from Contractual Agreements.
 - g. Final Application for Payment: Submit in accordance with General Conditions and Section 01 29 00, Payment Procedures.
 - h. Extra Materials: As required by individual specification sections.

1.02 RECORD DOCUMENTS

A. Quality Assurance :

1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
2. Accuracy of Records:
 - a. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive Site measurement, investigation, and examination.
3. Make entries within 24 hours after receipt of information that a change in the Work has occurred.
4. Prior to submitting each request for progress payment, request Engineer's review and approval of current status of hardcopy markup of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for either monthly, partial or final Payments.

1.03 RELEASES FROM AGREEMENTS

- A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's property or right-of-way.
- B. In the event Contractor is unable to secure written releases:

1. Inform Owner of the reasons.
2. Owner or its representatives will examine the Site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.
3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price, or require Contractor to furnish a satisfactory bond in a sum to cover legal Claims for damages.
4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if: (i) Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate Claims that Contractor has failed to fulfill terms of side agreement or special easement, or (ii) Contractor is unable to contact or has had undue hardship in contacting grantor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

A. General:

- a. Promptly following commencement of Contract Times, secure from Engineer at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.
- b. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
- c. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation:

1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make documents and Samples available at all times for observation by Engineer.

C. Making Entries on Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from Drawings.
 - 2) Red when showing information added to Drawings.
 - 3) Blue and circled in blue to show notes.
2. Date entries.
3. Call attention to entry by "cloud" drawn around area or areas affected.
4. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished first floor

data if not shown or where depth differs from that shown.

- b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, and Engineer's written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
- D. Dimensions on Schematic Layouts: Show on Record Drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
- 1. Clearly identify the item by accurate note such as "cast iron drain," "galv. water," and the like.
 - 2. Show, by symbol or note, vertical location of item ("under slab," "in ceiling plenum," "exposed," and the like).
 - 3. Make identification so descriptive that it may be related reliably to Specifications.

3.02 FINAL CLEANING

- A. At completion of the Work or part thereof and immediately prior to Contractor's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire Site or parts thereof, as applicable.
- 1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Engineer.
 - 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
 - 3. Repair, patch, and touch up marred surfaces to specified finish and match adjacent surfaces.
 - 4. Clean and wax wood, vinyl, or painted floors.
 - 5. Broom clean exterior paved driveways and parking areas.
 - 6. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
 - 7. Rake clean all other surfaces.
 - 8. Leave water courses, gutters, and ditches open and clean.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Detailed information for the preparation, submission, and Engineer's review of Operations and Maintenance (O&M) Data, as required by individual specification sections.

1.02 DEFINITIONS

- A. Preliminary Data: Initial and subsequent submissions for Engineer's review.
- B. Final Data: Engineer-accepted data, submitted as specified herein.
- C. Maintenance Operation: As used on Maintenance Summary Form is defined to mean any routine operation required to ensure satisfactory performance and longevity of equipment. Examples of typical maintenance operations are lubrication, belt tensioning, adjustment of pump packing glands, and routine adjustments.

1.03 SEQUENCING AND SCHEDULING

- A. Equipment and System Data:
 - 1. Preliminary Data:
 - a. Do not submit O&M information until Shop Drawing for equipment or system has been reviewed and approved by Engineer.
 - b. Submit O&M information prior to shipment date.
 - 2. Final Data:
 - a. Submit Instructional Manual data not less than 30 days prior to equipment or system field functional testing.
 - b. Submit compiled O&M information, in both hard copy and electronic media formatted data prior to Substantial Completion of Work.
- B. Materials and Finishes Data:
 - 1. Preliminary Data: Submit at least 30 days prior to request for final inspection.
 - 2. Final Data: Submit within 10 days after final inspection.

1.04 DATA FORMAT

- A. Prepare preliminary and final data in the form of an instructional manual. Prepare final data on electronic media.

B. Instructional Manual Format:

1. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
2. Size: 8-1/2 inches by 11 inches, minimum.
3. Cover:
 - a. Identify manual with typed or printed title "OPERATION AND MAINTENANCE DATA" and list:
 - 1) Project title.
 - 2) Designate applicable system, equipment, material, or finish.
 - 3) Identity of separate structure as applicable.
 - 4) Identify volume number if more than one volume.
 - 5) Identity of general subject matter covered in manual, and identity of equipment number and specification section.
4. Spine:
 - a. Project title.
 - b. Identify volume number if more than one volume.
5. Title Page:
 - a. Contractor name, address, and telephone number.
 - b. Subcontractor, Supplier, installer, or maintenance contractor's name, address, and telephone number, as appropriate.
 - 1) Identify area of responsibility of each.
 - 2) Provide name and telephone number of local source of supply for parts and replacement.
6. Table of Contents:
 - a. Neatly typewritten and arranged in systematic order with consecutive page numbers.
 - b. Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
7. Paper: 20-pound minimum, white for typed pages.
8. Text: Manufacturer's printed data, or neatly typewritten.
9. Three-hole punch data for binding and composition; arrange printing so that punched holes do not obliterate data.
10. Material shall be suitable for reproduction, with quality equal to original. Photocopying of material will be acceptable, except for material containing photographs.

C. Data Compilation Format:

1. Compile all Engineer-accepted preliminary O&M data into a hard-copy, hard-bound set.
2. Each set shall consist of the following:
 - a. Binder: Commercial quality, permanent, three-ring or three-post binders with durable plastic cover.
 - b. Cover: Identify each volume with typed or printed title "OPERATION AND MAINTENANCE DATA, VOLUME NO. _ OF _", and list:
 - 1) Project title.
 - 2) Contractor's name, address, and telephone number.
 - 3) If entire volume covers equipment or system provided by one Supplier, include the following:
 - a) Identity of general subject matter covered in manual.
 - b) Identity of equipment number and specification section.
 - c. Provide each volume with title page and typed table of contents with

- consecutive page numbers. Place contents of entire set, identified by volume number, in each binder.
- d. Table of contents neatly typewritten, arranged in a systematic order:
 - 1) Include list of each product, indexed to content of each volume.
 - 2) Designate system or equipment for which it is intended.
 - 3) Identify each product by product name and other identifying numbers or symbols as set forth in Contract Documents.
 - e. Section Dividers:
 - 1) Heavy, 80 pound cover weight, tabbed with numbered plastic index tabs.
 - 2) Fly-Leaf:
 - a) For each separate product, or each piece of operating equipment, with typed description of product and major component parts of equipment.
 - b) List with Each Product:
 - (1) Name, address, and telephone number of Subcontractor, Supplier, installer, and maintenance contractor, as appropriate.
 - (2) Identify area of responsibility of each.
 - (3) Provide local source of supply for parts and replacement.
 - c) Identity of separate structure as applicable.
 - f. Assemble and bind material, as much as possible, in same order as specified in the Contract Documents.

D. Electronic Media Format:

- 1. Portable Document Format (PDF):
 - a. After all preliminary data has been found to be acceptable to Engineer, submit Operation and Maintenance data in PDF format on DVD or portable hard drive for delivery to Owner.
 - b. Files to be exact duplicates of Engineer-accepted preliminary data.
 - c. Arrange by specification number and name.
 - d. Provide a single combine file of all manuals which includes a hyperlinked table of contents to each O&M item.
 - e. Include copies of warranties, bonds, special guarantees, and service agreements that are provided under Section O I 77 00, Closeout Procedures.
 - f. Files to be fully functional and viewable in most recent version of Adobe Acrobat.

1.05 SUBMITTALS

A. Informational:

- 1. Data Outline: Submit two copies of a detailed outline of proposed organization and contents of Final Data prior to preparation of Preliminary Data.
- 2. Preliminary Data:
 - a. Submit two copies for Engineer's review.
 - b. If data meets conditions of the Contract:
 - 1) One copy will be returned to Contractor.
 - 2) One copy will be retained in Engineer's file.
 - c. If data does not meet conditions of the Contract:
 - 1) All copies will be returned to Contractor with Engineer's comments (on separate document) for revision.

- 2) Engineer's comments will be retained in Engineer's file.
- 3) Resubmit two copies revised in accordance with Engineer's comments.
3. Final Data: Submit two copies in format specified herein.

1.06 DATA FOR EQUIPMENT AND SYSTEMS

A. Content For Each Unit (or Common Units) and System:

1. Product Data:
 - a. Include only those sheets that are pertinent to specific product.
 - b. Clearly annotate each sheet to:
 - 1) Identify specific product or part installed.
 - 2) Identify data applicable to installation.
 - 3) Delete references to inapplicable information.
 - c. Function, normal operating characteristics, and limiting conditions.
 - d. Performance curves, engineering data, nameplate data, and tests.
 - e. Complete nomenclature and commercial number of replaceable parts.
 - f. Original manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and sequentially numbered parts list, and diagrams required for maintenance.
 - g. Spare parts ordering instructions.
 - h. Where applicable, identify installed spares and other provisions for future work (e.g., reserved panel space, unused components, wiring, terminals).
2. As-installed, color-coded piping diagrams.
3. Charts of valve tag numbers, with the location and function of each valve.
4. Drawings:
 - a. Supplement product data with Drawings as necessary to clearly illustrate:
 - 1) Format:
 - a) Provide reinforced, punched, binder tab; bind in with text.
 - b) Reduced to 8-1/2 inches by 11 inches, or 11 inches by 17 inches folded to 8-1/2 inches by 11 inches.
 - c) Where reduction is impractical, fold and place in 8-1/2-inch by 11-inch envelopes bound in text.
 - d) Identify specification section and product on Drawings and envelopes.
 - 2) Relations of component parts of equipment and systems.
 - 3) Control and flow diagrams.
 - 4) Coordinate Drawings with Project record documents to assure correct illustration of completed installation.
5. Instructions and Procedures: Within text, as required to supplement product data.
 - a. Format:
 - 1) Organize in consistent format under separate heading for each different procedure.
 - 2) Provide logical sequence of instructions for each procedure.
 - 3) Provide information sheet for Owner's personnel, including:
 - a) Proper procedures in event of failure.
 - b) Instances that might affect validity of guarantee or Bond.
 - b. Installation Instructions: Including alignment, adjusting, calibrating, and checking.
 - c. Operating Procedures:

- 1) Startup, break-in, routine, and normal operating instructions.
- 2) Test procedures and results of factory tests where required.
- 3) Regulation, control, stopping, and emergency instructions.
- 4) Description of operation sequence by control manufacturer.
- 5) Shutdown instructions for both short and extended duration.
- 6) Summer and winter operating instructions, as applicable.
- 7) Safety precautions.
- 8) Special operating instructions.
- d. Maintenance and Overhaul Procedures:
 - 1) Routine maintenance.
 - 2) Guide to troubleshooting.
 - 3) Disassembly, removal, repair, reinstallation, and re-assembly.
6. Guarantee, Bond, and Service Agreement: In accordance with Section 01 77 00, Closeout Procedures.

B. Content for Each Electric or Electronic Item or System:

1. Description of Unit and Component Parts:
 - a. Function, normal operating characteristics, and limiting conditions.
 - b. Performance curves, engineering data, nameplate data, and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 - d. Interconnection wiring diagrams, including control and lighting systems.
2. Circuit directories of panelboards.
3. Electrical service.
4. Control requirements and interfaces.
5. Communication requirements and interfaces.
6. List of electrical relay settings, and control and alarm contact settings.
7. Electrical interconnection wiring diagram, including as applicable, single-line, three-line, schematic and internal wiring, and external interconnection wiring.
8. As-installed control diagrams by control manufacturer.
9. Operating Procedures:
 - a. Routine and normal operating instructions.
 - b. Startup and shutdown sequences, normal and emergency.
 - c. Safety precautions.
 - d. Special operating instructions.
10. Maintenance Procedures:
 - a. Routine maintenance.
 - b. Guide to troubleshooting.
 - c. Adjustment and checking.
 - d. List of relay settings, control and alarm contact settings.
11. Manufacturer's printed operating and maintenance instructions.
12. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Maintenance Summary:

1. Compile individual Maintenance Summary for each applicable equipment item, respective unit or system, and for components or sub-units.
2. Format:
 - a. Use Maintenance Summary Form bound with this section or electronic

- facsimile of such.
- b. Each Maintenance Summary may take as many pages as required.
- c. Use only 8-1/2-inch by 11-inch size paper.
- d. Complete using typewriter or electronic printing.
- 3. Include detailed lubrication instructions and diagrams showing points to be greased or oiled; recommend type, grade, and temperature range of lubricants and frequency of lubrication.
- 4. Recommended Spare Parts:
 - a. Data to be consistent with manufacturer's Bill of Materials/Parts List furnished in O&M manuals.
 - b. "Unit" is the unit of measure for ordering the part.
 - c. "Quantity" is the number of units recommended.
 - d. "Unit Cost" is the current purchase price.

1.07 DATA FOR MATERIALS AND FINISHES

A. Content for Architectural Products, Applied Materials, and Finishes:

- 1. Manufacturer's data, giving full information on products:
 - a. Catalog number, size, and composition.
 - b. Color and texture designations.
 - c. Information required for reordering special-manufactured products.
- 2. Instructions for Care and Maintenance:
 - a. Manufacturer's recommendation for types of cleaning agents and methods.
 - b. Cautions against cleaning agents and methods that are detrimental to product.
 - c. Recommended schedule for cleaning and maintenance.

B. Content for Moisture Protection and Weather Exposed Products :

- 1. Manufacturer's data, giving full information on products:
 - a. Applicable standards.
 - b. Chemical composition.
 - c. Details of installation.
- 2. Instructions for inspection, maintenance, and repair.

1.08 SUPPLEMENT

A. The supplement listed below, following "End of Section," is part of this Specification.

- 1. Maintenance Summary Form.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

MAINTENANCE SUMMARY FORM

PROJECT:

CONTRACT:

1. EQUIPMENT ITEM
2. MANUFACTURER
3. EQUIPMENT/TAG NUMBER(S)
4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS)
5. NAMEPLATE DATA (hp, voltage, speed, etc.)
6. MANUFACTURER'S LOCAL REPRESENTATIVE:

Name:

Phone #:

Address:

7. MAINTENANCE REQUIREMENTS

Maintenance Operation Comments	Frequency	Lubricant (If Applicable)
List briefly each maintenance operation required and refer to specific information in manufacturer's standard maintenance manual, if applicable. (Reference to manufacturer's catalog or sales literature is not acceptable.)	List required frequency of each maintenance operation.	Refer by symbol to lubricant required.

8. LUBRICANT LIST

Reference Symbol	Shell	Exxon Mobile	Chevron Texaco	BP Amoco	Or Equal
List symbols used in No. 7 above.	List equivalent lubricants, as distributed by each manufacturer for the specific use recommended.				

9. RECOMMENDED SPARE PARTS FOR OWNER'S INVENTORY

Part No.	Description	Unit	Quantity	Unit Cost
Note: Identify parts provided by this Contract with two asterisks.				

SECTION 01 91 14
EQUIPMENT TESTING AND FACILITY STARTUP

PART 1 GENERAL

1.01 DEFINITIONS

- A. Facility: Entire Project, or an agreed-upon portion, including all of its unit processes.
- B. Functional Test: Test or tests in presence of Engineer and Owner to demonstrate that installed equipment meets manufacturer's installation, calibration, and adjustment requirements and other requirements as specified.
- C. Performance Test: Test or tests performed after any required functional test in presence of Engineer and Owner to demonstrate and confirm individual equipment meets performance requirements specified in individual sections.
- D. Unit Process: As used in this section, a unit process is a portion of the facility that performs a specific process function, such as the sewage grinder pump, sodium hypochlorite disinfection system, sodium fluoride saturator/injection, control and building mechanical/electrical/plumbing and security systems.
- E. Facility Performance Demonstration:
 - 1. A demonstration, conducted by Contractor, with assistance of Owner, to demonstrate and document the performance of the entire operating facility, both manually and automatically (if required), based on criteria developed in conjunction with Owner and as accepted by Engineer.
 - 2. Such demonstration is for the purposes of (i) verifying to Owner entire facility performs as intended, and (ii) documenting performance characteristics of completed facility for Owner's records. Neither the demonstration nor the evaluation is intended in any way to make performance of a unit process or entire facility the responsibility of Contractor, unless such performance is otherwise specified.

1.02 SUBMITTALS

- A. Informational Submittals:
 - 1. Facility Startup and Performance Demonstration Plan.
 - 2. Functional and performance test results.
 - 3. Completed Unit Process Startup Form for each unit process.
 - 4. Completed Facility Performance Demonstration/Certification Form.

1.03 FACILITY STARTUP AND PERFORMANCE DEMONSTRATION PLAN

- A. Develop a written plan, in conjunction with Owner's operations personnel; to include the following:
 - 1. Step-by-step instructions for startup of each unit process and the complete facility.
 - 2. Unit Process Startup Form (sample attached), to minimally include the following:
 - a. Description of the unit process, including equipment numbers/ nomenclature of each item of equipment and all included devices.
 - b. Detailed procedure for startup of the unit process, including valves to be opened/closed, order of equipment startup, etc.
 - c. Startup requirements for each unit process, including water, power, chemicals, etc.
 - d. Space for evaluation comments.
 - 3. Facility Performance Demonstration/Certification Form (sample attached), to minimally include the following:
 - a. Description of unit processes included in the facility startup.
 - b. Sequence of unit process startup to achieve facility startup.
 - c. Description of computerized operations, if any, included in the facility.
 - d. Contractor certification facility is capable of performing its intended function(s), including fully automatic operation.
 - e. Signature spaces for Contractor and Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Facility Startup Meetings: Schedule, in accordance with requirements of Section 01 31 19, Project Meetings, to discuss test schedule, test methods, materials, chemicals and liquids required, facilities operations interface, and Owner involvement for each unit process startup.
- B. Contractor's Testing and Startup Representative:
 - 1. Designate and furnish one or more personnel to coordinate and expedite testing and facility startup.
 - 2. Representative(s) shall be present during startup meetings and shall be available at all times during testing and startup.
- C. Provide temporary valves, gauges, piping, test equipment and other materials and equipment required for testing and startup.
- D. Provide Subcontractor and equipment manufacturers' staff adequate notification to assist with startup to prevent delays. Schedule ongoing work so as not to interfere with or delay testing and startup.
- E. Owner will:
 - 1. Provide water, power, chemicals, and other items as required for startup, unless otherwise indicated.
 - 2. Operate process units and facility with support of Contractor.
 - 3. Provide labor and materials as required for laboratory analyses.
 - 4. Coordinate manufacturer's representative assistance for Owner-furnished products.

3.02 EQUIPMENT TESTING

A. Preparation:

1. Complete installation before testing.
2. Furnish qualified manufacturers' representatives, when required by individual specification sections.
3. Obtain and submit from equipment manufacturer's representative Manufacturer's Certificate of Proper Installation Form, in accordance with Section 01 43 33, Manufacturers' Field Services, when required by individual specification sections.
4. Equipment Test Report Form:
 - a. Provide written test report for each item of equipment to be tested, to include the minimum information:
 - 1) Owner/Project Name.
 - 2) Equipment or item tested.
 - 3) Date and time of test.
 - 4) Type of test performed (Functional or Performance).
 - 5) Test method.
 - 6) Test conditions.
 - 7) Test results.
 - 8) Signature spaces for Contractor and Engineer as witness.
5. Cleaning and Checking:
 - a. Prior to beginning functional testing:
 - 1) Calibrate testing equipment in accordance with manufacturer's instructions.
 - 2) Inspect and clean equipment, devices, connected piping, and structures to ensure they are free of foreign material.
 - 3) Lubricate equipment in accordance with manufacturer's instructions.
 - 4) Turn rotating equipment by hand when possible to confirm that equipment is not bound.
 - 5) Open and close valves by hand and operate other devices to check for binding, interference, or improper functioning.
 - 6) Check power supply to electric-powered equipment for correct voltage.
 - 7) Adjust clearances and torque.
 - 8) Test piping for leaks.
6. Ready-to-test determination will be by Owner's Representative or Engineer based at least on the following:
 - a. Acceptable Operation and Maintenance Data.
 - b. Notification by Contractor of equipment readiness for testing.
 - c. Receipt of Manufacturer's Certificate of Proper Installation, if so specified.
 - d. Adequate completion of work adjacent to, or interfacing with, equipment to be tested.
 - e. Availability and acceptability of manufacturer's representative, when specified, to assist in testing of respective equipment.
 - f. Satisfactory fulfillment of other specified manufacturer's responsibilities.
 - g. Equipment and electrical tagging complete.
 - h. Delivery of all spare parts and special tools.

B. Functional Testing:

1. Conduct as specified in individual specification sections.
2. Notify Owner and Engineer in writing at least 10 business days prior to scheduled date of testing.
3. For the South Entry Operable gate, provide notification to the Fire Department to witness testing and provide approval of gate operation.
4. Prepare Equipment Test Report summarizing test method and results.
5. When, in Engineer's opinion, equipment meets functional requirements specified, such equipment will be accepted for purposes of advancing to performance testing phase, if so required by individual specification sections. Such acceptance will be evidenced by Engineer/Owner's signature as witness on Equipment Test

Report.

C. Performance Testing:

1. Conduct as specified in individual specification sections.
2. Notify Engineer and Owner in writing at least 10 business days prior to scheduled date of test.
3. Performance testing shall not commence until equipment has been accepted by Engineer as having satisfied functional test requirements specified.
4. Type of fluid, gas, or solid for testing shall be as specified.
5. Unless otherwise indicated, furnish labor, materials, and supplies for conducting the test and taking samples and performance measurements.
6. Prepare Equipment Test Report summarizing test method and results.
7. When, in Engineer's opinion, equipment meets performance requirements specified, such equipment will be accepted as conforming to Contract requirements. Such acceptance will be evidenced by Engineer's signature on Equipment Test Report.

3.03 STARTUP OF UNIT PROCESSES

- A. Prior to unit process startup, equipment within unit process shall be accepted by Engineer as having met functional and performance testing requirements specified.
- B. Startup sequencing of unit processes shall be as chosen by Contractor to meet schedule requirements, meeting the requirements of the Construction Sequencing unless otherwise approved.
- C. Make adjustments, repairs, and corrections necessary to complete unit process startup.
- D. Startup shall be considered complete when, in opinion of Engineer, unit process has operated in manner intended from the beginning for 5 continuous days without significant interruption. This period is in addition to functional or performance test periods specified elsewhere.
- E. Significant Interruption:
 1. May include any of the following events:
 - a. Failure of Contractor to provide and maintain qualified onsite startup personnel as scheduled.
 - b. Failure to meet specified functional operation for more than 2 consecutive hours.
 - c. Failure of any critical equipment or unit process that is not satisfactorily corrected within 5 hours after failure.
 - d. Failure of any noncritical equipment or unit process that is not satisfactorily corrected within 8 hours after failure.
 - e. As determined by Engineer.
- F. A significant interruption will require startup then in progress to be stopped. After corrections are made, startup test period to start from beginning again.

3.04 FACILITY PERFORMANCE DEMONSTRATION

- A. When, in the opinion of Engineer, startup of all unit processes has been achieved, sequence each unit process to the point that facility is operational.
- B. Demonstrate proper operation of required interfaces within and between individual unit processes.
- C. After facility is operating, complete performance testing of equipment and systems not previously tested.

- D. Document, as defined in Facility Startup and Performance Demonstration Plan, the performance of the facility including its computer system as provided by the Contractor equipment.
- E. Certify, on the Facility Performance Demonstration/Certification Form, that facility is capable of performing its intended function(s), including fully automatic and computerized operation.

3.05 SUPPLEMENTS

- A. Supplements listed below, following "End of Section," are a part of this Specification:
 - 1. Unit Process Startup Form.
 - 2. Facility Performance Demonstration/Certification Form.

END OF SECTION

UNIT PROCESS STARTUP FORM

OWNER: City of Vancouver Water Department

PROJECT: Water Station 1 Wellhouses

Unit Process Description: (Include description and equipment number of all equipment and devices):

Startup Procedure (Describe procedure for sequential startup and evaluation, including valves to be opened/closed, order of equipment startup, etc.):

Startup Requirements (Water, power, chemicals, etc.):

	—	—
	—	
	—	

Evaluation Comments:

FACILITY PERFORMANCE DEMONSTRATION/CERTIFICATION FORM

OWNER: City of Vancouver Water Department
Wellhouses

PROJECT: Water Station 1

Unit Processes Description (List unit processes involved in facility startup):

Unit Processes Startup Sequence (Describe sequence for startup, including computerized operations, if any):

Contractor Certification that Facility is capable of performing its intended function(s), including fully automatic operation:

Contractor:
Signature & Print

Date:

Engineer:
Signature & Print

Date:

City of Vancouver

Water Station 1 Well Nos. 3B and 5B Facilities

Technical Specifications

The following professional engineers licensed in the State of Washington contributed to these technical specifications.



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Division 2

Sitework

2.00 GENERAL

Sections in these specifications titled “*Common Work for . . .*” shall apply to all following subsections whether directly referenced or not.

2.05 Common Work for Exterior Improvements

This division covers the work for providing materials and performing all sitework as described in these specifications and as shown on the Plans.

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Erosion and Sedimentation Control Materials
- Fill and Aggregate Materials
- Paving and Surfacing Materials
- Fencing Materials
- Landscaping and Hydroseed Materials
- Fencing Materials

Other items listed in this section or required by the Owner.

2.08 Special Inspections for Earth Work

Part 3 – Execution

Field Quality Control

Special inspections including visual, probing of subgrade, and compaction effort (nuclear densometer or probe) are required for the following locations:

- Trench backfill crossing roads and parking areas (visual, probe and nuclear densometer testing)
- Road and parking area fill and native subgrade (visual, probe, and nuclear densometer testing if found necessary by the Owner)
- Crushed surfacing under roads, parking areas, and structures (visual, probe, and nuclear densometer testing)
- Native (and fill if any) subgrade of vaults, footings, foundations, and floors (visual and probe)
- Finished excavation of detention pond prior to seeding (visual and probe)
- Pond berm native subgrade, fill placement, and compaction (visual, probe and nuclear densometer testing)

- Roadway embankment cut native subgrade (visual and probe)
- Roadway fill embankment subgrade (visual, probe and nuclear densometer testing at various lifts)

Areas where fill (either native or non-native) is being placed shall be tested for compaction compliance by a special inspector. The Owner will pay for the initial testing. If tests indicate failure of compaction requirements, the Contractor shall pay for subsequent tests until tests indicate compliance with the specifications. Areas of native undisturbed subgrade shall be visually inspected by the Owner prior to placement of any material overtop. Contractor shall coordinate with the Owner a minimum of two (2) full working days prior to inspection being needed.

The Contractor shall fully cooperate with the special inspector, including providing safe access to the testing areas. No extra compensation will be provided for cooperation with and facilitation of inspections.

2.10 SITE PREPARATION

2.10.2 Clearing and Grubbing

Part 3 - Execution

Construction

Clearing and grubbing shall be performed by the Contractor to remove and dispose of unwanted debris, vegetative matter, and other items noted on the Plans within the construction limits and shall conform to Section 2-01 of the Standard Specifications.

Protect trees and tree roots, structures and foundations, utilities, fences, and all other existing improvements not being removed regardless if shown to be protected on the Plans.

Remove and relocate permanent improvements that are within the construction limits, such as mailboxes and traffic signs. Locate mailboxes to preserve mail service during construction. Return facilities to original location, or plan location, at completion of local work.

Do not remove organic material including plants, grasses, trees, and native topsoil unless directed on the Plans. Where the Contractor is allowed to clear areas to facilitate construction but is not required to, restore any areas disturbed by construction to existing or better condition including matching surface restoration with seed, sod, or plantings as shown in adjacent areas required to be modified by the Plans. Restoration shall be completed at no additional cost to the Owner.

2.10.3 Well Protection

Part 1 – General

The project is located within the Owner's Sanitary Control Area for their potable water supply. The Owner has water quality records for the aquifer that indicate that it is not currently contaminated.

The Contractor is responsible for preventing accidental release of contaminants due to construction activities. The Contractor is responsible for aquifer water quality during the entire

construction phase and shall take appropriate means to protect the water quality. This may include but is not limited to, providing tarps under inactive equipment, the use of non-toxic oil in construction hydraulic equipment, immediate spill containment and cleanup, installation and maintenance of temporary erosion and sedimentation control devices, and all other work necessary to protect the water quality of the well.

Submittals

At a minimum, the Contractor shall provide the following as part of a spill control and response plan. A draft of this plan is due at the pre-construction conference. The approved version of the plan is due prior to commencing construction activities.

1. Provide a designated person in charge of spill control and site maintenance. This person shall be on-site during operating hours and be responsible for supervising the use and storage of hazardous materials and shall take appropriate actions in the event of a release. This person shall also be available 24 hours per day in the event of a release during non-working hours.
2. Provide secondary containment of hazardous materials and refueling areas (containment equal to the size of the primary container or the largest container for multiple containers in one containment device). Sanitary, refueling and hazardous material storage are not allowed within the 100-foot sanitary radius on the well site, and the Contractor shall designate other areas for this in their plan. Prevent public access to hazardous materials left on site during non-working hours.
3. Construction vehicles and stationary equipment that are leaking fuel, hydraulic fluid, and/or other hazardous materials shall be removed from the well protection area or repaired in place as soon as possible and may remain on the site in the interim only if leakage is completely contained. Keep spill containment and treatment materials on-site at all times. Depending on the frequency of occurrences, the Contractor may be required to provide spill containment devices on equipment at all times (i.e. diapers).
4. Store equipment and supplies adequate for the immediate clean-up of the worst-case hazardous materials spill on-site and close to hazardous materials.
5. All spills or leaks shall be immediately contained, reported, and cleaned up as required by state and local regulations, Washington Department of Ecology guidelines and as noted below. Upon detection of a leak, Contractor shall immediately stop work and correct the leak, contain the spill, and remove the contaminated material from the site for proper disposal. Over-excavate the contaminated site at least 2 feet in all directions to confirm that the spilled material has not penetrated further.

2.10.4 Dewatering

Part 1 - General

Submittals

The Contractor is to determine the scope, type, size, quantity, method of installation, operation, and removal of the dewatering system necessary to keep excavations de-watered to an elevation below the base of the excavation sufficient to stabilize the soils in the excavation and the surrounding areas, and to prevent flotation of partially completed structures. Prepare a detailed dewatering system plan and submit to the Owner for review prior to the installation

of any dewatering system. This plan shall include, as a minimum, the scope, type, size, quantity, method of installation, operation, and removal of all dewatering systems.

Part 3 - Execution

Installation/Construction

Dewatering systems must be positioned away from all building and utility construction so as to not become a part of the permanent facility.

Furnish, install, and operate all necessary machinery, appliances, and equipment to meet these water control requirements. De-water and dispose of the water so as not to cause injury to property or a nuisance to the public. Maintain sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outages, and have competent personnel available at all times to operate the equipment. The dewatering system shall not be shut down between shifts, on holidays, weekends, or during work stoppages.

Field Quality Control

The quality of all water discharged from the site shall meet all State and local requirements. Employ all means necessary to remove suspended solids, oils, trash, and other deleterious materials from water prior to discharging.

Control groundwater and surface water to prevent the softening of the bottom of excavations, or formation of quick conditions or boils during excavation. Lower ground water to **3** feet below the base of the excavation. The Owner will determine if soil conditions are unsuitable for supporting the improvements. The Contractor will determine soil conditions are unsuitable for performing work, placing materials, and proceeding with construction activities. When the dewatering system does not meet the specified requirements, and as a consequence there is a loosening or disturbance of the foundation soils, instability for the slopes, or damage to the foundation or structures occur, the Contractor shall at its own expense, supply all materials, labor, and equipment, and perform all work required for the restoration of foundation soil, slopes, or structure to the satisfaction of the Owner.

Restoration

Remove and backfill dewatering wells in accordance with applicable Federal and State regulations.

2.10.5 Temporary Access Roads

Part 1 - General

Summary

Provide temporary site access and maintain vehicular site access at all times. Access shall be of a quality to permit Contractor's forces and outside inspector's safe and convenient ingress/egress. Unless specifically provided for in other bid items, the cost of building and maintaining construction access shall be incidental with no separate payment. Any bid items for aggregate materials (e.g. crushed rock, ballast, etc.) shall not relate to construction access unless the description of that bid item specifically states inclusion of the construction access.

Part 3 - Execution

Repair/Restoration

Maintain all construction accesses during construction. The cost of such maintenance is incidental to the bid price. Maintenance includes repairing settled and damaged areas and providing dust control. Cost for maintenance due to rain, snow, wind, or other weather conditions is incidental to the bid price.

Cleaning

Wherever construction vehicle access routes intersect paved roads, make provisions to minimize the transport of sediment onto the paved road. Remove all dirt, mud, rocks, vegetation, or other deleterious material from all construction equipment prior to leaving the site. This may include spray washing, sweeping, or other physical methods needed to remove materials.

If sediment or other debris is transported onto a paved road surface, clean the road thoroughly by the end of the workday. Remove debris from roads by shoveling or sweeping. Street washing will be allowed only after debris has been removed in this manner.

2.11 Earthwork Materials

2.11.1 Common Work for Earthwork Materials

Part 1 - General

Acceptance at Site

Owner will review the site near the end of each pay period to determine the equivalent percentage of earthwork completed compared to the total earthwork lump sum price. Contractor will be paid based on the Owners judgement of percentage completed.

Part 2 - Products

Source Quality Control

All imported fill material shall be free of hydrocarbons (e.g. gasoline, diesel, oil, etc.), pesticides, herbicides, hazardous volatile organic compounds (VOCs) and synthetic organic chemicals (SOCs). Provide certification to the Owner that the fill is free of these chemicals.

Provide test data from an independent testing laboratory, insuring the imported fill to be within the regulatory limits set by the Department of Health and Department of Ecology. This will include VOC and SOC tests on imported fill at random intervals averaging every 75 cubic yards. Imported fills found not to be compliant with regulatory standards shall be hauled off site and disposed of properly, at the sole expense of the Contractor.

2.11.2 General Fill

Part 1 – General

Summary

All fill not specifically defined as another type shall be “General Fill”.

References

Section 9-03.14(3) Common Borrow of the Standard Specifications.

Part 2 – Products

Components

General fill shall be soil free of organics, debris, and other deleterious materials, with no individual particles having a maximum dimension larger than 5 inches. The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as general fill.

Part 3 – Execution

Installation/Construction

Compact general fill in uniform layers not exceeding 12 inches in loose thickness and to at least 90 percent maximum dry density based on the ASTM D-1557 (modified) test procedure or 95 percent maximum dry density based on the ASTM D-698 (standard) test procedure.

2.11.3 Structural Fill

Part 1 – General

Summary

All fill placed below and against building components, building structures, vaults, manholes, handholes, slabs, sidewalks, and drives shall be “Structural Fill” unless other fill materials are specifically shown on the Plans. The structural fill material has been selected to support the weight of the structure in combination with the existing native material and to prevent adverse movement during an earthquake. Take particular care to maintain the integrity of the design by using structural fill where shown.

References

Where free draining material for structural fill is required as indicated on the Plans or needed to maintain compaction in adverse weather conditions, it shall conform with Section 9-03.14(1), “Gravel Borrow” of the Standard Specifications.

Structural fill for foundation subgrades, or where free drainage is not required through the structural fill shall conform with 9-03.14(2) “Select Borrow” of the Standard Specifications.

Part 2 – Products

Components

When structural fill will be used around pipes, 100-percent of the material shall pass a 1-inch sieve.

Structural fill shall be soil free of organics, debris, and other deleterious materials. The Owner will determine if native on-site materials are suitable for use as structural fill.

Part 3 – Execution

Installation/Construction

The moisture content of the material and weather conditions at the time of placement will be used to determine the suitability of native materials for backfill as structural fill. Structural fill shall bear on firm base and be placed in uniform layers not exceeding 12 inches in loose thickness. The backfill area must be free of standing water and the subgrade soils must be stable. Each layer of structural fill shall be compacted to at least 95 percent of its maximum dry density based on the ASTM D-1557 (modified) test procedure or 98 percent of its maximum dry density based on the ASTM D-698 (standard) test procedure.

2.11.4 Pipe Bedding

Part 1 – General

Summary

Fill placed below and around buried utilities. The bedding material has been selected to support the weight of the utility by distributing the load so that the completed utility and backfill system does not weigh more than the native material. The grain size has been selected so that the bedding will not migrate into the bottom of the trench. Maintain the integrity of the utility design by using the appropriate pipe bedding material.

Submittals

Recent aggregate gradations must be provided.

Part 2 – Products

Materials

Pipe bedding material for water, storm, and sanitary sewer utilities shall conform with Section 9-03.12(3) “Gravel Backfill for Pipe Zone Bedding” of the Standard Specifications, unless noted otherwise on the plans.

Part 3 – Execution

Installation/Construction

Bedding material shall bear on firm subgrade, surround the pipe and conduits to the limits shown on the Plans, and provide uniform support along the entire length. Excavate holes for pipe bells to prevent concentrated loading at joints or bridging of the pipe.

2.11.5 Trench Backfill

Part 1 – General

Summary

All fill placed above the pipe bedding in a trench shall be “Trench Backfill”. The trench backfill material has been selected to distribute surface loads over the utility. The grain size has been selected so that the trench backfill will not migrate into the pipe bedding or trench walls. Take

particular care to maintain the integrity of the utility design by using the appropriate trench backfill material where shown.

References

Trench backfill shall consist of materials conforming to Section 9-03.19 “Bank Run Gravel for Trench Backfill” of the Standard Specifications or as approved by the Owner.

Part 3 – Execution

Installation/Construction

Trench backfill shall follow the requirements of WSDOT 7-09.3(10) and 7-09.3(11).

2.11.6 Gravel Backfill for Drains

Part 1 – General

Summary

All fill placed around drain pipes in a trench shall be “Gravel Backfill for Drains” to provide drainage for stormwater runoff.

References

Gravel backfill for drains shall conform with Section 9-03.12(4) of the Standard Specifications.

2.11.7 Gravel Base Course

Part 1 – General

Summary

All fill placed directly under and against paving, foundations, and structures shall be “Gravel Base Course” unless otherwise called out on the Plans.

References

Aggregate for gravel base course under structures, and foundations shall conform to Section 9-03.10 Aggregate for Gravel Base or 9-03.9(3) Crushed Surfacing Base Course of the Standard Specifications.

Aggregate for gravel base course under roadways, paved areas, sidewalks, and for gravel areas shall conform to Section 9-03.9(3) Crushed Surfacing Base Course of the Standard Specifications.

2.11.8 Gravel Top Course

Part 1 – General

Summary

Gravel travelled surfaces shown on the Plans shall be “Gravel Top Course”. Gravel top course may also be required directly under paving by the road jurisdiction or if shown on the plans.

References

Aggregate for gravel top course shall conform to Section 9-03.9(3) Crushed Surfacing Top Course and Keystone of the Standard Specifications.

2.11.20 Geotextile Fabric

Part 1 – General

Delivery, Storage, and Handling

Ship, store, place, overlap, and secure fabric based on manufacturer requirements.

Part 2 – Products

Materials

Chose geotextile fabric to meet the requirements based on place and purpose of use.

Geotextile fabric called out on the Plans to separate drain rock or French drains from surrounding soils shall be equal to Tencate Mirafi 140N.

Geotextile fabric for embankment stabilization shall be equal to Mirafi Miramat TM8.

Other locations may require a specialized geotextile fabric and if so shall either be identified in the Plans.

2.12 Road Surfacing

2.12.3 Hot Mix Asphalt (HMA)

Part 1 – General

References

Hot Mix Asphalt (HMA) shall comply with Section 5-04 of the Standard Specifications. All HMA shown on the Plans shall be Commercial HMA unless otherwise noted. Furnish, place, spread, and compact to the thickness shown on the Plans.

HMA used for road paving and patching shall comply with Section 5-04 of the Standard Specifications for HMA Class 1/2-inch. HMA used for driveways and parking lots shall be HMA Class 3/8-inch. Furnish, place, spread, and compact to the thickness shown on the Plans.

2.13 Tree and Shrub Preservation

Part 1 - General

Warranty

Trees or shrubs to be protected that become damaged or die within one year of acceptance shall be remedied or replaced by the Contractor at the discretion of the Owner with plants of the same species and size.

Part 3 – Execution

Installation/Construction

Individual trees and areas shown to remain shall be protected by high visibility construction fence.

Install fencing before site preparation, grading and clearing and grubbing operations. Under no circumstances shall the Contractor, for convenience, or ease of construction, or any other reason not approved by the Owner, remove existing trees that are not designated to be removed.

No work may commence until protective fencing is in place and approved by Owner's Representative. Prior to installation, stake the location of protection fencing for approval by the Owner. Location stakes or marking shall be placed not greater than 20 (twenty) feet on center.

Fencing shall be constructed and located to protect vegetation from physical or chemical damage, flame, smoke, heat, and damage to, or compaction of roots.

Construction access, vehicle or equipment parking, material storage or material disposal will not be allowed within drip lines of existing trees to remain.

Excavate within drip line of trees only where shown. Where trenching for utilities is required within drip line, tunnel under or around roots by methods that do not tear or compromise the health of the roots. Do not cut main lateral roots or tap roots.

Where pruning is shown on the plans, or allowed by the Owner, cut branches with sharp and clean pruning instruments and do not break or chop. Prune flush with trunk surface.

Field Quality Control

The Contractor shall notify the Owner prior to cutting roots over 4 inches in diameter. Treat cut roots over 1-inch in diameter and cut branches 2-inch and larger with asphaltic pruning paint.

2.20 EARTH MOVING

2.23 Excavation

Part 1 – General

Summary

Excavate as necessary to construct the improvements shown.

Part 2 – Products

Materials

Remove all excavated material from the project site.

Part 3 – Execution

Installation/Construction

Excavation includes the digging, scraping, and removing existing native material, abandoned or interfering utilities, abandoned or interfering structures, and any other obstacles necessary for the construction of the improvements. Excavation includes utility excavation, structural excavation, and grading excavation.

Perform utility excavation to the depths necessary to complete the utility work shown.

Perform structural excavation to the limits shown and established by the Owner. Extend the base of the excavation laterally a minimum of 2 feet beyond the structure unless specified otherwise on Plans.

Examination

The Owner will evaluate the base of the excavation to determine if it is suitable for backfilling. The Owner will evaluate the stability of the base of excavation by determining if all significant organic soils or other unsuitable materials have been removed.

Construction

Perform excavation required by the Owner that is beyond the depth shown, per the direction of the Owner.

2.30 SITE IMPROVEMENTS

2.31 Fencing and Gates

2.31.1 Common Work for Fencing

Part 1 – General

Related Sections

- Division 3 Concrete
- Division 10.14.23 Signage

Part 3 – Execution

Preparation

Clear the area along the fence path, remove surface irregularities and grade earth smooth and continuous prior to fence installation.

2.31.2 Temporary Construction Security Fence

Part 1 – General

Related Sections

- Division 10.14.7 Signage

Part 2 – Products

Materials

Provide warning signage at the site entrance for the duration of the project. Sign(s) to be no smaller than 2-feet square with language of (or similar) “Construction Site, No Trespassing”.

Chain link shall be 13-gauge minimum. Top and bottom wire shall be used for fencing with posts directly driven into the ground. Top and bottom rail shall be used for modular fencing using concrete block bases.

Provide padlocks for all gates and least two keys to the Owner.

Part 3 – Execution

Installation/Construction

Provide a 6-feet tall temporary construction fence surrounding the construction site. Space fence posts at a maximum of 12 feet on center. Maintain fence during construction and secure fence after each workday. Install posts securely directly into the ground or set in temporary concrete base blocks. Attach chain link securely to the fence posts. The construction fence may be used in combination with the permanent fence provided that the fence is continuous around the site perimeter.

Clearing limit identification fencing shall not be considered a Temporary Construction Security Fence.

2.31.3 Chainlink Fence

Part 1- General

Summary

This section describes the requirements for the chainlink fence located as shown and detailed on the Plans and these specifications.

Related Sections

- Division 2.31.1 Common Work for Fences
- Division 3.31.3 Post Footings

References

Chainlink Fence Manufacturers Institute Product Manual Specifications

WSDOT Standard Specifications Section 8-12

WSDOT Standard Specification Section 9-16

ASTM F626, A392, A817, F668, F1043, F1083, A121, F567

Submittals

Galvanizing information, steel quality standards, hardware quality standards.

Dimensional drawings including details, finishes, accessories and foundations.

Part 2 - Products

Materials

Obtain chain link fences and gates, including accessories, fittings, and fastenings, from a single source.

Chain-Link (woven wire fabric) fencing shall be commercial grade, as detailed on the Plans and in accordance with Sections 8-12 and 9-16 of the Standard Specifications except as modified herein.

Part 3 - Execution

Installers

Installers shall have a minimum of two years of experience. References from three previous projects shall be submitted for review during shop drawing submittal.

Examination

Verify areas to receive fencing are completed to final grades and elevations.

Ensure property lines and legal boundaries of work are clearly established.

Perform complete utility locates within the areas of fencing to verify conflicting utilities. Fence posts may require adjustment to avoid utilities by a minimum of 2-feet.

Installation/Construction

Chainlink Fence Framing Installation:

- A. Install chain link fence in accordance with ASTM F567 and manufacturer's instructions.
- B. Locate terminal post at each fence termination and change in horizontal or vertical direction of 30 degrees or more.
- C. Space line posts uniformly at 10-feet on center maximum and to avoid utilities by 2-feet minimum.
- D. Concrete set terminal and gate posts: Drill holes in firm, undisturbed or compacted soil. Trowel finish around post. Slope to direct water away from posts. Footings shall be sized per schedule on the Plans or, if not shown per WSDOT Type 3 Chain Link fence.
- E. Check each post for vertical and top alignment and maintain in position during placement and finishing operations.
- F. Bracing: Install horizontal pipe brace at mid-height for fences 8-feet tall and over, on each side of terminal posts. Firmly attach with fittings. Install diagonal truss rods at these points. Adjust truss rod, ensuring posts remain plumb.
- G. Tension wire: If shown on the Plans, install tension wire before stretching fabric and attach to each post with ties. Secure tension wire to fabric with 12½ gauge hog rings 24 inches O.C.
- H. Top rail: If shown on the Plans, install lengths, 21-feet. Connect joints with sleeves for rigid connections for expansion/contraction.

- I. Brace Rails for fabric height 8-feet and over. Install brace rails between terminal posts and adjacent line posts with fittings and accessories. Install brace rails at each gate post and each corner post with angle change exceeding 30 degrees.
- J. Bottom Rails: If shown on the Plans install bottom rails between posts with fittings and accessories.

Chain Link Fabric Installation

- A. Fabric: Install fabric on side facing outward from site and attach so that fabric remains in tension after pulling force is released. Leave no more than 3-inches between finish grade and bottom selvage. Attach fabric with wire ties to line posts and tension wire at 15-inches on center and to rails and horizontal braces at 24-inches on center.
- B. Tension (stretcher) bars: Pull fabric taut; thread tension bar through fabric and attach to terminal posts with bands or clips spaced maximum of 15-inches on center. Hog ties are allowed.

Accessories

- A. Tie wires: Bend ends of wire to minimize hazard to persons and clothing.
- B. Fasteners: Install nuts on side of fence opposite fabric side for added security.

2.40 DEMOLITION AND STRUCTURE MOVING

2.41.16 Structure Demolition

Part 1 - General

Summary

Demolish, remove and dispose of three existing well buildings, including structure, slab, footings, equipment, pumps, piping, conduits, appurtenances, and electrical systems. The existing well buildings are wood framed structures with approximate dimensions as shown on the plans.

References

- ANSI A10.6 Safety Requirements for Demolition Operations
- WAC Section 173-304-461, Inert waste and demolition waste landfilling facility requirements.
- WAC Section 296-62-07721, Communication of hazards.
- WAC Section 296-155-260, Fire protection.
- WAC Section 296-155-775, Preparatory operations.
- WAC Section 296-155-780, Stairs, passageways, and ladders.
- WAC Section 296-155-795, Removal of walls, masonry sections, and chimneys.
- WAC Section 296-155-800, Manual removal of floors.

- WAC Section 296-155-805, Removal of walls, floors, and material with equipment.
- WAC Section 296-155-815, Storage.
- WAC Section 296-155-820, Removal of steel construction.
- WAC Section 296-155-825, Mechanical demolition.
- OSHA

Submittals

Submit a comprehensive demolition plan describing the proposed sequence, methods and equipment for demolition, removal and disposal of structures, including salvage where warranted. Do not proceed with demolition work until the Owner has approved the comprehensive demolition plan.

Provide to the Owner the location of all disposal sites, and copies of the permits and approvals for demolition and for disposal sites before any waste is hauled off the site.

Regulatory Requirements

The Contractor shall obtain all special permits and licenses and give all notices required for performance and completion of the demolition and removal work, hauling, and disposal of debris. The Contractor shall acquire all permits and approvals required for the use of the disposal site(s). The cost of any such permits and approvals shall be included in the Bid Price.

Schedules

Coordinate operations with affected property owners and utilities likely to be impacted by construction and other adjacent contractors. No additional costs or contract time are allowed for delays resulting from a lack of such coordination by the Contractor.

City will coordinate termination of existing electrical utility to the site.

Warranty

Protect, indemnify and save harmless the Owner from any damages that may arise from the Contractor's activities in making these arrangements. Such indemnity shall be in accordance with RCW 4.24.115 as amended by CH. 305, Laws of 1986. Any action required to satisfy any permit and/or any approval requirements in a Contractor provided disposal site shall be performed by the Contractor at no additional expense to the Owner.

Part 3 - Execution

Preparation

All structures, utilities, and properties not specifically targeted for demolition as shown on the Contract Plans, shall be protected from damage or interruption by the Contractor's activities. Responsibility for safety and protection of buildings near or in the project limits are the Contractor's. Repair or replace damaged structures, utilities, and/or properties to the satisfaction of the Owner.

The location of underground utilities; power, telephone, fiber optic, cable, gas, etc., shown on the Contract Drawings are approximate. The actual locations may vary from those shown.

The Contractor is responsible for verifying all utility locations. No extra costs are allowed for delays resulting from utility conflicts for which the Contractor is responsible. On questions regarding the disposition of existing utilities, improvements, or buildings, the Contractor shall contact the Owner for advisement.

Conduct demolition and removal work in a manner to minimize the spread of dust and flying particles.

Construction

Upon abatement of asbestos- and lead-containing materials, demolition may commence. Meet the requirements of the WAC.

All material shall be hauled from the site and properly disposed of.

Field Quality Control

Burying or burning of trash and debris on the site is not permitted.

Remove trash and debris frequently so their presence will not delay the progress of the work.

Removed materials, trash, and debris shall become the property of the Contractor and be removed from the Owner's property and disposed of in a legal manner. Location of disposal site and length of haul are the Contractor's responsibility.

2.50 EXCAVATION SUPPORT AND PROTECTION

2.51 Contractor Designed Shoring

Part 1 - General

Summary

Where shoring, sheet piling, sheeting, bracing, lagging, or other supports are necessary to prevent cave-ins or damage to existing structures, it is the responsibility of the Contractor to design, furnish, place, maintain, and remove supports in accordance with applicable laws, codes, and safety requirements.

References

Chapter 296-155 of WAC, "Safety Standards for Construction Work, Part N, Excavation, Trenching, and Shoring".

OSHA

Quality Assurance

Where the Contractor is required to provide the shoring design, it shall be prepared by a competent person as defined by WAC 296-155-650. Before beginning any excavation that is governed by the shoring requirements, the Contractor shall submit their stamped shoring plan and calculations to the Owner for approval. The stamp must be present on all Plans and calculations, and all submittals must be approved by the Owner prior to starting work.

Part 3 - Execution

Installation/Construction

Design, planning, installation, and removal of sheeting, shoring, sheet piling, lagging, and bracing shall maintain the undisturbed state of soil below and adjacent to excavation.

2.60 CONTAMINATED & WASTE MATERIALS HANDLING

2.60.2 Waste Material Control

Part 1 – General

Quality Assurance

Adhere to all requirements of federal, state, and local statutes and regulations dealing with pollution. Permit no public nuisances.

Use only dump sites that are approved by the regulatory agency having jurisdiction, and present proof of approval upon request.

Part 3 – Execution

Installation/Construction

The Contractor shall take precautions to warn, protect, and prevent the public from all hazards that exist on site due to demolition or construction operations. Surround stockpiled debris with yellow warning tape attached to lath, stakes, poles, or fencing to warn the public of any potential hazard.

Use water sprinkling, temporary enclosures, or other methods to limit dust and dirt from rising and scattering in the air. Collect and clean surface water runoff that is contaminated with site debris, silt, or other material that adversely affects water quality prior to discharge. On-site collection ponds may not be used to keep silt laden water from entering the storm water collection system.

Do not use water to control dust when its use may create hazardous or objectionable conditions such as ice formation, flooding, or pollution.

Minimize the amount of dust and other airborne particles caused by any demolition, excavation, stockpiling, or removal activities. Implement dust control measures prior to the beginning of work activities. Exposed soil may be wetted with water or covered to minimize dust creation. Water runoff from the wetting procedure shall be accumulated and cleaned prior to disposal. Remove water runoff accumulation from the site prior to project completion.

Cleaning

Keep the construction area clean and orderly. Upon completion of the work, leave buildings broom clean and all parts of the work clean and free of rubbish and excess material of any kind. Leave fixtures, equipment, walls, and floors clean and free of stains, paint, roofing splashes, or other marks or defects. Upon completion, restore site and all work or equipment and material storage areas to their original conditions. Remove all miscellaneous unused material resulting from work and dispose of it in a manner satisfactory to the Owner. The site, through the progress of construction, shall be kept as clean as possible and in a neat condition.

2.61 Contaminated Materials

2.61.2 Toxic Spill or Release Contact Requirements

Part 3 - Execution

Field Quality Control

During construction, if there is any toxic substance spill or release discharged into the environment, report the location, quantity, date and time of the spill or release to Washington State Emergency Management at 1 (800) 258-5990 and the Owner's representative. Spills shall be monitored, contained, and cleaned up to applicable codes at the Contractor's expense.

2.90 LANDSCAPING

2.90.1 Common Work for Landscaping

Part 1 – General

Submittals

In addition to Division 2.05, provide the following information.

- Composition of compost.
- Written maintenance instructions recommending proper procedures for maintenance of plant materials.
- Top Soil - Submit the data for topsoil to be used as determined by an approved testing lab. Data shall include percentage of organic content as determined by incineration process and recommendations on type and quality of additives required to establish satisfactory pH factor, organic content, and supply of nutrients to bring the soil to a satisfactory level for planting.
- Nursery Material Plant Lists with quantities and sizes (pot volume and/or tree height)
- Planting schedule, indicating approximate planting date.

Delivery, Storage, and Handling

Deliver fertilizers in original, unopened and undamaged containers that list weight, analysis, and name of manufacturer. Store in such a manner as to prevent wetting and deterioration. Take all precautions customary in good trade practice in preparing plants for transplanting. Spray deciduous plants in foliage with an approved "Anti-Desiccant" immediately after digging to prevent dehydration. Dig, pack, transport, and handle plants with care to ensure protection against injury. If plants cannot be planted immediately upon delivery, properly protect them with soil, wet peat moss, or in a manner acceptable to the Owner. Water plantings as necessary to keep them alive and in healthy condition. Provide dry, loose topsoil for planting bed mixes.

Project/Site Conditions

Prevent damage to existing features, pavement, utility lines, areas to receive planting and other features remaining as part of final landscaping and/or site improvements.

Quality Assurance

The Contractor, with the approval of the Owner will select a qualified testing laboratory to test and inspect operations under this Section at the Contractor's expense. Notify testing laboratory of times for inspections.

Notify Owner if any undesirable conditions are met during construction so that supplemental recommendations can be made.

Comply with sizing and grading standards of the latest edition of "American Standard for Nursery Stock." A plant shall be dimensioned as it stands in its natural position.

Warranty

Warrant trees, shrubs and ground cover for the period as stated in the Warranty section of Division 1 against defects including death and unsatisfactory growth, except for defects resulting from negligence by Owner, abuse or damage by others or unusual phenomena or incidents beyond the Contractor's control.

Replace, in size and kind and in accordance with the Plans and Specifications, all plants that are dead or, as determined by the Owner, in an unhealthy or unsightly condition, or have lost their natural shape due to dead branches or other causes due to the Contractor's negligence. Such replacement(s) will be at Contractor's expense.

Warranty shall not include damage or loss of trees, plants, or ground covers caused by fires, unusual floods, freezing rains, lightning storms, sustained winds over 75 miles per hour, or other catastrophic "Acts of God". Winter kill caused by extreme cold and severe winter conditions not typical of planting area, unanticipated acts of vandalism or negligence on the part of the Owner and damage caused by wildlife, shall not be covered under this warranty.

Part 2 – Products

Materials

A complete list of plants, including a schedule of sizes, quantities and other requirements is shown on the Plans. If quantity discrepancies or material omissions occur in the plant materials list, the planting Plans shall govern.

All plants shall be nursery grown under climatic conditions similar to those in the project locale for a minimum of 2 years or transplanted from on-site. All potted plants shall be grown in the containers in which they are sold for a minimum of one year.

Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, providing that the larger plants will not be cut back to size indicated. Provide plants indicated by two measurements so that only a maximum of 25 percent are of the minimum size indicated and 75 percent are of the maximum size indicated.

Part 3 – Execution

Examination

Examine proposed planting areas and conditions of installation. Do not start planting work until unsatisfactory conditions are corrected and approved by the Owner's Authorized Representative.

Notify Owner's Authorized Representative at least 7 working days prior to installation of plant material.

The Owner will make final inspection to determine acceptance of planted areas, upon Contractor's request. Provide notification at least 10 working days before requested inspection date. Planted areas will be accepted, provided all requirements, including maintenance, have been complied with and plant materials are alive and in a healthy, vigorous condition after final acceptance of the project.

Upon one year after Substantial Completion, the Owner will assume plant maintenance.

Repair/Restoration

Replace all dead plant materials within thirty (30) days of discovery.

Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.

Tighten and repair guy wires and stakes as required.

Correct defective work as soon as possible after deficiencies become apparent and weather and season permit.

Field Quality Control

Provide plant material record Plans legibly recording actual construction indicating horizontal and vertical locations, referenced to permanent surface improvements. Identify field changes of dimension and detail any changes.

Cleaning

During landscape work, keep adjacent areas clean and work area in an orderly condition.

Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment as instructed by Owner. Repair damage resulting from planting operations.

Remove temporary irrigation systems when no longer needed and approval by the Owner.

2.90.3 Soil Amendments

2.90.3.3 Mulch

Part 2 – Products

Materials

Mulch for slopes less than 2H:1V: Shredded plant waste as described above or commercially available straw. Straw shall not include Reed Canary grass.

Mulch for slopes 2H:1V or steeper: Nutramulch compost or approved equal. Mulch shall meet the requirements of WSDOT 9-14.5(2)C Short-Term Mulch.

Part 3 – Execution

Installation

Plant Waste or Straw: Spread to a uniform thickness of 2-inches in thickness unless otherwise shown on the Plans. Blend into the soil.

Nutramulch: Premix with soil at $\frac{1}{3}$ mulch to $\frac{2}{3}$ soil ratio for 3-inch depth or apply 1.5-inch depth and till into the soil.

2.90.10 Topsoil

Part 2 – Products

Materials

Protect existing topsoil in seeding/planting areas or remove and stockpile for later use. Existing topsoils that are contaminated or degraded due to the Contractor's activities shall be replaced by the Contractor at no cost to the Owner.

Import topsoil shall be naturally occurring surface soil with a maximum sand content of 60 percent. Topsoil shall have no evident rocks or debris over $\frac{1}{2}$ -inch. Acidity pH range shall be between 5.0 and 6.5. Organic matter content shall be 10 to 20 percent by dry weight. Add dolomite limestone, if required, to obtain pH. Limestone, if used, shall be finely ground, passing a minimum of 90 percent through the U.S. Standard No. 8 sieve and 20 percent through the U.S. Standard No. 100 sieve. Add approved nutrients, if required, to bring nutrients to a satisfactory level for planting as recommended by a qualified testing laboratory (exclude nitrogen, potassium, and phosphorus).

Part 3 – Execution

Installation

In planter areas, soil excavated shall be mixed with organic compost in a ratio of $\frac{1}{3}$ organic compost to $\frac{2}{3}$ sandy loam.

In seeding areas, place topsoil and rake or blade to a smooth, consistent surface. Do not compact. Install 2-inch depth topsoil unless specified otherwise on the plans or within the specific seeding/planting specification section.

Dispose of excess soil per the Owner's instructions.

2.90.11 Hydroseed

Part 1 – General

Related Sections

- Division 2.90.21 Erosion Control Matting

Scheduling

Apply hydroseed within the optimum seeding windows whenever possible. Hydroseed may be used for temporary erosion control only with the approval of the Owner. Time construction practices to minimize bare, cleared, and excavated areas so that surfaces are hydroseeded and seed germinates and grows stabilizing surfacing as soon as possible. The optimum seeding windows are April 1 through June 30 and September 1 through October 1. Seeding that occurs between July 1 and August 30 will require irrigation until 75 percent grass cover is established. Seeding that occurs between October 1 and March 30 will require a mulch layer 2-inches thick until 75 percent grass cover is established.

Maintenance

Provide temporary irrigation, mulch or plastic sheeting (plastic sheeting for short term protection only, 7 days maximum) to hydroseeded areas as required for establishment and to protect the seed from construction activities at no additional cost to the Owner.

Part 2 – Products

Materials

Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. Mulch may be made up of 100-percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, and kenaf; compost; or blends thereof. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Mulch or tackifier product used shall be installed per manufacturer's instructions.

Areas that have seed applied by hand shall have a minimum 2-inch thick layer of compost-based mulch or 1-inch layer of topsoil. Slow-release fertilizers shall be used. Fertilizer shall not be agitated more than 20 minutes in the hydromulch machine before it is to be used.

On 2:1 slopes and less, Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products may be used in lieu of erosion control mat. BFM/MBFM products are applied with approximately 10 percent tackifier. BFM/MBFM shall be allowed to cure 24-36 hours before rainfall and shall not be installed on wet or saturated soils.

Western Washington Hydroseed Mix

Install seed, fertilizer, and mulch for hydroseed mix at the following application rates:

Seed	180 pounds per acre
Fertilizer	90 pounds per acre, 10-4-6 Nitrogen-Phosphorus-Potassium (N-P-K)
Mulch	1,500 pounds per acre
BFM/MBFM	3,000 pounds per acre (for 2:1 slopes and steeper)

Ditch/Pond Seed Mix			
Name	Proportion by Weight	% Purity	% Germination
Tall or Meadow Fescue	75-80%	98%	90%
Seaside/Creeping Bentgrass	10-15%	92%	85%
Redtop Bentgrass	5-10%	90%	80%
All Other Areas Seed Mix			
Name	Proportion by Weight	% Purity	% Germination
Redtop or Oregon Bentgrass	20%	92%	85%
Red fescue	70%	98%	90%
White Dutch Clover	10%	98%	90%

Fertilizer: None

Mulch: Wood Cellulose Fiber or HECP Long-Term Mulch per WSDOT 9-14.5(2)A at 2,500 lbs./acre.

Part 3 – Execution

Preparation

The seedbed should be firm and rough. All soil should be roughened regardless of slope. If compaction is required, slopes must be track walked before seeding. Backblading or smoothing of slopes greater than 4:1 is not permitted if they are to be seeded.

Installation

All disturbed surfaces within the project not otherwise covered by asphalt, gravel, quarry spalls, concrete, or other plant material/landscape items shall be hydroseeded, except ditches and swales may have seed applied by hand. Apply seed prior to installing erosion control blankets.

Field Quality Control

These specifications are the minimum requirements for the anticipated conditions. The Contractor is responsible to ensure seeded areas establish ground cover and to provide any additional measures necessary to establish ground cover in seeded areas. Any seeded areas that fail to establish at least 75-percent cover (100-percent cover for areas that receive sheet or concentrated flows) shall be reseeded at no additional cost to the Owner.

Provide a temporary irrigation system until growth is established if hydroseeding is applied between April 1st and October 1st in Western Washington or Oregon, or for any work at any time in Eastern Washington. Remove temporary irrigation systems when no longer required.

2.90.13 Sod

Part 1 - General

Maintenance

Keep sod areas moist until well-established.

Part 2 – Products

Materials

Sod shall be a blend of 70-percent merion bluegrass and 30 percent red fescue and contain no more than 1-percent of other grasses, none of which shall be of a coarse undesirable variety. Sod shall not be less than 10 months old nor more than 30 months old and shall be healthy and have a dense, vigorous, well-developed root structure. Sod shall be delivered to the job site within 24 hours of being harvested and installed before roots dry.

Part 3 – Execution

Preparation

Spread 200 lbs. of lime per 1,000 square foot, thoroughly incorporate and bring to grades indicated. Rake entire surface to a smooth and even grade; remove all rocks over 1/2-inch in diameter, grass roots, debris, and roll.

Installation

Use tight, staggered joints.

Division 3

Concrete

3.00 GENERAL

Sections in these specifications titled “*Common Work for . . .*” apply to all following subsections whether directly referenced or not.

3.05 Common Work for Concrete

Part 1 - General

This division covers that work necessary for furnishing and installing all concrete as described in these specifications and as shown on the Plans.

References

Materials shall conform to the following standards:

- Cement - ASTM C150
- Coarse aggregate - ASTM C33
- Fine aggregate - ASTM C33
- Admixtures - ASTM C494
- Air-entraining admixtures – ASTM C260
- Fly Ash – ASTM C618
- Admixture and products in contact with potable water – NSF 61

Submittals

Submittal information shall be provided to the Owner for the following items:

- Concrete mix design including aggregate gradation and substantiating strength data.
- Admixture Data
- Special placement procedures for hot or cold weather
- Concrete anchors
- Concrete anchor installer certification per ACI/CRSI Adhesive Anchor Installer Certification Program.
- Schedule of surface finishes
- Rebar mill certifications
- Rebar placement shop drawings
- Precast concrete items
- Schedule of form inserts
- Grouts
- Embedded items
- Form Liners and associated products

- Form Release agent
- Method of plugging through-bolt holes

Concrete mix designs shall be submitted to the engineer for approval a minimum of two weeks prior to placing any concrete. The mix design shall include the amounts of cement, fine and coarse aggregate, water and admixtures, as well as the water cement ratio, slump, concrete yield, aggregate gradation, and substantiating strength data in accordance with ACI 318, Chapter 5. A batch plant inspection may be required, the cost of which shall be paid by the Contractor. Review of mix submittals by the engineer of record indicates only that information presented conforms generally with contract documents. Contractor or supplier maintains full responsibility for specified performance.

Part 2 - Products

Components

Nominal maximum size for aggregates is the smallest standard sieve opening through which the entire amount of aggregate is permitted to pass. Provide intermediate aggregate grades as required to achieve a well-graded mix.

All concrete surfaces exposed to weather or standing water shall be air entrained. Total air content shall be in accordance with IBC requirements unless specified otherwise herein. Air shall be measured at the truck, unless otherwise agreed to.

Water used in concrete shall be potable.

Fly ash may be substituted for up to 15 percent of the required cement, except where noted.

Any products that will be applied to the surface of the concrete and will be in contact with potable water must carry NSF 61 certification. Any concrete admixtures used in potable water storage structures must also carry NSF 61 certification.

Mixes

Concrete shall be mixed, conveyed, and proportioned in accordance with IBC section 1905.

The concrete mix shall include the amount of cement, fine and coarse aggregate, including aggregate gradations, water, and admixtures as well as water cement ratio, slump, concrete yield, and sustaining strength data in accordance with these specifications, the requirements of the International Building Code Section 1905, and the requirements of ACI 318.

Finishes

Coat all aluminum in contact with concrete as specified in Division 9.

Part 3 - Execution

Inspection

See Statement of Special Inspections on the Drawings for special inspection requirements. Provide two (2) full working day notice to Owner prior to needing the required inspections.

Also comply with local building department and permit requirements for inspection and notification.

The Contractor shall repair, replace or modify, as appropriate, any items noted in the Special Inspector's inspection or the building department inspection.

Testing

Concrete strength tests shall be performed per section 1905.6 of the IBC and per the requirements noted herein. The Owner will provide and pay all costs of concrete testing. The Engineer shall be furnished with copies of all inspection reports and test results.

Cylinders used for concrete strength tests shall be 6 by 12. Four by 8 cylinders may be used for mixes with maximum aggregates less than 1-inch, however the testing lab must apply a 0.94 multiplier to the compressive strength test results unless data acceptable to the Engineer is presented that would justify a higher multiplier. All mixes utilizing aggregates over 1 inch shall be tested using 6 by 12 cylinders.

When 4 by 8 cylinders are utilized AASHTO T23 requirements shall be followed, and the retainer used with neoprene pads when testing for compressive strength shall be constructed according to ASTM C1231.

The Contractor will coordinate all concrete testing with the testing agency. Costs will be paid by the Owner.

Give the Owner and testing agency 48-hour notice prior to concrete placement. If Contractor fails to provide the required notice, the Owner may elect to cancel the affected concrete placement. Contractor shall be responsible for costs and delays due to improper notification.

If the Contractor schedules a concrete placement and does not notify the Owner and testing agency of a cancellation within 24 hours of the scheduled placement, the Contractor shall pay the testing agency costs for an unnecessary trip. If the Contractor fails to provide the testing agency with adequate notification and testing agency cannot attend concrete placement, Contractor shall reschedule placement. Contractor shall be responsible for all associated delays.

The Contractor shall provide all assistance and cooperation necessary to testing personnel to obtain the required concrete tests. Contractor and Owner will have access to testing results as soon as they are available.

The testing agency shall take a minimum of four samples for every 50 yards of concrete placed (and a minimum of four per pour); one for a 7-day test, two for 28-day tests, and one for backup testing in case the other two samples do not meet design strength. Additional samples may be taken to verify strength prior to form removal at the Contractor's expense.

3.06 Maintenance of Concrete

3.06.30.71 Resurfacing of Cast-in-Place Concrete

Part 1 - General

This division covers that work necessary for repairing spalled and damaged concrete. Repair any areas with deterioration exceeding ½-inch, where rebar is exposed or where directed by the Owner.

Part 2 - Products

Materials

CONCRETE REPAIR MATERIAL: SikaTop 111 PLUS or equal cement-based repair mortar. Mortar shall be ANSI/NSF Standard 61 approved if in contact with potable water and contain a corrosion inhibitor. See Manufacturer's Literature for primer and auxiliary products appropriate for use with the repair material.

Siloxane / Silane sealer shall be Tnemec / Chemprobe Prime-A-Pell 633 or Prime-A-Pell H20.

Part 3 - Execution

Preparation

The Contractor shall be familiar with the product and methods and be prepared to discuss the repair procedure at the Preconstruction Meeting.

High pressure power-wash the exposed structure to remove all loose, delaminated concrete to sound concrete.

Surface Preparation: Remove loose, delaminated concrete to sound concrete. Where corrosion of the reinforcement exists, continue bulk removal along the reinforcing steel and adjacent areas with evidence of corrosion-induced damage. Under-cut all exposed reinforcing steel by a minimum of $\frac{3}{4}$ -inch. The shape of the prepared cavity should be square or rectangular in shape. The edges of the patches shall be saw-cut perpendicular to the surface to a minimum depth of $\frac{1}{2}$ -inch. Repair area shall be a minimum of $\frac{1}{2}$ -inch deep throughout. Use abrasive blasting to remove residual dust, debris, fractured concrete, and contaminants that prevent proper bonding. Following abrasive blasting, blow out repair areas with oil-free compressed air. The final surface texture should be rough with minimum $\frac{1}{8}$ -inch amplitude.

Treatment of exposed reinforcement: All signs of corrosion should be removed from exposed reinforcing steel by an abrasive blasting, wire wheel or needle scaler. If the cross-sectional area of the reinforcing steel has been significantly reduced, the engineer should be consulted. Prime reinforcing as recommended by the repair material manufacturer.

Installation

Surface Saturation: Saturate surface with potable water. The base concrete shall be in a saturated surface dry (SSD) condition prior to application of repair material to prevent a rapid loss of moisture from the repair material and into the substrate.

Mixing and Application of Repair Material: Mixing and application shall be in strict accordance with the manufacturer's instructions. Apply the material with adequate pressure before the bond coat dries. Thoroughly consolidate the repair material into the corners of the patch and around any exposed reinforcement in the repair zone. If a second lift is required, thoroughly roughen the surface of the first lift by scoring the soft mortar to achieve an aggressive finish, similar in profile to the prepared concrete substrate. If the second lift will not be immediately applied, keep the first lift moist until application of the second lift. Finish to match existing surface. Cure using curing compound.

Apply silane sealer as specified to exposed surfaces and edges of roof slab.

3.10 FORMING AND ACCESSORIES

3.11 Formwork

3.11.13 Structural Cast in Place Forming

Part 1 – General

The Contractor shall submit a construction joint plan to the Engineer for review prior to formwork and rebar installation if altered from that shown on the Plans. Modifications to the construction joints shall be submitted to the Engineer no less than 7 working days prior to placing the forms and rebar.

Part 2 – Products

Materials

Unless otherwise directed, coat contact surface of forms with colorless, non-staining, mineral oil that is free from kerosene, or other approved suitable material, to permit satisfactory removal of forms without concrete damage. Form-release agent for interior of potable water storage structures shall be National Sanitation Foundation Standard (NSF) No. 61 approved for use in direct contact with potable water.

Form construction for surfaces covered with backfill shall be made of steel, plywood, or dressed, matched lumber. Form construction for exposed surfaces shall be made of new plywood or steel without surface markings.

Form ties for use in liquid containment structures shall be standard plastic cone snap-ties with $\frac{3}{4}$ -inch diameter neoprene waterstop washer or removable taper ties. Use Greenstreak X-plugs with removable taper ties or equal. Contractor shall submit to the Engineer form ties to be used for review prior to installation.

Part 3 - Execution

Installation/Construction

Concrete forms shall be sufficiently tight to prevent leakage of concrete or mortar and shall be properly braced or tied together to maintain desired position and shape until removed.

Conduits, pipes and sleeves of any material not harmful to concrete and within the limitations of ACI 318, Section 6.3 are permitted to be embedded in concrete with approval of the Engineer. Provide a $\frac{3}{4}$ -inch chamfer or radius at all exposed corners and edges, unless specifically stated otherwise on the Plans.

Forms shall remain in place until the concrete has developed sufficient strength to withstand imposed loads without damage or deflection. Wall and slab forms shall remain in place for a minimum of 24 hours after completion of the pour. Forms for beams and suspended slabs shall remain in place for a minimum of 14 days AND until concrete has developed 28-day design strength, unless approved by the Engineer. The Contractor shall coordinate with the testing lab to verify concrete strength prior to form removal.

Do not allow water to flow through areas where forms are to be placed. During form construction and prior to placement of concrete, keep footings and floor slab areas free of standing water.

Field Quality Control

Variations from plumb, specified grade, conspicuous lines, and walls shall not exceed plus or minus ¼-inch in any 10-foot length, and shall not exceed one inch over the entire length. Variations from dimensions shall not exceed plus or minus ½-inch. Closer tolerances shall be achieved by the Contractor as necessary to accommodate equipment and other permanent materials.

3.15 Concrete Accessories

3.15.02 Premolded Joint Filler

Part 1 – General

References

Premolded joint filler for expansion or through joint applications shall conform to the specifications for “Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction”, AASHTO M 213, except the requirement for water absorption is not applicable.

Part 2 – Products

Materials

The thickness and width of premolded joint filler shall be as indicated on the Plans. Where no premolded filler thickness is indicated, the thickness shall be ¾-inch.

3.15.05 Pipe Penetrations through Concrete

Part 1 - General

Summary

Structures not holding water or subject to exterior groundwater: Unless identified otherwise on the Plans, all pipes larger than 2-inch diameter passing through poured-in-place concrete shall be isolated from the concrete as described herein.

Part 2 - Products

Materials

Provide a Sch 40 or thicker PVC pipe as a sleeve. Size the sleeve so its inside diameter is ½-inch to 2-inches larger than the carrier pipe outside diameter.

Seal the annular space between the pipe and the sleeve with a foam backer rod appropriately sized for the gap followed by butyl rubber caulking.

Spray applied expansion foam in lieu of caulking may be allowed for rigid carrier pipes (ductile iron, steel, hard copper, DR18 or thicker PVC) but requires the Owner's approval. Applications that will be considered for foam are where differential movement more than

1/8-inch between the pipe and the concrete is neither expected nor desired. Use an outdoor or pest-block foam rated to fill a 1.5-inch or smaller gap, do not use wide-gap style foam.

Part 3 - Execution

Preparation

Protect sleeves that will be cast into concrete from intrusion of concrete slurry. Thoroughly clean surfaces that will be in contact with caulking.

Installation

Center the sleeve on the carrier pipe in the concrete formwork. Extend the sleeve a minimum of 2-inches below the concrete base for horizontal pours. Set the top of sleeve no lower than flush with the finished concrete surface unless directed by the Owner to set higher than the surface. If the sleeve extends above the finished surface, following curing contact the Owner for directions on the distance above the surface to cut the finished top of sleeve. Cut plumb with the concrete surface and debur edges.

Install backer rod and caulking at both ends of the sleeve if both are accessible.

If using expansion foam, cut and sand flush with the surface after the foam is cured.

Coring of the finished concrete in lieu of a sleeve will be only allowed with prior written approval by the Owner.

3.15.19 Concrete Anchors

Part 1 - General

Quality Assurance

Installation of adhesive anchors shall be performed by personnel certified in accordance with the ACI/CRSI Adhesive Anchor Installer Certification Program. In lieu of certification the installer shall attend on-site training held by the adhesive manufacturer prior to the installation of adhesive anchors.

Part 2 - Products

Materials

Concrete Anchors shall be Hilti HIT 500-V3, Simpson SET-XP, or Powers PE1000+ Adhesive Anchors.

CMU Anchors shall be Simpson SET-XP Adhesive Anchors.

Anchorage into non-grouted, hollow masonry cells is not allowed unless specifically called out on plans. Where allowed, anchors in unreinforced masonry cells shall be Simpson SET-XP epoxy adhesive in conjunction with the Simpson Optimesh screen.

Threaded rod shall be stainless steel except in dry locations.

For wall mounted equipment weighing less than 250 pounds in grouted or non-grouted CMU cells, Simpson Titen-HD Screw Anchors may be used. Screw anchors may not be used for securing items subject to cyclic loads, such as walking surfaces or machinery.

Part 3 - Execution

Installation

Install in accordance with Manufacturer's recommendations. Special Inspection in accordance with IBC, Section 17, must be provided. Provide a minimum of 48 hours' notice to Engineer prior to starting installation. Concrete anchors shall not be used to resist tension or fatigue loading without Owner's evaluation and approval.

Use threaded rod or reinforcing bar as shown on the drawing, and meeting Manufacturer's recommendations. Provide minimum embedment as shown. Holes shall be drilled with carbide-tipped drill bit. Holes shall be cleaned of dust and debris. Adhesive shall be inserted with a mixing nozzle.

3.20 REINFORCING

3.21 Reinforcement Bars

3.21.11 Plain Steel Reinforcement Bars

Part 1 - General

References

ACI – American Concrete Institute- latest edition

CRSI Manual of Standard Practice – latest edition

Part 2 - Products

Materials

Grade – ASTM A706, Grade 60

ASTM A615, Grade 60 shall be permitted if:

- (a) The actual yield strength based on mill tests does not exceed f_y by more than 18,000 psi; and,
- (b) The ratio of actual tensile strength to the actual yield strength is not less than 1.25.

Detailing - ACI 318 and ACI 315

Lap requirements - See schedule on Plans or as required by ACI 318

Tie wire - 16 gauge minimum

Bar supports shall conform to "Bar Support Specification" CRSI Manual of Standard Practice, MSP-1-80. Provide Class 1, plastic protected bar supports. Use pre-cast concrete blocks to support bars off ground. Bar supports in water holding and buried structures shall be non-metallic.

Bar supports for the bottom rebar mat of suspended slabs or beams in water holding structures must be point supports (chairs or dobbies), not continuous.

Part 3 - Execution

Installation

Reinforcing steel shall be detailed in accordance with ACI 315 and 318 and as shown on the Plans. Lap all reinforcements in accordance with "the reinforcing splice and development length schedule". Provide corner bars at all wall and footing intersections. Bend wire bar ties away from formwork to provide the same concrete clearance as shown on the Plans to the bars.

Welding of reinforcing steel shall not be performed unless specifically approved by the Engineer. If approved, Contractor will arrange and pay for all required Special Inspections associated with welding of reinforcing steel.

Field Quality Control

Reinforcing steel shall be free of rust and loose scale at time of concrete placement. Bars with kinks, improper bends, or reduced cross-section due to any cause will not be used. Bars shall not be field bent. Bars may not be tack-welded or otherwise heated.

If, within the project warranty period, rust spots appear on the concrete due to failure to achieve proper clearance on the rebar or wire ties, the Contractor shall grind out and patch the areas using a method satisfactory to the engineer.

3.30 CAST-IN-PLACE CONCRETE

3.30.05 Common Work for Cast in Place Concrete

Part 1 - General

Delivery

Concrete shall be transported in a truck mixer to the jobsite and discharged within 1.5 hours after cement has been added to water or aggregates. Rejected concrete will be at Contractor's expense.

Part 2 - Products

Components

If allowed, curing materials shall conform to ASTM C171 and liquid membrane-forming compounds shall conform to ASTM C309. When concrete is to be coated or stained, use UV-dissipating form release and curing compounds.

Part 3 - Execution

Preparation

Do not place concrete during rain, sleet, or snow until water and freezing protection is provided.

Position embedded items accurately, and support against displacement or movement during placement.

Fill voids in sleeves, insets, anchor slots, etc., temporarily with readily removable materials to prevent entry of concrete into voids.

Before beginning placement of concrete, remove hardened concrete and foreign materials from inner surface of mixing and conveying equipment. Before depositing concrete, remove debris from space to be occupied by the concrete. Secure reinforcement in position to prevent movement during concrete placement.

At the beginning of the concrete pour for walls taller than 8 feet, place a 1½ to 2½-inch thick grout pad prior to placing the concrete for the wall. Grout mix shall consist of fine aggregates, concrete and water in the same ratios as used in the wall concrete. The placement of the concrete shall proceed immediately after the grout placement so as to prevent any cold joints.

At construction joints, thoroughly clean surface of existing concrete to remove laitance. Roughen existing concrete surface to expose aggregate uniformly and apply approved bonding agent to existing concrete in accordance with manufacturer's recommendations. Prior to placing fresh concrete, dampen joint and coat with grout mixture in accordance with ACI 301, Section 8.5.

Installation

Placement shall be in accordance with IBC, Section 1905.

Place no concrete when air temperature is below or expected to be below 40 degrees during the 28-day curing period unless a low temperature concrete mix has been approved by the Owner. Provide adequate equipment for heating materials and protecting concrete during freezing or near freezing weather. Keep materials, reinforcement, forms, and ground in contact with concrete free from frost at time of placement. Heat mixing water as required. Use no materials containing ice.

Place no concrete when air temperature exceeds or is expected to exceed 85 degrees during the 28-day curing period unless a high temperature placement plan has been approved, and unless adequate precautions are taken to protect work. Cool ingredients prior to mixing. Flake ice or crushed ice of a size that will melt completely during mixing may be substituted for all or part of water. Cool forms and reinforcing prior to placing concrete.

Handle concrete from mixer, ready-mixed truck, or from transporting vehicle to place of final deposit by methods which prevent separation or loss of ingredients. Under no circumstances shall concrete that has partially hardened be deposited.

Place concrete in maximum lifts of 3 feet. Deposit concrete continuously so that no concrete will be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within the section. If a section cannot be placed continuously, locate and reinforce construction joints at points as provided for in the Plans or as approved by the Owner. Maximum concrete drop shall be 5 feet.

Consolidate concrete by vibration, supplemented by hand spading, rodding, forking, or tamping. Thoroughly work concrete around reinforcement, around embedded items, and into corners of forms to eliminate air or rock pockets which may cause honeycombing, pitting, or planes of weakness. Insert and withdraw internal vibrators at points approximately 18 inches in each direction and extend into the lower concrete lifts. At each insertion, the

duration shall be sufficient to consolidate the concrete; but not sufficient to cause segregation. Do not use vibrators to transport concrete within forms. Consolidate slabs by utilizing vibrating screeds, roller pipe screeds, internal vibrators, or other approved methods. Have a spare vibrator available at jobsite during concrete placing operations.

After removal of forms, cut out and patch defects in concrete surfaces. Remove form tie cones. Cut or snap off form ties to a depth of $\frac{3}{4}$ -inch. Chip out rock pockets, holes from form tie removal, and other defects to solid concrete. Repair defects in accordance with 3.06.30.71.

Curing

See section 3.39.

3.31 Structural Concrete

Part 1 - General

Summary

All concrete shown in the contract documents including below-grade structures, ringwalls, and all other concrete items not specifically called out otherwise. Not to be used for mass concrete or liquid containment. Hydraulic Concrete may be substituted.

Performance Requirements

28-day compressive strength – 4,500 psi minimum

Slump - Without plasticizers; 4 inches for floor and roof slabs, 7 inches for walls. With plasticizers, maximum 9 inches or as desired for placement. Use water reducers as required to achieve slump.

Part 2 - Products

Mixes

Water/cement ratio - 0.40 maximum

Nominal maximum aggregate size – $\frac{3}{4}$ -inch (AASHTO Grading No. 67)

Entrained air ratio – 3.5 percent minimum to 6.5 percent maximum

3.31.30 Thrust Blocks, Driveways, Curb, Gutter, Sidewalks, Equipment Pads, and Fence Posts

Part 1 - General

Summary

All concrete for non-structural applications including thrust blocks, driveways, sidewalks, equipment pads, and fence post foundations. Hydraulic or Structural Concrete may be substituted.

Performance Requirements

28-day compressive strength – 4,500 psi minimum

Part 2 - Products

Mixes

Water/cement ratio - 0.45 maximum

Nominal maximum aggregate size – ¾-inch (AASHTO Grading No. 67)

Entrained air ratio – 3.5 percent minimum to 6.5 percent maximum

3.35 Concrete Finishing

3.35.05 Common Work for Surface Finishing

Part 2 - Products

Finishes

Each concrete area that requires finishing shall conform to one of the following requirements:

- Foundation (exterior) - Ordinary Wall
- Foundation (interior) - Ordinary Wall
- Interior Floors - Floated
- Equipment Pads - Sacked Wall
- Sidewalks – Light Brushed

Part 3 - Execution

Preparation

Do not place concrete which requires finishing until the materials, tools, and labor necessary for finishing the wet concrete are on the job and acceptable to the Owner. If rainfall is possible, tent the work area prior to the pour and maintain protection until the concrete is cured sufficiently to resist damage.

3.35.50 Ordinary Wall Finish

Part 2 Products

Materials

Ordinary Wall Finish requires the use of like-new forms and linings that will produce a uniform surface.

Part 3 - Execution

Construction

After points have set sufficiently, grind or fill form marks and pointings to give a smooth surface even with flat wall surface. Fill all holes greater than ¼-inch with 1:2 mortar floated to an even, uniform finish.

3.35.54 Floated Finish

Part 3 - Execution

Construction

Consolidate, strike off, and level concrete; but do not work further until ready for floating. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit floating operations. Consolidate surface with power-driven floats. Hand floating may be used if area is small or inaccessible to power units.

Field Quality Control

Check surface planeness during or after first floating. Cut down high spots and fill low spots to produce surface with tolerance of $\frac{1}{4}$ -inch in 10 feet in any direction. Refloat to a uniform, smooth, sandy texture immediately after leveling.

3.35.56 Light Brush Finish

Part 2 – Products

Finish

When concrete has appropriately set, finish with light soft broom finish. Brush perpendicular to slab slope.

Part 3 - Execution

Construction

Consolidate, strike off, and level concrete; but do not work further until ready for floating. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit floating operations. Consolidate surface with power-driven floats. Hand floating may be used if area is small or inaccessible to power units.

Field Quality Control

Check surface planeness during or after first floating. Cut down high spots and fill low spots to produce surface with tolerance of $\frac{1}{4}$ -inch in 10 feet in any direction. Re-float to a uniform, smooth, sweat finish concrete.

3.35.58 Sacked Wall Finish

Part 1 – General

References

Provide sacked finish in accordance with Section 6-02.3(14)A of Standard Specifications.

3.39 Concrete Curing

Part 2 - Products

Materials

Curing compounds are not permitted on surfaces that will receive coatings.

Part 3 - Execution

Installation

All concrete for structures, sidewalks, drives, curbs, shotcrete (see section 3.37), and where directed by the Owner, shall be water-cured in accordance with ACI 308.1 unless approved in advance by the Owner. If allowed, curing compound shall be applied immediately after finishing or form removal. When plastic or burlap covers are used to augment or protect curing, extend sheeting beyond the edges of the concrete and secure against wind lift. Inspect and adjust curing systems daily, including over weekends and holidays.

3.40 PRE-CAST CONCRETE

3.48 Pre-Cast Concrete Specialties

3.48.50 Utility Structures

Part 1 - General

Related Divisions

- 13.39.13 Sanitary Sewer Manholes, Frames, and Covers

Design Requirements

All concrete structures identified on the Plans as being pre-cast, prefabricated, or not specifically detailed with reinforcing steel shall be pre-cast concrete.

Pre-cast vaults shall conform to ACI 318 and be constructed to the equivalent dimensions and functional characteristics of the specific product identified on the Plans.

Unless shown otherwise on the plans, round structures larger than 30-inch inside diameter, or rectangular structures with longest interior side 30-inches or longer, that utilize riser sections, shall be cast with an integral keyway for interlocking the riser sections.

Performance Requirements

Pre-cast structures shall be constructed to withstand anticipated construction loads that occur during transport, handling, and placement as well as the anticipated design loads. Design loads shall include the anticipated soil pressures, hydrostatic loads, and HL-93 traffic loading.

Part 2 - Products

Materials

Additional reinforcement shall be provided within the pre-cast concrete structure at all penetrations, openings, joints, and connections. The additional reinforcement shall be provided to prevent damage during shipping, handling and installation. All damaged units shall be rejected.

All precast structures that consist of sections (base, riser, lid, etc.) shall have the joints sealed with rubber gaskets or mastic, of a material appropriate for the installation.

Part 3 - Execution

Cleaning

Fill picking holes with grout flush to the structure surface, including those in vault lids. Cut, remove, and grind smooth shipping lifting hooks on the vault interior, unless directed otherwise by the Engineer.

3.60 GROUTING

3.62 Non-Shrink Grouting

3.62.13 Non-Metallic Non-Shrink Grout

Part 1 - General

Summary

Use Precision Non-Shrink Grout for grouting all equipment base plates, pipe supports, and base plates for metalwork. Precision Non-Shrink grout may also be used for all other non-shrink grouting operations. General Purpose Non-Shrink grout may be used for any applications other than those noted for Precision Non-shrink Grout. Non-shrink grout shall be used to seal all new pipe and conduit penetrations (watertight) into and out of all concrete and CMU block walled structures.

Storage and Handling

Stockpile grout to prevent contamination from foreign materials and store admixtures to prevent contamination or damage from excess temperature change

Part 2 - Products

Materials

Precision Non-Shrink Grout:

Provide a high-precision, fluid, non-shrink, quartz or non-catalyzed metallic aggregate grouting material. Provide a ready-to-use grout that hardens free from bleeding, settlement, or drying shrinkage when mixed, placed and cured at any consistency – fluid, flowable, plastic or damp-pack.

Provide precision, non-shrink natural aggregate grout that when cured produces the following properties:

- A. Compressive Strength at fluid consistency (ASTM C109-Modified): 3500 psi (24 MPa) at 1 day, 7500 psi (52 MPa) at 28 days.
- B. Passes ASTM C1107 as a grade B grout when tested as temperature minimum and maximums of 45 degrees Fahrenheit to 90 degrees Fahrenheit (8 degrees Celsius to 32 degrees Celsius) at a working time of 30 minutes. Grout must be tested at a fluid consistency per ASTM C939 and remain fluid at temperature range minimum and maximums for the 30-minute working time. All materials including water must be mixed and tested at temperature minimum/maximums.

- C. Modulus of Elasticity at 28 days at fluid consistency (ASTM C469): 3.0×10^6 psi (20.7 GPa) minimum, 3.9×10^6 (27.0 GPa) maximum.
- D. Coefficient of Thermal Expansion for fluid consistency (ASTM C531): 7.5×10^{-6} /degrees Fahrenheit maximum (13.5×10^{-6} /degrees Celsius).
- E. Flexural strength at 28 days for fluid consistency (ASTM C78): 1300 psi (7.9 MPa).
- F. Resistance to rapid freezing – thawing (ASTM C666, Procedure A): 300 cycles- min RDF 90 percent.
- G. Split tensile strength at 28 days at fluid consistency (ASTM C496): 450 psi (3.1 MPa).
- H. Pass 24-hour grout test under stated temperature, time and fluidity constraints. See MBT Protection and Repair 24-hour Grout Form.

Precision non-shrink grout shall be MasterFlow 928 or 885 Grout or approved equal.

General Purpose Non-Shrink Grout:

General Purpose Non-shrink grout shall meet the compressive strength and nonshrink requirements of CRD-C 621, Grades B and C; Corp of Engineers Specification for Non-shrink grout; and ASTM C1107, Grades B and C. General Purpose Non-shrink grout shall be MasterFlow 713, Dayton Superior 1107 Advantage, or approved equal.

Provide curing compounds as recommended by the grout manufacturer.

Water to be used in mixing the grout shall be potable.

Mixes

Comply with grout manufacturer's recommendations for mixing procedures.

Adjust water temperature to keep mixed grout temperature in the range of 45 degrees Fahrenheit (7 degrees Celsius) and 90 degrees Fahrenheit (32 degrees Celsius) minimum/maximum.

Use cold or iced water to extend working time in hot weather or in large placements.

Use warm water in cold conditions to achieve minimum as mixed temperatures.

Part 3 - Installation

Preparation

Mechanically remove unsound concrete within the limits of the grout placement.

Remove at least ¼-inch (6mm) of existing concrete facing and continue removal as required to expose sound aggregate.

Thoroughly clean the roughened surface of dirt, loose chips, and dust. Maintain substrate in a saturated condition for 24 hours prior to grouting. Surface should be saturated surface dry at time of grouting.

Clean baseplates and other metal surfaces to be grouted to obtain maximum adhesion. Remove loose rust and scale by grinding or sanding.

Comply with grout manufacturer's recommendations for form construction. Construct forms to be liquid tight.

Installation

Place grout mixture into prepared areas from one side to the other. Avoid placing grout from opposite sides in order to prevent voids. Work material firmly into the bottom and sides to assure good bond and to eliminate voids.

Ensure that foundation and baseplate are within maximum/minimum placement temperatures. Shade foundation from summer sunlight under hot conditions. Warm foundation when foundation temperature is below 45 degrees Fahrenheit (7 degrees Celsius).

Wet cure exposed shoulders for 48 hours followed by two coats of curing compound for best results. The minimal requirement is to wet cure until grout has reached final set, followed by two coats of curing compounds.

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Division 4 Masonry

4.00 GENERAL

This division covers that work necessary for furnishing and installing masonry as described in these specifications and as shown on the Plans.

Sections in these specifications titled "*Common Work for . . .*" shall apply to all following subsections whether directly referenced or not.

4.05 Common Work for Masonry

This division covers that work necessary for providing materials and performing all masonry as described in these specifications and as shown on the Plans.

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Masonry Mortar
- Masonry Grout
- Reinforcing Steel Shop Drawings – Include plan view showing blocks and exact location of all vertical reinforcing.
- Concrete Masonry Units (CMU) – Provide certification for all units. Provide samples for all colored and/or faced units.
- Color Scheme
- Waterproofing materials
- Masonry Insulation
- Masonry Accessories
- Letter of Certification for Masonry Prism Testing as noted in the IBC

4.20 UNIT MASONRY

4.22 Concrete Unit Masonry

Part 1 - General

Summary

This division covers that work necessary for furnishing and installing all Concrete Unit Masonry as described in these specifications and as shown on the Plans. Masonry mortar shall be used to properly level, position, bond together, seal irregularities, and provide a weather-tight joint between the concrete masonry units (CMU). Masonry grout shall be used to fill all CMU cells that contain reinforcing steel.

Related Sections

- Division 7.21.30 CMU Wall Insulation
- Division 9.05.00 Common Work for Finishes
- Division 9.06 Color Schedule
- Division 9.97.23 Concrete and Masonry Coatings: Interior walls
- Division 9.97.23.9 Exterior walls
- Division 9.97.23.10 Water repellant

References

- 2012 International Building Code
- TMS 602/ACI 530.1/ASCE 6 Specifications for Masonry Structures
- TMS 402/ACI 530/ASCE 5
- ASTM A-615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- ASTM C-33, Standard Specifications for Concrete Aggregates
- ASTM C-67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
- ASTM C-90, Standard Specification for Loadbearing Concrete Masonry Units
- ASTM C-144 Standard Specification for Aggregate for Masonry Mortar.
- ASTM C-150, Standard Specification for Portland Cement
- ASTM C-207, Standard Specification for Hydrated Lime for Masonry Purposes
- ASTM C-270, Standard Specification for Mortar for Unity Masonry
- ASTM C-404, Standard Specification for Aggregate for Masonry Grout.
- ASTM C-476, Standard Specification for Grout for Masonry
- ASTM C-744, Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units
- ASTM C1019, Standard Test Method for Sampling and Testing Grout

Design Requirements

Compressive strength shall be determined using the unit strength method or the prism test method in accordance with IBC Section 2105.2.2. Net Area compressive strength shall be a minimum of 1500 psi.

Mortar shall conform to section 2103.9 of the IBC for type “S” mortar with a minimum compressive strength of 1800 psi at 28 days.

Masonry grout shall comply with Article 2.2 of TMS 602/ACI 530.1/ASCE 6.

Storage, Delivery, and Handling

All blocks shall be covered and protected against wetting prior to use.

Stockpile and handle grout and mortar to prevent contamination from foreign materials; store admixtures to prevent contamination or damage from excessive temperature changes. Water to be used in mixing the grout shall be free from foreign materials.

Part 2 - Products

Materials

Concrete Masonry Units

Concrete Masonry Units shall be hollow load-bearing type, conforming to ASTM C-90, Grade N, Type 1, 1900 psi minimum. Provide aggregates meeting ASTM C33. All units, unless otherwise noted, shall have normal weight aggregate having a uniform quality, texture, and color. Unit sizes and shapes shall be 8 inches high by 16 inches long by 8 inches wide (nominal).

Masonry shall be split face exterior with smooth face interior as shown on the drawings.

Exterior face of masonry units upon which equipment (cabinets, electrical panels, awnings, anchor plates, etc.) will mount, may be smooth face or ground smooth in the field. Measure locations and size of equipment carefully. Smooth face may extend no more than 1-inch past the equipment and must result in consistent, parallel lines.

Masonry Mortar

Cement shall meet ASTM C-150, lime shall meet ASTM C-207 and aggregates shall meet ASTM C-144.

Proportion mortar by volume and mix in a standard mortar mixer operated in accordance with manufacturer's recommendations. Mix ingredients thoroughly in dry form and add water to bring the mixture to the proper consistency for use. Do not hand-mix mortar.

Mortar proportioned in accordance with ASTM C270, Table 1 need not be tested. Where testing is required, mortar shall be laboratory tested prior to use in accordance with ASTM C270.

Provide mortar pigment to match owner-selected color of concrete masonry units.

Masonry Grout

Masonry grout components shall comply with ASTM C-150 for Portland cement and ASTM C-404 for aggregates.

Per ASTM C-476 Fine Grout Standards, masonry grout shall consist of one-part Portland cement to three parts masonry sand and one-tenth part lime and shall have a minimum compressive strength of 2000 psi.

Compressive strength of masonry grout shall be determined in accordance with ASTM C1019.

Reinforcement

Reinforcing steel bars shall be ASTM A-615, Grade 60. Provide bar lengths and sizes as shown on the Plans.

Components

Provide vertical reinforcement at all corners, on each side of openings 24 inches and larger than and at the intervals shown. Provide horizontal reinforcing at bond beams as shown on the Plans, and above and below all openings larger than 24-inches.

Accessories

Where called out, anchors shall be dovetail anchor slots and anchors. Anchor slots shall be equal to Burke "Fleming" masonry anchor slot and anchors shall be equal to "AA Wire Products Dovetail Flex-O-Look Channel and Ties", or equal.

Finishes/Colors

Mortar color shall match one of the adjacent block course colors unless shown otherwise on the Plans.

Coat the following surfaces with the products identified under "Related Divisions" above.

- Exterior walls
- Interior walls

Part 3 - Execution

Preparation

When joining fresh masonry to set or partially set masonry construction, the Contractor shall clean the exposed surface of set masonry and remove loose mortar prior to laying fresh masonry.

The Contractor shall protect sills, ledges, and offsets from mortar drippings or other damage during construction. The Contractor shall protect the adjoining work from mortar drippings, and newly-laid masonry from damage and from rain until the mortar has set.

Installation

Masonry construction shall comply with the requirements of IBC 2104 and with TMS 602/ACI 530.1/ASCE 6.

The cold weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 C, shall be implemented when the ambient temperature falls below 40 degrees Fahrenheit (4 degrees Celsius).

The hot weather construction provisions of TMS 602/ACI 530.1/ASCE 6, Article 1.8 D, shall be implemented when the ambient air temperature exceeds 100 degrees Fahrenheit (37.8 degrees Celsius), or 90 degrees Fahrenheit (32.2 degrees Celsius) with a wind velocity greater than 8 mph (12.9 km/hr)

The Contractor shall lay only dry masonry units. When masonry needs to be sawed, only masonry saws shall be used to cut and fit masonry units. All units shall be set plumb, true to line, and with level courses accurately spaced. The masonry unit shall be adjusted to final position while the mortar is soft and plastic. If the units are displaced after the mortar has

stiffened, the Contractor shall remove the units, clean the joints or mortar, and relay with fresh and clean units.

All joints shall be tooled and concave unless otherwise specified.

The Contractor shall remove mortar protruding into cells of cavities to be reinforced.

All un-grouted concrete masonry units with an exterior face shall be insulated as shown on the Plans and detailed in Division 7.

All masonry reinforcement and accessories shall be installed as shown on the Plans and submitted details. The Contractor shall not splice reinforcing except as shown on the Plans. The minimum splice, where not indicated, shall be 32 bar diameters or 24 inches, whichever is greater. All accessories shall be cleaned of all dirt, grease, oil, loose mill scale, excessive rust, or other foreign matter which may reduce bond with grout or mortar.

Fill all vertical and horizontal cells that contain reinforcing and as detailed on the Plans with grout. Cells shall have an unobstructed vertical alignment. The Contractor shall provide grouted bond beams where required. Provide lintels made up of reinforced, grouted lintel sections over all wall openings as shown on the Plans. The Contractor shall install horizontal and vertical reinforcing and hold in position as the work progresses to maintain the following clearance between the reinforcing and the block surface: 1½ exterior, ¾-inch interior.

The maximum lift for grout pours shall be 4 feet. The Contractor shall make sure that the grout is consolidated with a vibrator immediately after pouring and re-consolidate after excess moisture has been absorbed; but before plasticity is lost. Provide clean-outs at the bottom of all grouted courses. Contractor may eliminate clean-outs at the Owner's discretion, if the bottoms of all cells are free of knocked-off mortar fins and dirt. The Contractor shall hold grout 1½ inches below the top of the upper most units when work stops for over one hour, and thoroughly clean and roughen the joint before proceeding with the work.

The Contractor shall grout full-space-around door frames and other built-in items. Build in all work with the masonry including anchor bolts. Build in wall plugs, doors, windows, and accessories and plumbing appurtenances as erection progresses.

At the stoppage of work at any time, the work shall be covered with tarpaulins or boards to prevent rain or snow from entering the cores of the block. The walls shall be adequately braced to support masonry. If mortar or grout has been misplaced, the Contractor shall have it immediately removed.

Shore reinforced lintels a minimum of 14 days after grout placement or until a 28-day strength is achieved.

Prior to completion, fill all holes in joints. All defective joints shall be cut out and repointed. At the end of each day's work and after final pointing, dry-brush the masonry surface.

Field Quality Control

Variations from plumb, specified grade, conspicuous lines, and walls shall be plus or minus ¼ inch in any 10-foot length, not to exceed plus or minus 1 inch overall. Variations from dimension shall not exceed plus or minus ½ inch.

Special Inspection shall be in accordance with Table 1.18.3 (Level C Quality Assurance) of TMS 402/ACI 530/ASCE 5.

Also see Statement of Special Inspections on the Drawings. Provide 48-hour notice to Owner prior to needing the required inspections.

Comply with local building department and permit requirements for inspection and notification.

The Contractor shall repair, replace or modify, as appropriate, any items noted in the Special Inspector's inspection or the building department inspection.

The Contractor shall provide verification to the Engineer that site-produced mortar meets the required proportions using visual observations. Engineer reserves the right to require additional testing in accordance with ASTM C 270.

Field testing of grout shall be meet the requirements of ASTM C1019. The testing agency shall take a minimum of three grout samples for every 5,000 square feet of wall placed (and a minimum of four per week); two for 28-day tests, and one for backup testing in case the other two samples do not meet design strength. Additional samples may be taken to verify strength at the Contractor's expense.

Division 5

Metals

5.00 GENERAL

This division covers that work necessary for furnishing and installing metalwork as described in these specifications and as shown on the Plans.

Sections in these specifications titled “*Common Work for . . .*” apply to all following subsections whether directly referenced or not.

5.05 Common Work for Metals

Part 1 - General

Related Sections

- Division 9 Finishes

Submittals

Submittal information shall be provided to the Owner for the following items:

- Shop Drawings showing details of Fabricated Metalwork including connections and welding
- Calculations and plans stamped by a professional engineer licensed in the State of Washington for all Contractor- or Manufacturer-designed components or assemblies.
- Welder certifications if applicable. For ASME Section IX certifications, and if requested by the Owner, provide a continuity log if the last certification was 6 months prior to the work being performed.

Inspections

Unless otherwise noted on the Plans, specifications, or building department requirements, special inspections related to metal fabrications, placement and welding shall be subject to 48-hour notice to the Engineer prior to the inspection time. 48-hour notice is defined in Division 1, Contractor Responsibility.

Any Field welding shown on the Plans will require special inspections in accordance with section 1704.3 of the IBC and AISC 360.

Quality Assurance

Only prequalified welds (as defined by AWS) shall be used.

Fabricator shall be registered and approved by American Institute of Steel Construction (AISC) to perform shop fabrication without special inspection. Submit certificate of compliance to the Owner at the completion of fabrication. Owner will forward this to the Building Official.

If fabricator is not registered and approved, or the certificate of compliance is not received, the Contractor shall reimburse the Owner for all Special Inspections required by the IBC on shop fabricated items. The Contractor shall also reimburse the Owner for all Special Inspections required by the IBC for field welding not specifically shown on the Plans.

Contractor shall alert Owner at least 30 calendar days in advance if such Special Inspections will be required in order to procure the services of a testing lab.

Special Inspection by the Owner does not relieve the Contractor of responsibility of performing his own inspections and testing to ensure that all items are properly constructed.

Part 2 - Products

Materials

Structural Steel

Structural steel shall conform to the following requirements:

Plates, shapes, angles, rods - ASTM A36 and A992, $F_y \geq 36$ ksi

Special shapes, plates - ASTM A572, $F_y \geq 50$ ksi

Pipe Columns - ASTM A53, Grade B Type E or S, $F_y \geq 35$ ksi (see Division 15.22 for steel pipe carrying fluids).

Structural Tubing - ASTM A500, Grade B, $F_y \geq 46$ ksi

Stainless Steel

Stainless steel shall be type 304 (non-welded) or type 304L (welded) or as called out.

Plates - ASTM A240

Fasteners - ASTM F593

Extruded Structural Shapes - ASTM A276

Pipe - ASTM A240 or higher grade or as called out.

See Section 15.22.4 for information on pipe used for mechanical applications.

All stainless steel shall have a standard mill finish where concealed or No. 4 finish where exposed and shall be cleaned of all foreign matter before delivery to the job site.

Aluminum

Plates - ASTM B209, Type 6061-T6

Extruded Shapes - ASTM B308, Type 6061-T6

Pipe - ASTM B210 Type 6061

Architectural Applications - ASTM B210, Type 6063

Aluminum materials in contact with concrete or other metals or other masonry materials shall have surfaces coated per Division 9.

Galvanized Steel

Base metal shall be as specified for Mild Steel.

Hot-dip galvanized after fabrication in accordance with ASTM A 924/A 924M.

Finishes: For pieces that will NOT be painted, galvanize with zinc coating in accordance with ASTM A 653/A 653M. For pieces that WILL be painted, galvanneal with zinc/10 percent iron coating in accordance with ASTM A 653/A 653M.

Manufactured Units

Design of Contractor- or Manufacturer-designed components or assemblies shall meet the specific component requirements as provided here-in, as well as all applicable state and federal codes. Design shall include gravity loads and seismic loads in accordance with ASCE 7-10 Chapter 13 "Seismic Design Requirements for Nonstructural Components". Design criteria shall be as provided herein for components, and as provided on the Plans.

Contractor-designed components and assemblies shall be shop welded and field bolted if possible. Field welding will NOT be allowed unless specifically shown, or there is no reasonable alternative.

Finishes

All steel fabrications shall be surface prepped, shop primed and field coated in accordance with Division 9. Shop priming shall be protected as required to prevent damage to the coating during shipping. Hold back shop priming from areas to be field welded.

Isolate and coat dissimilar metals to prevent galvanic corrosion.

Non-exposed structural steel: Mill finish or as shown on Plans

Exposed structural steel (damp or wet locations): Division 9

Aluminum: Division 9

Galvanized steel: Division 9

Stainless steel: Uncoated

Part 3 - Execution

Fabrication

All welding shall be in accordance with AISC and American Welding Society (AWS) standards and shall be performed by AISC and/or AWS certified welders using electrodes to match base material. Only prequalified welds (as defined by AWS) shall be used. Welding inspection shall be performed in accordance with the applicable AWS provisions and Chapter 17 of the IBC. Shop welding requiring inspection or testing per IBC Chapter 17 must be tested by an independent testing laboratory certified by AWS and approved by the owner at the Contractor's expense. Field welding, where required or allowed, will be inspected by a representative of the owner at the owner's expense. This does not relieve the Contractor of responsibility of performing his own inspections and testing to ensure that all items are properly constructed.

All shop welds shall be ground smooth.

Any shop paint on metal surfaces adjacent to joints to be field welded shall be wire brushed to remove the paint film prior to welding.

Where steel items to be welded are galvanized, galvanizing must first be removed by grinding with a silicon carbide wheel, by grit blasting or by sand blasting.

Any cutting or grinding equipment used on stainless steel must be new or only previously used on other stainless-steel material.

All stainless-steel shop welds shall be pickled after welding to remove heat damage and contaminants. Field welds must be passivated using an Engineer approved product (Citrisurf 2210 or equal). If the metal will be in contact with potable water, pickling and passivation products must be citric acid based and thoroughly removed, or use a product approved by USDA or NSF.

Installation

Fabrications shall be installed as shown on the approved shop drawings. All members shall be accurately located and erected plumb and level.

Metal fabrications shall be installed or erected as based on the American Institute of Steel Construction (AISC) "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings", latest edition, plus all referenced code requirements.

Temporary bracing, such as temporary guys, braces, false-work, cribbing, or other elements, shall be provided by the Contractor in accordance with the requirements of the "Code of Standard Practice", wherever necessary to accommodate all loads to which the structure may be subjected, including construction loads. Such bracing shall be left in place as long as may be required for safety. As erection progresses, the work shall be securely bolted or welded to compensate for all loads during construction.

No permanent bolting or welding shall be performed until the structure has been properly aligned.

5.05.23 Bolts and Other Connectors For Structural Elements

Part 2 - Products

Materials

Bolts and other connectors not specifically called out otherwise shall be in accordance with the following.

Under no circumstances shall the fasteners be of lesser strength or higher corrosion potential than the materials being connected.

Connection bolts, nuts and washers for all materials in wet, damp or corrosive locations shall be Stainless Steel, alloy 304 in raw domestic or treated domestic water, alloy 316 in treatment process and sewage applications, and alloy 317 for acidic transport. Bolts and nuts shall meet ASTM F593B (bolts 1/4-inch to 1 1/2-inch in diameter with 30 ksi yield) and F594B (nuts). Use Nitronic 60 bolts and nuts for strong chlorine environments.

Steel and cast-iron fabrications: Connection bolts for dry locations shall be ASTM A307 galvanized or zinc plated bolts.

Structural Plastic Fabrications: Connection bolts shall be ASTM A307 galvanized in dry applications and Stainless Steel in wet, damp or corrosive locations.

Aluminum Fabrications: Connection bolts shall be ASTM A307 galvanized. Aluminum fasteners may be allowed where high strength is not needed (e.g. mounting expanded metal screens, or louver fins), confirm with Engineer prior to use. Steel screws must be galvanized, or zinc plated. 300 Series stainless steel fasteners allowed only with the use of isolating washers.

Stainless steel fabrications: Fasteners to match same stainless series as structure (e.g. 300 series fasteners with 300 series structure)

Bolts installed into hardened concrete and CMU shall be Concrete Anchors per section 3.15.19.

Bolts and studs shall be long enough that at least two threads extend beyond the face of the tightened nut.

For pump anchor bolts, see Division 11.

For mechanical pipe (non-structural) connections, see Division 15.21, "Common Work for Pipe and Fittings".

Part 3 - Execution

Installation

All materials to be joined together shall be connected as shown on the Plans, specifications, as recommended by the manufacturer, or as required by standard industry practices if not otherwise specified.

Dissimilar metals:

In damp locations, isolate dissimilar metals using nylon isolation sleeves and washers, Cooper B-Line Nylon Headed Sleeve Kit or equal.

For wet locations: avoid dissimilar metals unless specifically approved or shown. Use similar metals with welded connections. If approved or shown, use galvanized mild steel bolts installed into prepped and coated holes with additional field coating over the top of bolt.

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Division 6

Wood, Plastics, and Composites

6.00 GENERAL

Sections in these specifications titled “*Common Work for . . .*” shall apply to all following subsections whether directly referenced or not.

6.05 Common Work for Wood, Plastics, and Composites

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Trusses: Submit truss design drawings bearing the Professional Engineering seal and signature of the truss designer, placement diagram(s), permanent individual truss member restraint/bracing method and details, and any other structural details germane to the trusses.
- Trusses: Submit registration and approval to perform truss fabrication without special inspection and provide certificate of compliance or submit detailed fabrication and quality control procedures as specified.
- Structural Lumber
- Preservative Wood Treatment
- Shop Fabricated Structural Wood
- Millwork
- Wood Trim

Part 3 - Execution

Construction

Provide temporary bracing, such as temporary guys, braces, false-work, cribbing, or other elements, in accordance with the requirements of the “Code of Standard Practice”, wherever necessary to accommodate all loads to which the structure may be subjected, including construction loads. Leave bracing in place for as long as required for safety. Securely fasten the work as erection progresses to compensate for all loads during construction.

Perform no permanent fastening until the structure has been properly aligned.

6.10 ROUGH CARPENTRY

6.11 Wood Framing

Part 1 - General

References

U.S. Department of Commerce/National Institute of Standards and Technology - American Softwood Lumber Standard PS 20.

American National Standards Institute / American Forest and Paper Association National Design Specifications (ANSI/AF&PA NDS).

Part 2 - Products

Components

Structural lumber shall be of the nominal dimensions shown on the Plans and shall not exceed 19 percent moisture content when installed. All pieces shall be Kiln Dried Hem Fir or Spruce-Pine-Fir No. 2 grade or better unless otherwise specified on the Plans.

Lumber and other wood members shall meet requirements of ANSI/AFPA NDS: National Design Specification for Wood Construction, American Forest & Paper Association/American Wood Council, current edition. If a different edition is called out on the plans, that edition will govern.

Accessories including bolts with necessary nuts and washers, timber connectors, drift pins, dowels, nails, screws, spikes, and other metal fastenings shall conform to ASTM A-307. Provide bolts with malleable iron washers under nuts.

Nails shall be round wire of standard form. Spikes shall be button-head boat spikes. Galvanize bolts, dowels, washers, spikes, and other hardware, including nails, in accordance with ASTM A-153.

Preservative Treated Wood

All wood members which contact concrete or masonry shall be naturally durable wood or preservative-treated wood using water-borne preservatives, in accordance with AWWA U1 (Commodity Specifications A or F) for above-ground use. Coat cut ends of pressure treated wood with copper naphthenate based wood preservative.

- All fasteners in contact with preservative treated wood shall be hot-dip galvanized
- All connectors in contact with preservative treated wood shall be hot-dip galvanized
- Interior connectors in contact with preservative treated wood that are not exposed to the elements may be G185 galvanized.

Part 3 - Execution

Construction

Accurately cut and frame all lumber so that joints will have a close fit over entire contact surface. Secure lumber and piles in their proper alignment. No shimming will be permitted in making joints, nor will open joints be accepted. Bore holes in small timbers for boat or wire spikes with a bit of the same diameter or smallest dimension of the spikes, when necessary, to prevent splitting. Counterbore for countersinking wherever smooth faces are required.

Connectors and fasteners shall comply with the applicable provisions of IBC Sections 2304.9.1 through 2304.9.7. The number and size of fasteners connecting wood members shall not be less than that set forth in IBC Table 2304.9.1.

6.17 Shop Fabricated Structural Wood

6.17.53 Wood Trusses

Part 1 - General

References

Wood trusses shall comply with IBC Section 2303.4. Trusses shall be metal-plate-connected meeting the design, manufacture, and quality assurance requirements of ANSI/TPI 1 as published by the Truss Plate Institute.

Quality Assurance

Prefabricated wood trusses and cross-bracing and blocking shall be designed and certified by the truss manufacturer to meet the loads shown on the Plans and the above requirements. Each individual truss design drawing shall bear the Professional Engineering seal and signature of the truss designer.

Fabricator shall provide detailed fabrication and quality control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.

In lieu of procedures noted, fabricator may provide documentation that they are registered and approved to perform such work without special inspection. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building official stating that the work was performed in accordance with the approved construction documents.

6.20 FINISH CARPENTRY

6.20.05 Common Work for Finish Carpentry

Part 1 - General

Summary

Furnish all architectural woodwork shown on the Plans and specified herein. Architectural woodwork includes all exterior and interior non-structural woodwork exposed to view in finished project including shelving, millwork, trim, and plastic laminates.

Related Sections

- Division 9 Finishes

References

The "Quality Standards" of the Architectural woodwork institute (AWI) shall apply and, by reference, are hereby made a part of this specification. Any reference to premium, custom, or economy in this specification shall be defined as the latest edition of the AWI "Quality Standards".

Part 2 - Products

Quality Control

Discard material with defects which might impair the quality of work, and units which are too small to fabricate the work with minimum joints or optimum joint arrangement. Finish trim boards are to be selected for straight and un-warped / un-curved shape.

Part 3 - Execution

Installation

Set carpentry work accurately to required levels and lines, with member plumb, true, and accurately cut and fitted. All exposed trim work is to be mitered at corners. Where long runs require more than one board, cut ends at 45 degrees.

Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes. Use common wire nails or finishing screws, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required. Fill nail holes with putty prior to painting. Provide adequate end and edge distances.

Install hardware specified or required to complete the project. Adjust movable parts to operate perfectly at time of final acceptance. Make further adjustments required during the guarantee period.

6.22 Millwork

6.22.13 Standard Pattern Wood Trim

Part 2 - Products

Materials

Trim board material as shown on the Plans. If not shown on the Plans, trim board shall have a smooth, untextured finish and be high density fiberboard (HDF), oak, or fir.

Part 3 - Execution

Installation

Install trim board straight and true. Miter all corners. Caulk where gaps between the trim and the mating surface are unavoidable.

Division 7

Thermal and Moisture Protection

7.00 GENERAL

This division covers furnishing all labor, materials, and equipment for providing a structure that is completely weather-tight.

Sections in these specifications titled “*Common Work for . . .*” shall apply to all following subsections whether directly referenced or not.

7.05 Common Work for Thermal and Moisture Protection

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Insulation
- Roofing System
- Flashing and sheetmetal
- Vents
- Joint sealants
- Caulk

Warranty – Roofing System

The roofing Contractor shall warrant the roof system provided under this contract against leakage, and defects in materials and workmanship for a period of two years after date of project acceptance. The roofing system manufacturer shall provide a warranty for the roof system against leakage and defects in materials for a period of eighteen years after the roofing Contractor warranty expires.

Following roof installation, supplier shall furnish services of a qualified manufacturer's representative to inspect the roof and inform Owner of any defects or concerns regarding condition of roofing system at the job site. Contractor shall provide repair as necessary to the satisfaction of the manufacturer representative at Contractor's expense. Upon resolution of any defects or concerns (if any), manufacturer's warranty shall then be in full effect. The finished roofing system shall be free from leaks, warps, permanent discoloration, and coating degradation for the warranty period.

The roofing system manufacturer's warranty shall be non-prorated and in full effect (100 percent covered) for the full 2 years following project acceptance.

The manufacturer's warranty shall prorated from 100 percent covered from year 2 to year 5 and linearly decreasing to 10 percent at year 20.

7.20 THERMAL PROTECTION

7.21 Thermal Insulation

7.21.16 Blanket Insulation

Part 1 – General

Performance Requirements

Insulation shall be Kraft-paper-faced batt with a minimum R value of 49, unless noted otherwise in the plans.

Part 2 – Products

Manufacturers

Ceiling insulation shall be equal to Owens Corning.

Part 3 – Execution

Installation

Provide and install ceiling insulation as shown on the project Plans. Place insulation with craft paper face down and as recommended by the manufacturer. Insulation shall be placed to the extents possible to cover the attic. Place baffles above the insulation as the slope of the roof meets the building edge as needed to provide a 1-inch minimum air gap between the top of insulation and the underside of the roof sheathing.

7.21.13.13 Foam Board Insulation

Part 1 – General

Performance Requirements

Insulation for foundations shall be suitable for direct bury application. Unless shown otherwise on the plans, board against vertical foundation walls shall be minimum R-10.

Storage and Handling

Protect insulation stored on the jobsite from physical damage and direct sunlight. Store off the ground and cover with a light color polyethylene film. Make sure the covered insulation is well ventilated to prevent excessive temperature build-up.

Part 2 – Products

Manufacturers

Insulation shall be Foamular 150 as manufactured by Owens Corning or equal.

Part 3 – Execution

Installation

Extruded polystyrene insulation shall be placed as shown on the Plans. Do not damage insulation during installation and take adequate care to backfill soils to meet compaction standards while not damaging insulation. Insulation must begin at the base of the insulated

wall and end 24 inches below grade (per WSEC Table C402.1.3). Exposed areas of insulation shall be flashed or shall be coated with surface-binding cement as selected by the Owner

Install only as much insulation as can be covered, at least temporarily, during the same day.

7.21.30 CMU Wall Insulation

Part 1 – General

Performance Requirements

All non-grouted exterior exposed CMU walls to be filled with vermiculite, perlite, or equivalent fill.

Part 2 – Products

Materials

Where the code exception noted in Part 1 applies, vermiculate or perlite may be used.

Part 3 – Execution

Installation

Insulation shall be installed by methods and personnel approved by the block manufacturer.

7.24 Exterior Insulation and Finish Systems

7.24.32 Exposed Small Piping Insulation

Part 2 – Products

Manufacturers

Insulation shall be equal to S and S Industries.

Part 3 – Execution

Installation

All exposed piping 1-inch and less used to distribute hot, tepid, cold, potable, and non-potable water shall be insulated with closed-cell polystyrene insulation pre-slit and installed per manufacturer's written information. Insulation shall be sized to match the diameter of the piping.

7.27 Air Barrier

Part 1 – General

Performance Requirements

A continuous air barrier shall be provided throughout the building thermal envelope. The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8 of the 2012 Washington State Energy Code, Commercial Provisions.

Part 3 – Execution

Field Quality Control

The completed building shall be tested by the Contractor. The air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft² at a pressure differential of 0.3 inches water gauge in accordance with ASTM E 779 or an equivalent method approved by the Code Official. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the building owner and the Code Official. If the tested rate exceeds that defined here, a visual inspection of the air barrier shall be conducted and any leaks noted shall be sealed to the extent practicable. An additional report identifying the corrective actions taken to seal air leaks shall be submitted to the building owner and the Code Official and any further requirement to meet the leakage air rate will be waived.

7.40 ROOFING AND SIDING PANELS

7.42.93 Soffit Panels

Part 1 – General

Design Requirements

The panels shall be able to withstand the wind loading identified in the Plans.

Finishes

Finish all panels as recommended by the manufacturer. Color shall be chosen by the owner from a minimum of 15 colors.

Part 2 – Products

Materials

Steel panels shall be equal to AEP Span Prestige Series (PS-12) soffits. Panels shall have a Zinalume or Kynar finish. Vented and non-vented soffit panels shall have matching beads or groove widths and matching finishes. Provide venting per local building code requirements. All vents shall include aluminum or galvanized bird screens.

Fiber Cement soffit panels shall be James Hardie Hardiesoffit or of equal. Install and finish all panels as recommended by the manufacturer. The panels shall be able to withstand the wind loading identified in the Plans. Provide venting per local building code requirements. All vents shall include aluminum or galvanized bird screens.

Part 3 – Execution

Installation

Panels shall run perpendicular to rafters. Install panels next to transition between wall and eave as recommended by the manufacturer.

7.60 FLASHING AND SHEET METAL

7.61 Sheet Metal Roofing

7.61.05 Common Work for Metal Roofing

Part 1 – General

General

Work covered in this section consists of furnishing all labor, material, and equipment for preformed metal roofing as shown on the Plans and as specified herein.

Submittals

Submit shop drawings detailing all edges, hips, valleys, eaves, rakes, other flashing and include fastener schedule and in accordance with Division 1.33. Prior to Engineer review, Contractor shall have the shop drawings reviewed and approved by the system manufacturer.

The Roofer shall submit a list of a minimum of five (5) successfully completed projects with owner references, total roofing system square footage and roofing cost. The Roofer shall be regularly engaged in construction of metal roofing systems and approved to install metal roofing by the accepted system manufacturer. Such approval shall be submitted in writing along with the shop drawings as specified below.

Storage and Handling

The Contractor is responsible for continuously maintaining materials subject to precipitation or weather damage in new condition. Replace warped or weathered plywood, insulation, or other materials damaged by climatic conditions.

Follow all manufacturer's recommendations regarding product delivery, storage, and handling of materials.

Part 2 – Products

Materials

Materials shall be purchased directly from the manufacturer's commercial department to verify that the Contractor is approved by the system manufacturer to install the roofing system specified.

All materials shall be provided by one manufacturer, conform to the current IBC and the local building code.

Fasteners shall be as recommended by the roofing manufacturer; lengths as required. Other miscellaneous exposed fasteners shall be stainless steel or ZAC (exposed head of zinc/aluminum alloy). Fasteners shall be of the length to penetrate the top ridges of the steel decking only. Fasteners shall be inserted to penetrate only the top ridges of the steel roof support decking.

Finishes

The Owner shall select the roofing color from manufacturer's standard offering of not less than 15 colors. Color options shall be provided with the submitted shop drawings.

Part 3 – Execution

Examination

Verify that work of other trades which penetrates the roof deck, or requires workers and equipment to traverse roof deck, has been completed.

Examine surfaces for inadequate anchorage, foreign material, moisture, and unevenness which will prevent the execution and quality of application of roofing system as specified. Do not proceed with application of roofing until these defects are corrected.

Preparation

Provide temporary roof during inclement weather. Requests for use of alternate structural and/or base materials with superior weathering resistance, if approved by the Engineer, may be made in lieu of temporary roof replacement. Submit a description of each temporary roof system or alternate material schedule proposed.

Provide special protection from heavy traffic on completed work. Restore to original condition, or replace work or materials damaged during handling of roofing materials.

Installation

Apply ice and water shield underlayment conforming with ASTM D1970, with a tensile strength of 250 psi or greater per ASTM D412, (Grace Ice and Water Shield or equal) over the roof sheathing in conformance with the roof manufacturer's requirements and underlayment manufacturer's recommendations.

Apply roofing only in dry weather and when the ambient temperature is above 40 degrees Fahrenheit.

Except as otherwise shown or specified, comply with recommendations and instructions of metal roofing manufacturer.

Form and fabricate sheets, seams, strips, cleats, clips, hips, ridges, edge treatments, integral flashings, and other components of specified metal roofing to profiles, patterns, and drainage arrangement shown, and as required for permanent leak-proof construction. Provide for thermal expansion and contraction of work caused by ambient air temperature difference of 100 degrees Fahrenheit.

All openings shall be sealed from weather and to prevent recessed areas that may attract nesting animals. Panel corrugations shall be sealed with the manufacturer's standard closed cell neoprene blocks conforming to the panel corrugation. Gaps created between corrugations and flashings shall be avoided whenever possible. Where such gaps occur, they shall be sealed with manufacturer's low pitch closures, or equal. All closures shall be installed as close to the face of the opening as possible to minimize any recessed areas.

Provide uniform, neat seams with no exposure of sealant to ultraviolet light.

Flashing with a drip edge shall be installed on all edges, corners and angle points. Unless otherwise noted on the Plans extend roofing and flashing below fascia with drip edge hanging below wood supports and fascia. Valley gutters shall be provided at all valleys.

Field Quality Control

Metal roofing and its flashing shall be weather-tight. Exposed surfaces shall be free of dents, scratches, abrasions, or other visible defects.

Construction and fabrication of metal roofing shall comply with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) recommendations for fabrication and construction of details, expansion joints, and installation procedures, except as shown or specified.

Fabricate and install work true and accurate with lines and corners of exposed metal units. Form exposed faces and starter sections of seams flat and free of buckles, excessive waves, and avoidable tool marks considering temper and finish of metal. Hold-down attachments for roof shall be designed and spaced to resist uplift pressure due to Basic Wind Speed and Exposure as identified in the General Notes. Provide uniform, neat seams without tool marks or irregularities.

7.61.13 Standing Seam Sheet Metal Roofing

Part 2 – Products

Materials

Preformed metal roof paneling shall be equal to *Design Span HP as manufactured by AEP Span or Custom Bilt Metals, SL-1750 Snap-Lock Roof Panel*. The metal roofing system shall consist of 24-gauge, factory-formed, pre-finished panels with major ribs not less than 1 $\frac{5}{8}$ -inch in height.

Shop-fabricate metal in conformance with manufacturer's pattern specifications to result in a minimum 1-inch effective water dam height on both edges. Standing seam interval shall not exceed 16 inches with no stiffening ribs.

Edges, hips, valleys, eaves, rakes, and miscellaneous flashing shall be finished with matching pre-finished pieces of 24-gauge minimum, to form a weather-tight roofing system.

Roofing panels shall be factory-prefabricated in accordance with manufacturer's standard pattern and design.

Finishes

Color options shall be provided with the submitted shop drawings. All panels and flashing shall be treated with a protective coating of Zinalume conforming to ASTM 792, AZ50, with factory-applied paint finish of Kynar 500 or Hylar 5000 with a total dry film thickness of 1 Mil. Reverse face shall be protected by a wash coat or primer.

Part 3 – Execution

Installation

Panels shall be held down to the structure with concealed clips and fasteners. The fastening schedule shall be designed by the manufacturer to resist the loads identified in the General Notes. System shall extend to full extent of fascia boards and include a drip edge unless otherwise noted on the Plans. Extend panels from eaves to ridge in one piece.

All final hand turning of seams at joints and junctions is to be of the same quality as the machine-produced seams. Practices and techniques described in the SMACNA Architectural Sheet Metal Manual are to be used as the standard of practice unless otherwise specified or shown on the Plans.

7.62 Sheet Metal Flashing and Trim

Part 1 – General

Flashing shall be factory coated steel equal to *Construction Metals Inc. Professional Grade Flashing*. Gauge shall match flashing to be replaced or 26-gauge minimum. Width shall match existing to be replaced. Provide color choices to Owner for approval. Minimum color choices are 10.

All exterior trim shall be concealed-fastener metal trim, 26-gauge minimum. Provide color choices to Owner for approval. Minimum color choices are 10.

Part 3 – Execution

Installation

Install drip tight per manufacturer's requirements.

7.70 ROOF AND WALL SPECIALTIES

7.71 Roof Specialties

7.71.23 Manufactured Gutters and Downspouts

Part 1 - General

Submittals

Provide the following submittal information:

- Manufacturer's technical product data, installation instructions, and recommendations for each type of gutter required.
- Color chart of no less than 8 colors. Owner will select up to three colors for comparison.
- Minimum size 2" x 2" color chips or 3" long sections of gutter for each of the Owner's selected colors.
- Shop drawings indicating thicknesses and dimensions of parts, fasteners, anchoring methods, sealants, substrates, details and locations of gutter system, and provisions necessary to accommodate thermal expansion and contraction.
- Documentation (including photos) of 3 previous metal gutter systems of comparable size and complexity installed by the Contractor.

Quality Assurance

Installer shall have been in business for no less than three years within 150 miles of where the work will be performed.

Manufacturer shall have supplied the same gutter system that will be installed for no less than 3 years to the State where the work will be done.

Delivery, Storage and Handling

Protect materials against damage and discoloration. When hoisting, lift with non-marring slings and gutters shall not be bent at any point. Store gutters and downspouts with one end elevated for drainage and protect against standing water and condensation between adjacent surfaces.

Warranty

Provide manufacturer's coating warranty no less than 10-years non-pro-rated or 20-years pro-rated. Contractor shall warrant gutters, flashings, sealants, fasteners and accessories against defective materials and/or workmanship, to remain watertight and weatherproof with normal usage for two (2) years following project acceptance date.

Part 2 - Products

Materials

Gutters and downspouts to be the same material and gauge. Gutters to be seamless and formed on site. Provide and install all accessories needed for a complete installation.

Gutter profile shall be 5" K-Style.

Downspout profile shall be 2"x3" squared corrugated.

Finishes

Exterior finish to be dura coat, Kynar, or polyester resin. Interior finish to be polyester resin. Other coatings may be submitted for review. Anchors, supports, flashing, and fasteners shall be the same finish as the gutters and downspouts and as recommended by the manufacturer.

Apply touch up paint to damaged paint areas and field cuts. Items that have scratches exceeding 1" in length or more significant paint and substrate damage shall be replaced as directed by the Owner. The cost of any replacement shall be borne by the contractor.

Part 3 - Execution

Preparation

Take field measurements of completed roof drip lines prior to fabrication of gutters. If building dimensions differ from drawing dimensions, notify the Owner prior to fabrication. All surfaces shall be clean and dry prior to application of any sealants.

Examine substrates on which the gutter system is to be installed for level, flatness, and trueness to avoid gutter stresses and distortion and make corrections acceptable to the Owner. To prevent electrolytic corrosion, any substrate with dissimilar metals shall be treated or isolated prior to gutter system installation with a protective material acceptable to the Owner.

Installation

All cuts shall be neat, square and true. No torch cutting.

Install gutter system per the manufacturer's instructions and in accordance with the approved shop drawings, whichever is more stringent. Install gutters with a $\frac{1}{4}$ " per 20-foot slope.

Install downspouts vertically and aligned with the building features. Secure downspouts at regular intervals to the building per the manufacturer's requirements. Install one downspout per 30 feet of gutter, located at building corners, unless shown otherwise on the plans. Install downspouts no less than 6-inches clear of doors, windows, and wall mounted equipment. Provide and install offset elbows (no more than three per downspout) to avoid building features. Install a fabricated splashpad for each downspout if not shown otherwise.

Install any flashing in compliance with the manufacturer's instructions, approved shop drawings, and to allow for thermal movement.

Clean up

Gutters, flashings, and downspouts shall be swept and flushed clean as needed during construction and at final project acceptance.

7.72 Roof Accessories

7.72.05 Common Work for Roof and Wall Specialties

Part 1 – General

Design Criteria

Attic ventilation shall be installed in accordance with IBC 1203. Contractor shall certify in writing that attic ventilation meets the IBC specification during the submittal process.

Part 3 – Execution

Installation

Blocking shall be installed on all exterior eaves. Ventilation baffles shall be provided at all eave vents that provide a 1-inch minimum air gap between the attic insulation and the roof sheathing. Gable end vents or roof vents shall be provided.

7.72.26 Ridge Vent

Part 2 – Products

Manufacturers

Roof vents shall be equal to Cor-A-Vent model V-600 ridge vents or approved equal.

Part 3 – Execution

Installation

Roof vents shall be applied to both the hip ridges as well as the roof peak unless otherwise noted on the roof plan.

7.90 JOINT PROTECTION

7.92.13 Elastomeric Joint Sealants

Part 1 – General

Submittals

Submit schedule for caulk used on the project for approval prior to application.

Part 2 – Products

Materials

Kitchen, Bath, Laboratory, and Other Wet Areas

DAP® KWIK SEAL PLUS® Premium Kitchen & Bath Adhesive Caulk w/MICROBAN® or equal.

Concrete and Masonry

DAP® Premium Polyurethane Concrete & Masonry Sealant or equal.

Wood or Concrete Board Siding

DAP® ALEX PLUS® Acrylic Latex Caulk Plus Silicone or equal.

Doors and Windows

DAP® DYNAFLEX 230® Premium Elastomeric Sealant or equal. Where necessary to provide a suitable backstop and bond breaker, tightly pack with polyethylene foam. Rope the back of grooves, leaving a minimum depth of ¼-inch for sealant. Prime surfaces as recommended by manufacturer.

Other Surfaces

Contractor shall provide caulk appropriate to surface and reason for caulk application. Caulk shall be the most durable available (longest warranty) by DAP®, or equal.

Part 3 – Execution

Installation

Caulk all joints and spaces necessary to provide a completely weather-tight product.

Apply caulking in strict accordance with manufacturer's directions with regard to temperature at application and curing times, surface condition, moisture, and cleanliness.

Apply after surfacing prime and prior to final coatings if surface is to be coated. If surface will not be coated, provide color choices to the Owner for approval prior to application.

Clean all adjoining surfaces of excess sealant, smears, or marking due to application and leave joints with neat, uniformly-filled surfaces.

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Division 8

Openings

8.00 GENERAL

Sections in these specifications titled “*Common Work for . . .*” apply to all following subsections whether directly referenced or not.

8.05 Common Work for Openings

Part 1 - General

Summary

This division covers furnishing all labor, materials, and equipment necessary for providing all interior and exterior doors, frames, and windows.

Related Sections

- Division 5.05.23 Bolts and Other Connectors

Submittals

Submittal information shall be provided to the Owner for the following items:

- Doors
- Windows
- Hardware
- Locks
- Keys

8.06 Schedules for Openings

See the contract Plans for schedule of doors and windows.

8.10 DOORS AND FRAMES

8.10.05 Common Work for Doors and Frames

Part 1 - General

Summary

This specification covers the doors, frames, accessories, and hardware for both interior and exterior man doors.

Submittals

Submittal information shall include the following:

Manufacturer's product data and installation instructions for each type of door, frame, accessory, or hardware. Include both published data and any specific data prepared for this project.

Door and frame shop drawing for approval prior to fabrication. Include detailed plans, elevations, details of framing members, required clearances, anchors, and accessories. Include relationship with adjacent materials.

As requested by the Engineer, provide sample color chips representing specified colors and finishes.

Performance Requirements

Doors between rooms requiring a fire separation shall have a listed fire rating equal to or greater than the required room fire rating. See Plans for which rooms are required to be separated with a fire door. Doors and frames shall be listed and labeled for a minimum of 45 minutes.

Doors between rooms requiring an acoustical separation (soundproof or sound rated door) shall have a minimum STC rating of 45.

All exterior doors and frames shall be insulated for a maximum U-value of 0.60.

Quality Assurance

The manufacturer(s) shall be a minimum of ten (10) continuous years documented experience specializing in the manufacturing of doors, frames, accessories, and/or hardware of the type required for this project. At the request of the Engineer, the manufacturer shall provide testing and/or certification information demonstrating that the manufacturer shall design and construct all equipment to the latest applicable codes and standards. The manufacturer or their representative shall be available for consultation to all parties engaged in the project, including instruction to installation personnel.

Scheduling

The Contractor shall ensure that all approvals and/or shop drawings are supplied or returned to the manufacturer in time for fabrication without affecting construction progress schedule. In addition, they shall ensure that templates and/or actual hardware requested by manufacturer are available in time for fabrication without affecting construction progress schedule.

Warranty

The Manufacturer shall provide a one (1) year warranty against defects in workmanship and materials, including warping, rotting, decaying or bowing. The Installer shall warrant installation procedures and performance for a minimum of two (2) years from the point of substantial completion against defects due to workmanship and materials handling.

Part 2 - Products

Components

Provide doors, frames, and accessories as noted on the Door Schedule. Provide door hardware as specified, as noted on the Door Schedule, and as required by the local building code.

Contractor shall provide weather tight trim around all doors whether shown on the Plans or not.

The frames shall be furnished with sufficient wall and head anchors to secure the jamb and door against all operating, wind, and seismic loads. Exterior door frames shall have an integral weather-strip at head and jambs. Frames shall be trimmed in the field to form a weather tight seal if shown on the Plans or not.

Accessories

Provide door accessories as noted on the Door Schedule.

Hinges shall provide 180-degree rotation of the door. Hinges which are exposed at building exterior shall be equipped with tamper-proof pins that cannot be removed. Hinges exposed at the interior of the building shall be removable. The manufacturer shall provide door stops; no screw-on stops will be accepted.

Finishes

Prime doors and frames at the factory according to requirements for metals in Division 9.

Finishes shall be per the appropriate metal finishes in Division 9.

Part 3 - Execution

Installation

Install doors and frames in accordance with manufacturer's instructions and approved shop drawings; set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions. Seal metal-to-metal joints between framing members using good quality elastomeric sealant, and all doorjamb with caulking as specified.

Reinforce hinge and lock areas. Mount door using minimum of three (3) hinges.

Hang door in the frames and apply hardware in a neat, secure manner so that the doors will operate without dragging or binding.

Cleaning/Repair

Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609. Do not use abrasive, caustic, or acid cleaning agents.

Protect products of this section from damage caused by subsequent construction until substantial completion. If damage does occur, Contractor shall repair damaged or defective products to original specified condition in accordance with manufacturer's recommendations. Replace damaged or defective products that cannot be repaired to Owner's acceptance.

8.11 Metal Doors and Frames

8.11.13 Hollow Metal Doors and Frames

Part 2 - Products

Components

Doors and frames shall comply with ANSI/SDI A250.8 for level and model and A250.4 for physical performance level. All doors shall be 1³/₄-inch thick and insulated with a solid polyurethane or urethane foam core. Exterior doors shall be Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless) and fabricated from 16 gauge steel minimum. Interior doors shall be Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush) and fabricated from 18 gauge steel minimum.

Door frames shall be 14-gauge galvanized steel, as manufactured or recommended by the door supplier specifically for the door installed. Frames shall be furnished with sufficient wall and head anchors to secure the jamb and door against all operating, wind, and seismic loads.

Alternatively, door frames installed within CMU walls can be 16-gauge galvanized steel, tied to the CMU with masonry wire clips. Fully grout CMU block within one length of a full-sized block measured from door frame.

8.70 HARDWARE

8.71 Door Hardware

8.71.05 Common Work for Door Hardware

Part 1 - General

Summary

This specification covers door hardware for interior and exterior doors. The Contractor shall provide all hardware necessary to install doors in a secure, weather-tight manner. Unless otherwise specified, all door hardware shall be according to this section.

Related Sections

1.52.20 Locks and Keys

Submittals

Door hardware submittal information shall indicate that hardware is suitable for fire- and sound-rated applications, where applicable.

Performance Requirements

All door hardware shall be selected to meet local building and fire codes.

Part 2 – Products

Components

Key cylinders shall utilize the Owner's standard core and key. The key cylinder shall fit all exterior locking hardware. A vandal-resistant cover plate shall be provided at exterior surface of doors to prevent exterior access to deadbolts or slam latches at gap between door and frame.

All exterior, and fire- and sound- rated doors and frames shall have perimeter gasketing. Weather stripping shall consist of a vinyl, neoprene, or sponge neoprene strip mounted on an aluminum or stainless steel bracket which is fastened to the door or frame. Gasketing shall be Pemko or equal.

8.71.20 Hardware for Man-Doors

Part 2 - Products

Accessories

Dead Bolt: Doors with dead bolt locks shall use a 1-inch bolt throw, with concealed mounting screws, and a satin chrome finish. The dead bolt shall be thrown or retracted by a key on the outside and by a thumb knob on the inside. The dead bolt shall be equal to Schlage.

Exterior Door Lockset

Entrance Lock (Non-Emergency Exit): Non-emergency, exterior doors shall have an entrance lock (ANSI F20) with 3-inch-wide by 16-inch-high raised plate and rectangular pull with thumbpiece and deadbolt key cylinder hole on the exterior, and a lever and deadbolt thumbturn on the inside. The latchbolt shall be retracted by the thumbpiece/lever from either side. When locked, the outside key or inside knob/lever shall retract the deadbolt and latchbolt simultaneously. The outside knob/lever remains locked until the thumbturn is restored to vertical position. Throwing the deadbolt shall automatically lock outside knob/lever. The inside lever shall always be free for immediate egress.

Closers: Door closers shall be provided for exterior doors, fire-rated doors, restroom, and locker room doors, and elsewhere as shown in the Door Schedule on the Plans. Door closers shall be surface mounted, parallel-arm type with an aluminum or stainless steel finish. Door closers shall be Dorma 8600 or equal. Closer shall be UL-listed for fire door rating.

Push/Pull Plates: The inactive door on a double door shall be equipped with push/pull hardware. The pull hardware shall be the rectangular pull style mounted on a 3-inch-wide by 16-inch-high plate. The push plate shall be 3-inches wide by 16-inches high. Push/pull hardware shall be fabricated from stainless steel. Doors with push/pull hardware shall be equipped with closer.

Door Hinges: Door hinges shall be fabricated using polished and stainless steel and shall be equipped with permanently lubricated ball bearings. Hinges shall provide 180-degree rotation of the door. Hinges which are exposed at building exterior shall be equipped with tamper-proof pins that cannot be removed. Hinges exposed at the interior of the building shall be removable.

Thresholds: All interior and exterior doors shall have an extruded aluminum threshold. Thresholds shall be Pemko or equal.

Door Bottoms: All sound rated doors shall have a non-handed full-mortise automatic door bottom with neoprene seal that is fire and sound rated. All exterior and fire rated doors shall have vinyl or neoprene door-shoe or door-bottom sweep, Pemko or equal.

Astragals: Provide flush extension bolts at the top and bottom of inactive double doors. Equip inactive doors with an overlapping astragal constructed of similar material to door. Astragals shall be Pemko or equal.

Door Stops: All doors shall have a doorstop and holder fabricated from aluminum or stainless steel. Strike shall be wall- or floor-mounted and provide automatic doorstop and hold with quick release. Doorstop for interior doors shall be a wall-mounted concave rubber bumper with a stainless steel or aluminum mounting plate.

Coordinator: All double doors shall have a coordinator to restrict the closing of one door before the other so that they close and lock properly. If not shown on the plans, Owner shall select which double door will be the primary and secondary door during the submittal stage of the project.

Rain Drip: All exterior doors shall be equipped with an aluminum door-top rain-drip weather strip, mounted to the top edge of the door frame to prevent water intrusion. Rain drips shall be Pemko or equal.

Finishes

All hardware shall have the same finish and shall be satin nickel.

8.90 LOUVERS AND VENTS

8.90.05 Common Work for Louvers and Vents

Part 1 – General

Related Sections

- Division 17.08 - HVAC Functional Control

System Description

Ventilator shall be provided with explosion proof motors if noted in the Plans.

Design and Performance Requirements

See Louver and Damper Schedule on Plans and Functional Control description for design and performance requirements.

Submittals

Submit detailed product information including specifications, sizing information, dimensional drawings, coating systems, and available colors, and other information relevant to this project.

Part 2 – Products

Manufacturers

The following manufacturers are considered to be acceptable “or equals” unless otherwise noted on the Plans or elsewhere herein.

- Pottorff
- Cesco

- Louvers & Dampers, Inc.

Accessories

Provide all accessories needed for a complete installation including wall and roof thimbles, backguards, and mounting sleeves.

Components

A filter frame and an insect screen shall be provided on the interior side of all intake louvers. The filter frame shall allow for easy installation and removal of standard size filters. Provide one set of filters.

In chemical rooms or other corrosive environments, all materials in contact with the room air shall be fully resistant to corrosion attack from the atmosphere.

Finishes

All louvers shall be coated with factory Kynar, or powder coat finish, color to match exterior color scheme.

In chemical rooms or other corrosive environments, all materials in contact with room air shall be fully resistant to attack from the interior environment.

Part 3 – Execution

Install per manufacturer's recommendations.

Louver assembly shall be set flush with the wall exterior

Operate all moving parts prior to installation. Any non-functional or binding parts shall be repaired or replaced prior to installation. Install so that blade linkages are accessible after installation to permit service and lubrication without requiring removal of wallboard or other structures.

8.91 Louvers

8.91.13 Motorized Dampers

Part 2 – Products

Components

If automatic controlled operation, blades shall be adjustable from fully open to fully closed via a 120VAC motor actuator sized appropriately to operate the damper fully. Blades shall seal with neoprene or vinyl seals. Blades shall pivot on bronze or nylon bushings, or steel bearings. Contractor shall verify compatibility of damper to actuator. Motor actuator if any, shall be side mounted, out of the air stream. Motor actuator shall be located no lower than 6-inches above floor level. Provide disconnect switch for each unit (where applicable).

8.91.19 Fixed Louver

Part 1 – General

Provide fixed louver(s) as shown on the Plans.

Part 2 – Products

Components

Louver shall include channel frame mounted to the inside face of the wall.

Height and width of louver and damper shall be as shown on the Plans. Depth of louver, filter, and screen assembly shall be set flush with the wall exterior and any intrusion into the interior wall supported by the frame.

Division 9

Finishes

9.00 GENERAL

This division covers work necessary for providing all materials, equipment, and labor to coat all items in accordance with these specifications.

Sections in these specifications titled "*Common Work for . . .*" apply to all following subsections whether directly referenced or not.

9.20 PLASTER AND GYPSUM BOARD

9.21.23 Gypsum Board for Low Occupancy Areas

Part 1 - General

Summary

This section covers work within infrequently occupied facilities, process, or industrial buildings. This section includes the following areas:

1. Pump Room
2. Electrical Room

Related Sections

- Division 9.91.23.10 Interior Painting – Gypsum Wallboard

Part 2 - Products

Components

Gypsum board shall be selected based on the installed application (see below) and as recommended by the Gypsum Association GA-223-96. Gypsum board shall be $\frac{5}{8}$ -inch thick, unless otherwise noted.

Type	Application	ASTM
Regular	Interior Walls and Ceilings	C1396
Type X or C	Fire-Rated Construction	C1396
Soffit Board	Exterior Soffits and Ceilings	C931
Water-Resistant Gypsum Backing Board	Tile Base	C630

Joint treatment: U.S. Gypsum Company Perm-a-Tape or equivalent. Protect exposed corners with U.S. Gypsum Company Perm-a-Tape or equivalent moldings embedded in joint compound per manufacturer's recommendations.

Finishes

Finish-sand all areas to smooth, even surfaces suitable for paintings.

Part 3 - Execution

Installation

Provide and install all necessary components, including furring, as necessary to install gypsum board in accordance with local building code and Gypsum Associations standards (GA-216 and GA-600). Install gypsum board as needed to maintain fire and sound transmission rating.

Apply square edge with the long dimension parallel with supports. Abut sides and edges to vertical framing members, top and bottom plates, or headers. Attach using nails spaced at 8 inches O.C. at all edges, and 8 inches O.C. on intermediate support.

9.50 CEILINGS

9.90 PAINTING AND COATING

9.90.05 Common Work for Painting and Coating

Part 1 – General

Scope

The work specified in this Section covers the furnishing and installation of protective coating, complete in place. Shop coating and/or factory applied finishes on manufactured or fabricated items may be specified elsewhere. Regardless of the number of coats previously applied, at least two coats of paint shall be applied in the field to all coated surfaces unless otherwise specified herein.

Definitions

Applicator: When used to describe work, the applicator is the party who is qualified for and performs the coating work. When used to describe contract requirements, the Contractor has responsibility as the applicator unless specifically stated otherwise. Contract requirements include but are not limited to submittals, warranties, insurance, etc.

Submittals

- Applicator qualifications:
 - o Provide shop QP-3 accreditation and shop- or contractor- inspector CIP-3 accreditation for facilities performing any pipe coating application.
 - o Provide manufacturer's approval of coating system applicator.
- Products: Before beginning any painting or coating, submit a list of coatings and manufacturers for review by the Owner. Do not provide an indiscriminate collection of data sheets. Include the application each coating is intended for, any surface preparation, number of coats, method of application, and coating thickness. If submitted products are manufactured by a company other than the specified reference standard, provide complete comparison to specified projects including application procedures, coverage rates, and verification that product is appropriate for intended use. Provide information that demonstrates the submitted products are

equal to the performance standards of products manufactured by Tnemec Corporation, which is the reference standard.

- Colors: Provide color choices with physical cards prepared by the coating manufacturer. Electronic (PDF, jpg, etc.) charts, and charts made from office printers or copiers are not acceptable. If the Owner elects to make preliminary selection from an electronic or printed chart, the Contractor must provide physical samples of the colors selected for the Owner's approval.
- Safety Data Sheets (SDS): Provide an SDS for every materials including solvents.
- Potable Water: Provide NSF certification for finishes in potential contact with potable water. Submit this information according to the requirements regarding shop drawings included herein.
- Schedule: Provide a schedule of coating operations and inspection timing.

Performance Requirements

All finishes potentially in contact with potable water shall be National Sanitation Foundation (NSF) 61 or 600 certified for contact with potable water. Certification from the NSF or UL shall be supplied in writing at the time of the submittal process for Finishes. Verify the submitted coatings' current NSF requirements, restrictions, and applicability to the coated items. Verify finishes used on the project are compliant with primary and secondary standards of the Safe Drinking Water Act. Any violation shall be remedied at the Contractor's expense.

The completed coating shall produce a minimum dry film thickness in accordance with the specifications as determined by the microtest thickness gauge or comparable instrument. In areas where this thickness is not developed, sufficient additional coats shall be applied to produce it.

Quality Assurance

The Contractor is responsible for compatibility of all shop and field applied paint products including the use of primer, intermediate, and top coats by different manufacturers if applicable. For any Contractor initiated substitutions, the Contractor shall verify complete compatibility between coatings provided for the project. If coatings are not compatible per manufacturer's review it is the Contractor's responsibility to remove incompatible coatings fully and replace with compatible coating systems.

Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to the underlying paint.

The Contractor is responsible for obtaining written documentation from equipment/material manufacturers regarding the date at which shop prime coatings are applied and shall strictly adhere to the coating manufacturer's recommendations for recoat time intervals. The Contractor shall submit to the Owner such documentation upon request.

Storage and Handling

Bring all materials to the job site in the original sealed and labeled containers of the paint manufacturer. Materials are subject to inspection by the Owner. Store paint supplies as recommended by the manufacturer and as approved by the Owner.

Waste Products

Collect, contain, transport, and dispose all waste products generated for this project. Cleaning and disposal shall comply with all federal, state, and local pollution control laws. Provide acceptable containers for collection and disposal of waste materials, debris, and rubbish.

Cleaning and disposal shall comply with all federal, state, and local pollution control laws. Provide appropriate containers for collection and disposal of waste, debris, and rubbish.

Part 2 – Products

Manufacturers

The following coating system manufacturers are approved subject to compliance with the Specifications contained herein:

1. Tnemec Company
2. Sherwin Williams
3. International Paint (AkzoNobel)
4. Or Equal

The specified coating establishes the type and quality of the coating desired. Other manufacturers' products will be accepted provided sufficient information is submitted to allow the Owner to determine that the coatings proposed are equivalent to those named. Proposed coating shall be submitted for review in accordance with Division 1. Requests for review of equivalency will not be accepted from anyone except the Contractor.

Substitutions of the coatings of other manufacturers will be considered only if equivalent systems of coatings can be provided and only if a record of satisfactory experience with the system in equivalent applications is available. Offers for substitutions will not be considered which decrease film thickness, solids by volume or the number of coats to be applied, or which propose a change from the generic type of coating specified herein. All substitutions shall include complete test reports to prove compliance with specified performance criteria.

Part 3 – Execution

Preparation

Take any measures necessary to prevent over-spray of structures and/or components in the field from both preparation and coating work. Should over-spray occur, the Contractor is responsible for all costs associated with any damage resulting from over-spray.

Installers

Contractor is responsible for quality assurance including the retention of a coating applicator with experience necessary to complete the work as specified. Applicator's personnel shall be adequately trained for application of specified coatings. Applicator must prove adequate experience with the coatings specified for this project.

Shop-applied coatings shall be performed at a QP-3 accredited facility. Provide documentation verifying accreditation.

Examination

The Owner shall inspect and approve all surface preparations prior to application of any coating. Provide 24-hour notice prior to surface inspection needs.

Preparation

Prepare surfaces in accordance with the recommendations of the manufacturer of the coating to be applied to the surface, or the surface preparation requirements of these specifications, whichever are stricter. In general, all surface preparation shall meet Structural Steel Painting Council (SSPC) Surfacing Preparation (SP) guidelines, the National Association of Pipe Fitters (NAPF), American Water Works Association (AWWA), the National Association of Corrosion Engineers (NACE), and/or the Association for Materials Protection and Performance (AMPP) (formerly NACE/SSPC) as noted herein unless more strictly described by coating manufacturer.

Apply coatings only during weather meeting the coating manufacturer's recommendations. Air and surface temperatures, humidity, and all other environmental conditions shall be within limits prescribed by the manufacturer for the coating being applied, and work areas shall be reasonably free of airborne dust at the time of application and while coating is drying.

Materials shall be mixed, thinned, and applied according to the manufacturer's printed instructions. Dry Film Thickness (DFT) shall be as stated herein or applied based on coverage rates of square feet per gallon (sq. ft./gal).

Installation/Construction

Apply paint in strict accordance with manufacturer's printed instructions except that coating thickness specified herein shall govern. Finished coating on all items shall be clean, undamaged, and of uniform thickness and color.

Coat in a manner satisfactory to the Owner. The DFT listed in these specifications must be met, regardless of the applied film thickness or number of coats.

Observe all safety precautions stated in the manufacturer's printed instructions. Provide adequate ventilation and lighting at all times.

The manufacturer's recommended drying time shall be construed to mean "under normal conditions". Where conditions are other than normal because of weather, confined spaces, or other reason, longer drying times may be necessary. The manufacturer's recommendation for recoating time intervals shall be strictly adhered to.

Pipe being coated shall be emptied of water for a minimum of 24 hours prior to surface preparation and painting. Pipe shall not be filled with water until coating is dry. If, in the Owner's opinion it is not practical to drain the pipe, the water must stand for at least 48 hours to reach ambient temperature prior to coating the pipe. Do not allow water to flow for at least 24 hours after each coat.

Field Quality Control

The prime Contractor shall be completely responsible for coating quality. The Contractor shall provide both wet and dry film gauges and make such available to the Owner when requested.

If coating inspector finds anomalies and/or defects, the Contractor shall re-prepare and recoat those areas per the coating manufacturer's instructions.

Acceptance of the completed coatings shall be based on the proper application and proper preparation of the coated surfaces, and a finished product that meets minimum thickness and does not contain runs, drips, surface irregularities, overspray, color variations, scratches, pinholes, holidays, and other surface signs that detract from the overall performance and/or appearance of the finished project.

If, in the Owner's sole opinion, the finished color of exterior coatings does not match that of the submitted and approved colors, the Contractor will recoat as necessary to achieve the approved color at no additional cost to the Owner.

Inspection

For metals exposed to exterior atmospheric conditions, first coat of paint or primer must be placed within four hours of passing inspection. Bare steel must be reblasted and reinspected if not successfully coated within this four-hour time frame, at the Contractor's expense.

Use the Pictorial Surface Preparation Standards for Painting Steel Surfaces (VIS-1) by the Steel Structures Painting Council (SSPC) as a visual standard for inspection of surface preparation of metal surfaces. Test-Tex Tape may also be used to verify surface profile.

Inspect each coat prior to application of the next coat. Areas found to contain runs, overspray, roughness, streaks, laps, sags, or other signs of improper application shall be repaired or recoated in accordance with the manufacturer's recommendations. Finish coats shall be uniform in color and sheen. Surface preparations and coatings not inspected and approved by the Owner will be uncovered for inspection and approval at no additional cost to the Owner.

Repair / Restoration

The Contractor is responsible for all costs associated with any damage that occurs as a result of over-spray.

Scratched, chipped, or otherwise damaged coatings, including factory coatings, shall be repaired before final acceptance will be given.

Cleaning

If any cleaning of equipment at the site is performed with solvents, such work shall be done over leak-proof linings. Preparation or coating materials may not be disposed of onsite.

9.90.06 Product and Color Schedule

Colors of finish coatings on process equipment, piping, and building surfaces shall conform to the following schedule. All finishes shall be satin unless otherwise specified. Finish coatings, which are applied in the shop by the manufacturer, shall conform to this section. Factory coatings which are damaged shall be recoated in the field in accordance with these specifications.

Items of similar purpose shall be painted the same color. If items come from the factory with a shop applied coating that does not match said color, they shall be field coated to match. Exceptions may be listed in individual sections of these specifications.

The contractor shall allow no less than 15 working days from the time the Owner is provided with color selections for the Owner to make color choices.

The Owner will finalize the color schedule for painted items after award of the contract. The schedule outlined below shall be used for bidding purposes. Provide a pallet of colors from the manufacturer of not less than 30 color choices.

FINISH SCHEDULE		
Description	Coating System	Color
Exterior Coatings		
Concrete Slabs and Sidewalks	Not Coated	N/A
Concrete and CMU Walls - Above Grade	10	Color per Owner
Wood Siding, Soffits, and Trim	2	Color per Owner
Hollow Metal Doors and Frames	1	Color per Owner
Interior Coatings		
Concrete Floors and Slabs	Not Coated	N/A
CMU Walls	9	N/A
Wood - Interior Trim	7	White
Gypsum Wallboard - Ceilings	6	White
Hollow Metal Doors and Frames	5	Color per Owner
Pipe, Fittings, Couplings, and Related Equipment		
Stainless Steel, Copper, Brass or PVC	Not Coated	N/A
Ductile Iron (exposed)	4	Color per Owner
Supports (except stainless and fiberglass)	4, 5	Grey
Equipment (do not paint motors)	1	Color to match pipe
Miscellaneous		
Aluminum and Stainless-Steel Items	Not Coated	N/A
Aluminum - In Contact w/ Concrete, Masonry, or Other Metals	3	N/A
Architectural Metals	1	Varies based on function
Pumps		
Exposed exterior of casing, head, sole plate, mounting frame	4	Color per Owner
Pump bowl interior and exterior	11	N/A
Head interior	8	N/A
Motor	Factory epoxy	

9.90.13 Unpainted Items

Part 1 – General

Summary

Do not coat the following items unless specifically directed otherwise in these specifications or on the Plans.

- Aluminum, plastic, or stainless-steel items.
- Brass and copper pipe, valves, and fittings for plumbing fixtures.
- Nameplates, labels, or identification tags.
- Sensors, switches, transmitters.
- Pipe joint bolts, shackles, washers, and nuts.

Field painting is not required for equipment listed below if they come with a factory finish epoxy, polyurethane, or powder coat. Items supplied with only a factory prime coat must be field coated.

- Motors
- Control valve pilot systems
- Sensor piping systems
- Valves
- Flow meters
- Machinery and blowers
- Electrical panels

9.91.13 Exterior or Damp Environment Painting

9.91.13.01 - System 1: Metals – Exterior and Wet Conditions including Doors, Windows, and Frames

Part 2 - Products

1. Tnemec
 - a. Prime Coat: Series 27 Fast Cure Epoxy (3 to 5 Mil DFT)
 - b. Finish Coat: Series 1095 EnduraShield (3 to 5 Mil DFT)
2. Sherwin Williams

For products that are supplied in bare (unprimed) metal:

 - a. Primer: Corothane 1 Galvapak Zinc Primer B65G11 (2.5 to 3.5 Mil DFT)

- b. Intermediate: Acrolon 218HS B65-650 Series (3 to 5 Mil DFT)
- c. Finish Coat: Acrolon 218HS B65-650 Series (3 to 5 Mil DFT)

For products that are supplied with a shop prime coat:

- a. Primer: Shop
- b. Intermediate: Macropoxy 646FC B58-600 Series (5 to 8 Mil DFT)
- c. Finish Coat: Acrolon 218HS B65-650 Series (3 to 5 Mil DFT)

Part 3 - Execution

Surface Preparation

1. Clean, dry, and free of all dirt, oil, grease, and other contaminants.
2. For new work: SSPC-SP1 solvent cleaned.
3. For coating over existing painted surfaces: Remove all loose and damaged coatings. Prepare with SSPC-SP2 hand tool or SP3 power tool cleaning.
4. All hollow metal doors, windows, and frames shall be bonderized, pickled, or phosphatized, which will serve as a primer for and shall be compatible with the finish coat to be applied in the field

9.91.13.10 - System 2: Wood – Exterior, Painted

Part 1 - General

Exterior wood surfaces, including, but not limited to trim, soffit, siding, and other similar surfaces.

Part 2 - Products

1. Tnemec
 - a. Prime Coat:
 - i. Rough or open grain wood: Series 115 Uni-Bond or 151-1051 Elasto-Grip (250 to 300 square feet per gallon)
 - ii. Smooth wood: Series 115 Uni-Bond (250 to 300 square feet per gallon)
 - b. Intermediate Coat: Series 156 EnviroCrete (4 to 6 Mil DFT)
 - c. Finish Coat: Series 1029 Enduratone (4 to 6 Mil DFT)
2. Sherwin Williams
 - a. Primer: Exterior Latex Wood Primer (250 to 300 square feet per gallon)
 - b. Intermediate Coat: Loxon XP (4.0 to 6.0 Mil DFT)
 - c. Finish Coat: Loxon XP (4.0 to 6.0 Mil DFT)

Part 3 - Execution

Surface Preparation

1. Surface clean, dry, and free of contaminates.

9.91.13.12 - System 3: Metals - Metal in Contact with Concrete, Masonry or Dissimilar Metals.

Part 1 - General

This section applies to all non-submerged metal surfaces including aluminum, hot-dipped galvanized steel, or other metals, which are liable to corrode due to interaction of dissimilar metals or to chemical reaction due to embedment in concrete or masonry grout, and that are not covered as part of another coating system.

Part 2 - Products

1. Tnemec
 - a. First Coat: Series N69 Hi-Build Epoxoline II (4 to 6 Mils DFT)
2. Sherwin Williams
 - a. First Coat: 646 FC B58-600 Macropoxy (4 to 6 Mils DFT)

Part 3 - Execution

Surface Preparation

1. SSPC-SP1 Solvent Cleaning
2. Lightly sand to degloss and provide a surface profile.

9.91.13.13 - System 4: Ferrous Metal Pipe and Supports including Steel, Cast Iron, and Ductile Iron (Exposed Indoors and Outdoors).

Part 1 - General

This Section applies to all ductile/cast iron and ferrous metals, including bituminous coated pipe and materials unless specified otherwise. Do not coat stainless steel materials unless specified otherwise.

This Section applies to all pipe materials and equipment, including manufacturer applied coating systems.

Part 2 - Products

1. Tnemec
 - a. Primer: Series 1 Omnithane (2.5 to 3.5 Mil DFT).
 - b. Intermediate Coat: Series N69 Hi-Build Epoxoline II (6 to 8 Mil DFT)
 - c. Finish Coat: Series 73 or 1095 Endura-Shield (3 to 5 Mil DFT)
2. Sherwin Williams
 - a. Primer: Corothane 1 Mio-Zinc Primer (2.5 to 3.5 Mil DFT)

- b. Intermediate: Macropoxy 646FC B58-600 Series (6 to 8 Mil DFT)
- c. Finish: Acrolon Ultra B65-830 Series (2 to 3 Mil DFT)

Part 3 - Execution

Preparation

1. To prevent surface condensation, whenever possible the pipe should be empty and allowed to reach ambient temperature before coating. If condensation is present, dry thoroughly prior to coating.
2. Steel
 - a. SSPC-SP10 Near White Metal Blast Cleaning
3. Ductile and Cast-Iron Materials
 - a. It is strongly recommended that ductile iron and cast-iron pipe or materials to be field coated should be purchased factory primed without the standard asphalt coating. Field removal of asphalt coatings is extremely difficult and overly aggressive preparation can create a damaged surface unsuitable for coating.
 - b. Remove all oils, grease, and other contaminants using solvent cleaning prior to abrasive blasting or power tool cleaning. Blemishes or staining on the prepared surface are acceptable if such items cannot be removed by light scraping with a knife. SSPC-SP10 blue-gray with surface profile of 2.0 Mil, minimum. Do not burnish the surface. Clean all surfaces of dust and loose residue immediately prior to coating. See NAPF 500-03-04/05.
4. Prepare and coat all exposed bolt heads, threads, washers, nuts, and tie rods with the same system as the pipe.

9.91.23 Interior Painting

9.91.23.01 – System 5: Metals Interior (Dry Conditions)

Part 1 - General

This Section applies to all interior metals located indoors, not factory coated and where the metal is not holding or in direct contact with a liquid and not exposed to weather.

Materials

1. Tnemec
 - a. Primer: Series 1 Omnithane Prime (2.5 to 3.5 Mil DFT)
 - b. Finish Coat: Series N69 Epoxoline II (4 to 6 Mil DFT)
2. Sherwin Williams
 - a. Primer: Corothane 1 Galvapak Primer B65G11 (2.5 to 3.5 Mil DFT)
 - b. Finish: Macropoxy 646FC B58-600 Series (4 to 6 Mil DFT)
3. International Paint

- a. Primer:
 - i. Fast Set Option: Devran 261QC Epoxy
 - ii. Cold Cure Option: BarRust 235 Epoxy
 - iii. Summer Option: BarRust 231 Epoxy Mastic (4 to 6 Mil DFT)
- b. Finish Coat:
 - i. Fast Set Option: DevThane 349QC Aliphatic Polyurethane
 - ii. Commercial Option: DevThane 389 Aliphatic Polyurethane
 - iii. Premium Gloss Option: DevThane 379 UVA Aliphatic Polyurethane
 - iv. Premium SemiGloss Gloss Option: DevThane 378 UVA Aliphatic Polyurethane (2 to 3 Mil DFT)

Part 3 – Execution

Surface Preparation

SSPC SP1 followed by SP6 (commercial blast). Surface profile shall be 2.0 Mil, minimum.

9.91.23.10 - System 6: Gypsum Wallboard – Interior, Painted

Part 1 - General

- 1. Gypsum wallboard ceilings, walls, and other similar surfaces located in a conditioned environment (i.e. building).

Part 2 - Products

- 1. Tnemec
 - a. Primer: Tnemec Series 287 Enviro-Pox, applied at 2.0-4.0 mils DFT
 - b. Finish Coat: Tnemec Series 287 Enviro-Pox, applied at 2.0-4.0 mils DFT Prime Coat:
- 2. Sherwin Williams
 - a. Primer: PrepRite ProBlock Int/Ext Latex Primer Sealer B51 Series (180 – 200 square feet per gallon)
 - b. Finish Coat: Pro-Industrial Water Based Catalyzed Epoxy B73 Series (4 to 6 Mil DFT)

Part 3 - Execution

Surface Preparation

Surface clean, dry and free of contaminates.

9.91.23.12 - System 7: Wood – Interior, Painted

Part 1 - General

Interior painted wood surfaces, including, but not limited to trim and other similar surfaces.

Part 2 - Products

1. Tnemec
 - a. Primer: Series 115 Uni-Bond or 151-1051 Elasto-Grip (1.0 to 1.5 Mil DFT)
 - b. Intermediate Coat: Series 1029 EnduraTone (2 to 4 Mil DFT)
 - c. Finish Coat: Series 1029 EnduraTone (2 to 4 Mil DFT)
2. Sherwin Williams
 - a. Primer: PrepRite ProBlock Int/Ext Latex Primer Sealer B51 Series (1.0 to 1.5 Mil DFT)
 - b. Intermediate Coat: Sher-Cryl HPA B66-350 Series (2 to 4 Mil DFT)
 - c. Finish Coat: Sher-Cryl HPA B66-350 Series (2 to 4 Mil DFT)

Part 3 - Execution

Surface Preparation

Surface clean, dry and free of contaminants.

9.91.33.01 - System 8: Metals in Contact with Drinking Water (Pump discharge head interior)

Part 1 – General

Summary

This section applies to metals in contact with potable drinking water.

References

Coatings shall be NSF 61/600 approved for use in direct contact with potable drinking water. The NSF 61/600 approval shall be appropriate for the application at the time of submittal. Contractor is responsible for verifying the current NSF 61/600 requirements and restrictions of submitted coating.

Part 2 – Products

Materials

1. Tnemec
 - a. Valves $\geq 1\frac{1}{2}$ -inch diameter; Pipe ≥ 6 -inch diameter; Tanks ≥ 25 gallons.
 - i. Primer: None
 - ii. Finish Coat: Series FC22 Epoxoline (16 to 20 Mil DFT)
 - b. Fittings, Valves, & Pumps $\geq \frac{1}{2}$ -inch diameter; Pipe ≥ 10 -inch diameter; Tanks ≥ 50 gallons.
 - i. Primer: None

- ii. Finish Coat: Series 22 or FC22 Epoxoline (either one coat at 16 to 20 Mil DFT or two coats at 12 to 16 Mil DFT each coat)
- c. Fittings, Valves, & Pumps $\geq$ 4-inch diameter; Pipe $\geq$ 18-inch diameter; Tanks $\geq$ 1,000 gallons.
 - i. Primer: Series N140 Pota-Pox Plus or Series 141 Potapox 80 (6 to 8 Mil DFT)
 - ii. Finish Coat: Series N140 Pota-Pox Plus or Series 141 Potapox 80 (6 to 8 Mil DFT)
- 2. Sherwin Williams (Pipes $\geq$ 6-inch diameter; Tanks $\geq$ 100 gallons)
 - a. Primer: None
 - b. Finish Coat: Sherplate PW (16 to 20 Mil DFT)
- 3. International Devoe (Pipes $\geq$ 18-inch diameter; Valves $\geq$ 3/4-inch diameter; Tanks $\geq$ 300 gallons)
 - a. Primer: BarRust 233H (6 to 8 Mil DFT)
 - b. Finish Coat: BarRust 233H (6 to 8 Mil DFT)

Part 3 – Execution

Surface Preparation

Ferrous Metal: SSPC-SP1 followed by SP10 Near White Metal Blast Cleaning. Surface profile shall be 2.0 Mil, minimum.

Ductile Iron: SSPC-SP1 followed by NAPF 500-03-04/05 Grey White Blast or SP10 Grey White Blast. Surface profile shall be 2.0 Mil, minimum.

9.97.23 Concrete and Masonry Coatings

Part 1 - General

Scheduling

Most coatings on concrete will require a 28-day concrete curing period prior to coating. Schedule the work accordingly. No additional monetary or time compensation will be given for failure to plan for the required curing duration.

9.97.23.09 - System 9: Concrete and CMU Wall – Interior, Non-Immersion, Mild Condition

Part 1 - General

Summary

Interior surface of concrete and CMU walls in a conditioned environment (i.e. building).

Part 2 - Products

Materials

Concrete Masonry Unit (CMU) Walls

1. Tnemec
 - a. Prime Coat: Series 1254 Epoxoblock (24 to 26 Mil DFT) Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
 - b. Finish Coat: Series 280 Hi-Build Tneme-Glaze (8 to 12 Mil DFT)
2. Sherwin Williams
 - a. Primer: Cement-Plex 875 (60-80 square feet per gallon) Apply as needed to provide a smooth, continuous, pinhole-free, void-free film.
 - b. Finish Coat: Macropoxy 646FC, B58-600 Series (4 to 6 Mil DFT)

Part 3 - Execution

Surface Preparation

1. Clean, dry and free of contaminants and passing a wet mat test in accordance with ASTM D4263 Plastic Mat test.
2. Substrate shall be grouted or otherwise filled prior to painting.

9.97.23.14 – System 10: CMU and Concrete Exterior Colored Coating

Part 1 - General

Summary

Exterior surface of above grade concrete and CMU walls. This coating system is intended to function as colored coating with waterproofing improvement.

Part 2 – Products

Materials

1. Sherwin Williams (Waterproofing Acrylic System, satin sheen)
 - a. Prime Coat: LX21-50 Series, Loxon XP, Waterproofing Masonry Coating, DFT: 6.5-8.0 mils
 - b. Finish Coat: LX21-50 Series, Loxon XP, Waterproofing Masonry Coating DFT: 6.5-8.0 mils

Note: 10 or fewer pinholes per square foot is required for a waterproofing system.
2. Sherwin Williams (Conventional Acrylic System, egg shell gloss)
 - a. Prime Coat: LX02W0050, Loxon Concrete & Masonry Primer/Sealer, Acrylic Latex Primer, DFT: 2.0-3.0 mils
 - b. Finish Coats: B66-660 Series (Eg-Shel), Pro Industrial Acrylic, Acrylic Latex Coating, DFT: 2 Coats, 2.0-4.0 mils each

Part 3 – Execution

Surface Preparation

Clean, dry and free of contaminants- SSPC-SP13 / NACE No. 6 (ICR 310.2R, CSP 1-3) light surface preparation required.

9.99.33 Specialty Metal Coatings

9.99.33.07 – System 11: Vertical turbine pump bowls (Submerged, Potable Water)

Part 1 - General

This section applies to pump bowl interior and exterior. The coating shall be designed for submerged conditions. The coating shall be NSF certified for direct contact with potable drinking water.

Part 2 - Products

Materials

1. 3M Scotchkote - fusion bonded epoxy (12 to 16 Mil DFT)
2. Sherwin Williams - Sher-Plate PW (10 to 12 Mil DFT)
3. AkzoNobel Devoe - BarRust 233H NSF High Solids Low Temperature Curing Epoxy Coating (10 to 12 Mil DFT)

Part 3 - Execution

Preparation

SSPC SP1 followed by SP10 Near White Blast, Surface profile shall be 2.0 Mil, minimum.

Installation

Coatings on interior and exterior of vertical turbine pump bowls must be applied at the factory.

Repairs

Manufacturer shall supply NSF approved patch kit for field repairs.

Division 10 Specialties

10.00 GENERAL

This division covers that work necessary for fabricating and installing all furnishings and accessories as described in these specifications and as shown on the Plans.

Sections in these specifications titled "*Common Work for . . .*" apply to all following subsections whether directly referenced or not.

10.05 Common Work for Specialties

Part 1 - General

Submittals

Submittal information shall be provided to the Owner for the following items:

- Equipment Signs
- Fire Extinguishers
- First Aid Kit

10.06.10 Schedules for Signage

Part 3 - Execution

Installation

Install signs/markers directly on the devices in a location that does not interfere with the device operation or maintenance. If the device is too small or otherwise impractical to mount marker, locate marker as close as possible to the device on an adjacent surface.

10.10 INFORMATION SPECIALTIES

10.14.23 Panel Signage

Part 2 - Products

Materials

Equipment Signage

1. Equipment signs shall be plastic-laminated 1-inch high, by required length, by $\frac{1}{8}$ -inch thick, with $\frac{1}{2}$ -inch high letters in N-2 Standard Gothic characters.

Pump Signage

1. Provide a 2-inch high, temperature resistant metal or vinyl number or name on each pump or pump motor. Number shall face the pump control panels and be placed so as not to be obscured from other equipment. Confirm with Engineer the proper numbering or naming of each pump.

Construction Fence Perimeter Signage

1. Signs shall be made of polyethylene and be $\frac{1}{8}$ -inch thick minimum. Sign shall have a white background with construction orange print. Font shall be readable from 100 feet.
2. During construction, if construction site is to be partially or completely enclosed, signs stating "Construction Area, Keep Out" shall be placed so that at any location around the construction site within 100 feet of a sign can be read from that distance. Upon removal of temporary construction fencing, remove signs from fencing and deliver to Owner.

Electrical and Control Equipment

1. All components provided under this specification, both field- and panel-mounted, shall be provided with permanently-mounted nametags. The Engineer shall have complete control over the hardware to be labeled and the labeling provided. Provide labels as directed.
2. Provide a name tag for each piece of equipment and for each circuit and/or control device associated with the equipment.
3. Provide a nameplate for each control center unit door.
4. Electrical equipment name plates and service legends shall be phenolic-engraved, rigid, laminated plastic type with adhesive back. Letter height shall be $\frac{5}{16}$ -inch unless specified otherwise on the Plans. Labeling shall clearly identify the associate component. Color shall be black background with white letters.
5. Warning nameplates shall be provided on all panels and equipment which contain multiple power sources which may have energized circuits with the main disconnecting means in the off position. Lettering shall be white on red background.
6. Tags shall be securely attached. Adhesive backed tags shall also have at least two brass screws for positive fastening.
7. Provide engraved nameplates indicating load served, voltage, and phase for every circuit breaker, panel board, switchboard, motor control center, motor starter, disconnect switch, and fused switch.

10.40 SAFETY SPECIALTIES

10.43.16 First Aid Kit

Part 2 - Products

Components

Provide first aid kits at the locations shown on the Plans with the following items minimum:

- 2 packages adhesive bandages, 1 inch (16 per package)
- 1 package scissors and tweezers (1 per package)

- 1 package bandage compress, 4 inch (1 per package)
- 1 package antiseptic soap or pads (5 per package)
- 1 package triangular bandage, 1 inch (1 per package)
- 1 package iodine swabs (10 per package)
- 1 package ammonia inhalants (10 per package)
- 1 package bandage compress, 2 inch (4 per package)

Contain kit in a dust-proof, weatherproof, moisture-proof, 20-gauge steel cabinet with gasketed lid. Steel finish shall be baked enamel. Provide cabinet with wall mounting brackets. Cabinet cover shall fold down to provide a shelf, and shall be attached to cabinet by a continuous piano-type hinge. Border shall be red with white body, red lettering, cross and arrow. The kit shall have reorder information clearly marked on it.

10.44.16 Fire Extinguisher

Part 2 - Products

Components

Portable, wall-mounted, 10-pound, dry-chemical fire extinguisher shall be listed and approved by Underwriters Laboratories. The fire extinguisher shall contain a dry chemical agent which is effective in extinguishing Class A, B, and C fires (tri-class), and shall be rated 2A-10B-C or greater.

Part 3 - Execution

Installation

Install extinguisher no higher than 5-feet above floor and in accordance with applicable codes. Provide a fire extinguisher attached to the interior wall near each exit door to outside.

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Division 11

Equipment

11.00 GENERAL

Sections in these specifications titled “*Common Work for . . .*” apply to all following subsections whether directly referenced or not.

11.05 Common Work for Equipment

Part 1 - General

Submittals

Provide submittal information to the Owner for the following items:

- Pumps and Motors
- Heaters
- Ventilators
- Pump Anchor Bolts

11.10 PUMPS

11.10.05 Common Work for Pumps

Part 1 - General

Summary

This section covers work necessary to provide the pumps, complete with motors and accessories, described herein and as shown on the Plans.

Related Sections

- Division 9.90 Paintings and Coatings
- Division 10.14.23 Panel Signage
- Division 11.19 Pump Anchor Bolts
- Division 11.20.1 Common Work for Pump Motors

References

- HI - Hydraulic Institute.
- ASTM - American Society for Testing and Materials.
- AISI - American Iron and Steel Institute.
- ANSI - American National Standards Institute.

Performance Requirements

Power required to operate the pump(s) shall not exceed the motor nameplate horsepower regardless of any flow and head tolerances listed in this specification, unless allowed otherwise in the Pump Motors section.

The design and performance requirements listed for each pump must be met, with no exceptions. Pumps that do not meet all of the conditions will be rejected.

The design point must fall within the pump Preferred Operation Range (POR) referenced from the Best Efficiency Point (BEP) as follows:

Type	Specific Speed (US Units)	Design Point from BEP
Centrifugal	any	70% to 120%
Vertical	$\leq 4,500$	70% to 120%
Vertical	$> 4,500$	80% to 115%

Pump parts in contact with potable water, or raw water being supplied to a potable water treatment facility, shall be lead free complying with either NSF 61 ANSI 372 tested or NSF 61 Annex G compliant. Submit lead free information with pump submittal information.

Pump Name	Well 3B	Well 5B
Type	Vertical Turbine (well)	Vertical Turbine (well)
Maximum Speed	1,800 rpm	1,800 rpm
Design Flow	2,250 gpm	2,250 gpm
Design Head	308 ft	309 ft
Secondary Duty Point (Future Head Condition)	2,080 gpm @ 329 ft	2,080 gpm @ 328 ft
Min. Pump Efficiency	82%	82%
BEP Position	Left of Design Point	Left of Design Point
Tolerance Grade at Design Point	1B	1B
Max. NPSHR3	28.4 ft at 2,250 gpm	28.4 ft at 2,250 gpm
NPSHA	37 ft at 3,000 gpm	67 ft at 3,000 gpm
Fluid	Raw Water	Raw Water
Max. Fluid Temperature	50 degrees F	50 degrees F

Head Conditions

Head conditions specified in the table are inclusive of all pump components including the casing/bowls, discharge head or elbow, column pipe, and intake strainer, as applicable.

Tolerance Grade

Performance range shall adhere to the HI 11.6 (submersible sewer pumps) or HI 14.6 (centrifugal and vertical pumps) tolerances stated herein are referenced at the specified design

point(s). Flow tolerance is measured at the design point head. Head tolerance is measured at the design point flow. Efficiency is evaluated where a straight line drawn from zero flow, zero head, passes through the design point and crosses the actual pump curve.

All tolerance requirements listed must be met. They are not independently exclusive.

Grade 1B ($\pm 5\%$ Flow, and $\pm 3\%$ Head, and no less than -3% Efficiency).

Submittals

Provide the following information:

Source Quality Control

- A minimum of 5 installations with similarly sized and configured pumps in equivalent fluid applications installed by the Contractor or installer subcontractor. Include location, contact name, and number.
- Company name, address, and phone of the closest manufacturer's authorized service company and a qualified service company. Qualified service may be a company that is not a manufacturer's authorized service center but can perform competent service and order repair and replacement parts. Authorized service must be within the 48 contiguous US states. Qualified service must be within 200 miles of the project site.

Product Data:

- Specifications and data describing all pump parts, pieces, and components. Include information on materials of construction and proposed coating systems.
- Intake strainer mounting configuration (if applicable).
- Performance curves showing total dynamic head (TDH) in feet, efficiency, and net-positive-suction head required (NPSHR) versus output in gallons per minute (gpm). All losses from the drive shaft, seal, coupling, and other mechanical losses shall be included in the data presented. Catalog or software generated curves may be submitted for preliminary approval and ordering.
- Documentation on assembled pump and motor unit natural frequency. Natural frequency shall not occur within 20 percent of speed above or below the pump's nameplate speed.
- Provide up and down thrust forces versus flowrate for each design point specified.
- Provide up thrust force at dry start condition.
- Minimum required submergence (ft) at design point
- Complete list of all pump system components and accessories.
- Column pipe headloss calculation (if applicable).
- Bearing life (L10) for ball and roller bearings. Calculations supporting L10 of no less than 40,000 hours.

Shop Drawings:

- Detailed dimensional drawings showing outline dimensions, lengths, overall sizes, materials, and weights for each pump unit and associated accessories.

Closeout Submittals: Provide the following submittals prior to project closeout:

- Operations and Maintenance manual.
- Manufacturer signed warranties with pump serial numbers.

Quality Assurance

The pump manufacturer is responsible for the motor and pump assembly.

Delivery, Storage, and Handling

Deliver, store, and handle pumps in accordance with manufacturer's recommendations.

Warranty

Warrant all pumping equipment described in this section and provided under this contract against defects in materials and workmanship for a period of two years after date of project acceptance.

Following pump and motor installation, furnish the services of a qualified manufacturer's representative to inspect pump units and inform Owner, prior to field testing, of any defects or concerns regarding condition of each unit and its installation at the job site. Upon resolution of any defects or concerns (if any) and work performed by the Contractor at their expense, to the satisfaction of the Owner, manufacturer's warranty shall then be in full effect with no reservation or qualifications other than those stated in the manufacturer's warranty. Upon completion of pump installation, manufacturer's representative shall provide written certification that equipment is fully warranted as installed.

Extra Materials

Provide any special tools required for pump or motor maintenance.

Part 2 - Products

Components

For pumps in domestic water applications, all wetted pump components, coatings, and lubricants shall be approved for use in potable drinking water in accordance with U.S. Food and Drug Administration (FDA) or National Sanitation Federation (NSF 61) rules and regulations.

Neither 201 nor alloy-20 stainless steels are approved for any pump components unless specifically mentioned otherwise in these specifications.

All pump system components are to come from the pump manufacturer and include:

- Motor
- Bowl assembly
- Column assembly

- Discharge head, elbow, or pump casing
- Couplings
- Intake strainer. Secure the strainer to the intake by threading the suction bell or bracketing. Secure bolts used for bracketing from loosening with nylock nuts and/or center-punching the threads at the face of the nut. Lock-washers alone are not acceptable. Fasteners must be of compatible stainless steel material as the strainer. The pump supplier may propose other mounting methods for the Owner's review.
- All other necessary appurtenances for complete unit assembly.

Accessories

Provide removable guards to protect personnel from rotating components. Guards to meet the minimum requirements of WAC 296-806-20042.

All pumps are to include an engraved non-corrodible metal nameplate on the exterior of the pump head or body (duplicate attached to pump support flange or shipped loose if submersible), readily accessible without requiring any disassembly. The nameplate shall include, at a minimum, the following information (as applicable for the type of pump):

- Pump Manufacturer
- Pump Model Number
- Pump Serial Number
- Impeller Number
- Impeller Trim
- Number of Stages
- Design TDH (feet)
- Design Flow (gpm)
- Supplier Name and Phone Number
- Date of Manufacture

Source Quality Control

Factory Pump Performance Testing and Certification

Factory testing curves and data on each pump must be provided prior to pump delivery. Variations between factory tests and previously submitted catalog curves may be cause for rejection. Factory testing of the pump may use a dynamometer or calibrated shop motor.

Perform a performance test as described in the latest edition of Hydraulic Institute's (HI) Pump Tests (ANSI/HI 14.6 Centrifugal and Vertical, ANSI/HI 11.6 Submersible), with results submitted to the Engineer and approved for each pump prior to shipment to the construction site. Test pumps at the factory to HI standards, except as modified below.

- Test speed must be within 20 percent of the rated speed unless prior written approval is given by the Owner. Approval is not guaranteed.
- HI 14.6.5.7.1: No less than three additional test points beyond the five points listed in the HI standard are required. Two of these points between shutoff head and design point, and one point to the right of the design point.
- HI 14.6 Appendix K, 11.6.10: Model tests are not allowed unless prior approval is given by Owner. Supplier shall submit a written request to perform a model test with procedures outlined for Owner's review.
- Provide a certified data sheet and performance curve for each pump similar to HI 14.6 Appendix H pump test summary of information. At a minimum provide:
 - Information per HI standards.
 - TDH (ft) vs. Flow (gpm)
 - Power (hp) vs. Flow (gpm)
 - NPSHR (ft) vs. Flow (gpm) (catalog data is acceptable)
 - Motor Input Power
 - Hydraulic Efficiency (%) vs. Flow (gpm) (where applicable)

Graphs must be submitted and approved prior to shipment of pumps.

Provide preliminary curves to the Owner prior to performing official factory tests for verification of performance criteria and pump selection.

Part 3 - Execution

Examination

For pumps with a suction strainer, the Owner must observe and approve the strainer mounting configuration before the pump is installed.

Preparation

Disinfect domestic water pumps by flushing with a solution of 50 ppm chlorine prior to installation. After disinfecting, immediately flush and rinse the pumps with clean water to remove the high chlorine concentration solution. This includes the impellers and interior of bowls and casings.

Installation/Construction

Install pumps in accordance with manufacturer's directions. Installation shall be supervised and approved by manufacturer's representative prior to operating or field testing.

Adjust pump assemblies so that driving units are properly aligned, plumb, and level with the driven units and all interconnecting shafts and couplings. Flexible couplings shall not be used to compensate for misalignment.

Connect piping to the pump in a manner which prevents strain on the pump casing or head.

Field Quality Control

See Division 1.75 Starting and Adjusting for scheduling and notification requirements.

A qualified and authorized representative of the pump manufacturer shall conduct or supervise the field testing. Prior to acceptance of installed pumps, manufacturer's representative shall demonstrate proper operation of pumps at capacities stated.

Contractor is responsible for startup and adjustments to meet the specifications. Perform field tests to represent the performance of the new pump(s) when operating under actual field conditions and to establish the acceptance of the pump(s) furnished and installed. Perform the field test in the presence of the Owner after the piping and controls have been installed.

Perform a performance test similar to those described in the latest edition of Hydraulic Institute's (HI) Pump Tests (ANSI/HI 14.6 centrifugal and vertical, ANSI/HI 11.6 Submersible), with results for each pump submitted to the Owner for approval.

Perform a field test to the accuracy obtainable with the monitoring equipment installed with the piping and instrumentation. If sufficient field devices are not available to test all parameters, the Contractor shall provide testing gauges and meters as needed. At a minimum, the following are needed:

- Suction pressure gauge or water level probe.
- Discharge pressure gauge.
- Flow meter.
- Electric current and voltage meter(s), one per phase.
- Vibration sensor.

Where existing gauges and meters are retained and not been replaced under this contract, the Contractor may temporarily replace such equipment during testing with their own at their expense, if approved by the Owner. The Owner makes no guarantee of the accuracy of existing gauges and meters.

Results shall be within plus or minus 1 percent of the tolerances listed above under Performance Requirements.

Perform testing under the observation of the Owner. At that time, the following data shall be collected for each pump:

- TDH vs. Flow at a minimum of three points which include: Shutoff head (unless pressure is deemed excessive by the Owner), fully open to system, and approximately 50 percent design flow with throttled discharge valve. Additional points may be required at the discretion of the Owner.
- Overall Efficiency (motor power draw required for this calculation).
- Take vibration readings under normal operating conditions at the design point. If it is not possible to reach the exact design point, then the vibration readings will be taken within the preferred operating range at a point agreed to by the Owner. A factory vibration test is not a substitute for a field test.

- If a throttled valve is used to adjust the operational point during vibration testing, the valve must be no closer than 20 times the pipe diameter from the pump and separated from the pump by at least one flexible pipe joint.
- For variable speed pumps, take readings at full speed and two reduced speeds as directed by the Owner. Do not test below 50% of design flow without Owner's approval.
- Read vibrations at the locations described in HI 9.6.4.2.3. In general, the reading locations shall be at:
 - The middle of each bearing housing of between bearing pumps.
 - Near the outer casing bearing of end suction pumps.
 - Near the top of the motor support flange for vertical motors.
- Read vibrations in the three orthogonal planes, with the maximum reading governing the results. If the vibration tests fail, the pump manufacturer and/or Contractor shall modify the equipment and/or installation and retest until the standards are met. Submit the vibration test results to the Owner. The manufacturer's representative shall provide proper, calibrated instrumentation to verify completed unit vibration.
- Field vibration testing shall be performed by a Level 1 certified Vibration Analysis Tester. Certification shall be current and from one of the following: Mobius Institute, Vibration Institute, Technical Associates of Charlotte.

Maximum allowable completed unit vibration amplitude (pump and motor installed) shall be per the current HI Standards, Section 9.6.4.2.5.1.

Upon completion of pump installation and testing, manufacturer's representative shall provide written certification that equipment is installed correctly and fully warranted. Provide certification that pumps meet all requirements set forth in these specifications and submittal literature. The Contractor shall provide a written report of all test conditions and results.

Repair

Repair and retest units failing any field test. If unit fails second field test, unit will be rejected, and supplier shall furnish a unit that will perform as specified.

11.11 Well Pumps

Part 1 - General

Existing Conditions

The following data is assumed to be correct based on well logs. Contractor to verify existing well diameters and screen locations. Submit actual well data, if different from below, to Owner prior to purchasing pumps.

- Well 3B
 - Existing 20-inch diameter well casing.

- 20-inch to 16-inch casing reduction at 167-feet below ground surface (BGS).
 - 16-inch diameter screens from 207-feet BGS to 227-feet BGS and from 237-feet BGS to 252 BGS for Well 3B. Slot size of 0.100-inch.
- Well 5B
 - Existing 20-inch diameter well casing.
 - 20-inch to 16-inch casing reduction at 173-feet BGS.
 - 16-inch diameter screens from 215-feet BGS to 245-feet BGS and from 255-feet BGS to 270 BGS. Slot size of 0.100-inch.
- Maximum water temperature 72° F.

Part 3 – Execution

Installers

All modifications to the existing well casing and/or sanitary seal shall be performed by a Department of Ecology licensed well driller. Contractor shall provide license information prior to starting work. Contractor shall also provide all required coordination, inspection, and documentation with the Department of Ecology and the local health department as required for well modifications.

11.11.2 Vertical Turbine Pumps

Part 1 - General

Summary

This section covers that work necessary for providing and installing vertical turbine pumps, complete with motors and accessories, described herein and as shown on the Plans.

Related Sections

- 9.91.23.01 or 9.91.13.13 Indoor ferrous metals coating (pump head exterior)
- 9.91.33.01 Metals in contact with drinking water coating steel pump discharge head interior)
- 9.99.33.07 Pump bowls
- 11.10.1 Common Work for Pumps
- 11.20 Pump Motors

References

- Hydraulic Institute 2.1 – 2.6, 9.1 – 9.8, 14.6
- AWWA E102 Submersible vertical turbine pump construction.
- AWWA E103 Horizontal and vertical line-shaft pump construction.

Submittals

Submit detailed dimensional drawing for pump can, sole plate assembly, and pump foundation as applicable.

Shaft bearing losses for pumps with shafts longer than 50 feet. Bearing losses shall be included when selecting motor size.

Part 2 - Products

Manufactured Units

Pump shall be vertical turbine, well type.

Components

Discharge Head

Cast ductile iron pump head with positive sealing base plate and 2-plate sole plate system for mounting of pump as shown on the Plans. A discharge flange shall be incorporated in the pump head, design for through bolting of 150-pound ASA standard pipe flanges as shown on the plans. Sole plate shall have taps for one 2-inch NPT casing vent and two 2-inch NPT access port for sampling and level measuring equipment as shown on the Plans

Pump head to have a pressure rating at least 50 psi greater than full shut-off head, after accounting for suction head or lift.

3/4-inch minimum tap on outlet for discharge pressure gauge

Two access openings to the shaft seal, each protected with an expanded metal screen attached to the head with two piano hinges and a locking clip hasp.

Head Drain

If a stuffing box seal is used, provide a threaded drain port in the head. Field install Sch 40 PVC piping from drain port to the nearest floor drain, unless shown otherwise on the plans. Pipe size 1/2-inch diameter or match head port size, whichever is larger. Outlet must have an air gap of two pipe diameters above the floor or drain grate. Secure drain pipe to adjacent piping or structure with clamps spaced no more than 4 feet apart, and as necessary for a rigid assembly. Anchors shall be easy to disassemble and reuse. Do not obstruct walking paths or equipment access with drain pipe. Slope drain pipe at a minimum of 1/4-inch per foot. Do not place drain pipe outlet where water will run across a walking path.

Column

The column pipe shall be schedule 40 steel unless depth or pressure requires a stronger pipe.

Column pipe furnished in interchangeable sections not over ten feet in length. Threaded, sleeve type couplings are allowed for columns 12-inch diameter and smaller. The joints are to be butted for perfect alignment after assembly. Fourteen-inch and larger columns shall use flanges.

The column shall have threaded bronze or stainless steel bearing retainers screwed into the pipe couplings and retained by the butted pipe ends for threaded column pipe, or drop-in style

for flanged column pipe. Each bearing retainer shall contain a water lubricated, cutless, rubber bearing designed for vertical turbine pump service.

Line Shaft

Open type line shaft. Furnish the shaft in interchangeable sections not over ten feet in length.

The line shaft shall be selected such that the elongation due to weight and hydraulic thrust shall not exceed the axial clearance of impellers in the pump bowls. Size of shaft shall be no less than that determined by AWWA Specification E103, Section 4.4.

The line shaft shall be turned, ground, and polished precision 416 or 17-4PH stainless shafting sized to operate the pump without distortion or vibration and couple with steel couplings machined from solid bar steel.

Place a non-corrosive flame sprayed stainless steel journal on each shaft at the bearing point. The stainless-steel journal OD will be substantially flush with the shaft OD. (Recess not to be deeper than diameter corresponding to the root diameter of shaft threads.) Glued-on sleeves are not acceptable.

Head shaft shall be a 2-piece design with an easily accessible coupling located between pump and motor.

Provide an adjusting apparatus on top of the head shaft to allow for impeller adjustment. This method shall provide a positive locking device. Coupling shall be stainless steel.

Bowl and Impeller Assemblies

Bowl bearings shall be separate stacked bronze and fluted neoprene, water-lubricated, and designed for vertical turbine pump service.

Pump bowls shall be constructed from close-grained cast iron or ductile iron. Coat the bowl interior with ceramic, porcelain or per Division 9.99.33.07.

Enclosed impellers are allowed for all applications. Semi-open impellers are allowed if the suction bowl is less than 150 feet below the discharge head and there are no more than two stages.

Impellers shall be fabricated from:

Aluminum-bronze (ASTM B148, C95400, C95500, or as otherwise approved by the Owner)

Replaceable suction eye wear rings are required for 6-inch diameter (nominal) and larger bowls with enclosed impellers. Additionally, replaceable discharge end wear rings are required for thrust balanced (semi-open or enclosed) impellers.

Vertical impeller adjustment shall be by external means. Statically and dynamically balance impellers. Attach impellers to the pump shaft by a positive locking stainless steel tapered impeller collet. For shaft diameters larger than 2.5 inches, keys and thrust ring retainers shall be used.

If approved by the Owner, the suction impeller may be a "low NPSH" style to meet the NPSH design requirements.

Seals

Packed, bleed-off type stuffing box line shaft seal, with a minimum of one cage ring and five rings of packing.

Strainer

Provide a stainless steel or bronze strainer having a net inlet opening of not less than four times the area of the suction pipe. Strainer shall be a basket type. Select strainer diameter such that water velocity between the strainer and the well casing or pump barrel does not exceed 5 feet per second.

Finishes

See Related Sections. Coat the following items:

- Discharge head
- Pump bowl interior
- Pump bowl exterior

11.19 Pump Anchor Bolts

Part 2 - Products

Materials

Pump anchor bolts shall be Deco Heavy-Duty Adjustable Standard Anchors or approved equal. Provide removable mounting stud for easy pump installation and removal. Anchor must be adjustable to 75% of the bolt diameter in any direction prior to tightening bolt.

11.20 PUMP MOTORS

11.20.01 Common Work for Pump Motors

Part 1 - General

Summary

This section is not applicable for chemical dosing pumps or small sump pumps.

Related Sections

- Division 9.91.13.1 Coatings – Exposed Metals, Indoors
- Division 11.10.05 Common Work for Pumps

References

- HI - Hydraulic Institute.
- ASTM - American Society for Testing and Materials.
- AISI - American Iron and Steel Institute.
- ANSI - American National Standards Institute.
- IEEE – Institute of Electrical and Electronics Engineers

Submittals

Submittal information shall be provided for each individual motor.

Complete list of all motor components and accessories to be provided. All motor system components are to come from the pump manufacturer.

Company name, address, and phone of the closest manufacturer's authorized service company and a qualified service company. Qualified service may be a company that is not a manufacturer's authorized service center but can perform competent service and order repair and replacement parts. Authorized service must within the 48 contiguous US states. Qualified service must be within 200 miles of the project site.

Specifications and data describing all motor parts, pieces, and components. Include information on materials of construction and proposed coating systems.

Motor data including type, torque, RPM, no-load current, full-load amps, service factor, power factor, and motor efficiency at full-load. Provide maximum recommended motor starts per hour.

Bearing life (L10) for ball and roller bearings. Calculations supporting L10 of no less than 40,000 hours.

Provide catalog data for each motor showing the following information:

- Power factor vs. Load
- Efficiency vs. Load or Wire-to-Water Efficiency vs. Load.
- Speed vs. Load

Shop Drawings:

- Detailed dimensional drawings showing outline dimensions, lengths, overall sizes, materials, and weights for each motor and accessories.
- Wiring diagrams for motor and any embedded sensors or switches.

Closeout Submittals: Provide the following submittals prior to project closeout:

- Operations and Maintenance Manual
- Manufacturer signed warranties with serial numbers.

Quality Assurance

Motors shall be dynamically balanced at the factory and shall have rigid mounting maximum vibration amplitude meeting NEMA MG-1 Grade A:

	Grade A	Grade B	Grade B
Maximum Vibration	0.0019 inch pk-pk 0.12 inch / sec	0.0013 inch pk-pk 0.08 inch / sec	0.0016 inch pk-pk 0.10 inch / sec
1,200 rpm	All sizes	1 to 75 hp	Above 75 hp

1,800 rpm	All sizes	1 to 125 hp	Above 125 hp
3,600 rpm	All sizes	1 to 150 hp	Above 150 hp

Delivery, Storage, and Handling

Deliver, store, and handle motors in accordance with manufacturer recommendations. Store in a dry, enclosed environment and in the same orientation as their final mounting.

Design Requirements

Motors designed for continuous cycle.

Motors (not including submersibles) to be premium efficiency with efficiency at design point not less than shown in Table C405.8(1) or C405.8(2), as applicable, of the Washington State Energy Code (WAC 51-11C-40508), current edition. Efficiency as determined by IEEE Standard 112, Test Method B.

Size motors such that power draw in the defined operating range of the pump shall not exceed the nameplate size. Power draw shall not encroach into the service factor. Motor size selection shall include all losses, including motor and pump bearings.

Reverse thrust bearings: Oil-bath lubricated with up-thrust (or reverse axial thrust) protection of 30 percent of the normal operating thrust, or as required to support the pump reverse thrust at dry startup, whichever is less.

Pump Name	Well 3B	Well 5B
Phase, Volts, Hz	3-ph, 460-V, 60-Hz	3-ph, 460-V, 60-Hz
Horsepower (max. nameplate)	300	300
Starting (full voltage, reduced voltage, VFD) ¹	As shown	As shown
Nominal maximum speed (rpm)	1,800	1,800
Inverter duty (yes/no) ²	Yes	Yes
Shaft (solid/hollow)	Hollow	Hollow
Steady bushing required (yes/no) ³	Yes	Yes
Reverse ratchet (yes/no) ⁴	Yes	Yes
Enclosure ⁵	WP1	WP1
NEMA Design ⁶	B	B
Service Factor	1.15	1.15
Max ambient temperature rating	40° Celsius	40° Celsius
Insulation	Class F (115° Celsius rise max.)	Class F (115° Celsius rise max.)
Actual field temperature rise	Class B (90° Celsius max.)	Class B (90° Celsius max.)
Anti-Condensation heaters (yes/no) ⁷	No	No
Winding temperature sensors (PTC/RTD/None) ⁸	None	None
Winding thermostats (yes/no) ⁹	No	No
Bearing temperature sensors (yes/no)	No	No
Fluid leakage sensor (yes/no)	No	No

Table Footnotes

1. Full or reduced voltage starting: If not listed here, then as shown on the plans.
2. Motors for use with Variable Frequency Drives shall be inverter duty rated per NEMA MG1 Part 31.
3. Steady bushing (vertical motors): Must be provided when using a hollow shaft and mechanical seal. Also required for motors larger than 10 hp at speeds above 2,500 rpm.
4. Reverse ratchets: drop-in ball type (not pin and spring) non-reverse mechanism.
5. Other enclosure types will NOT be accepted if they are higher on the list below than the type shown in the table. Substitutions for Explosion Proof motors are not allowed.

6. For motors larger than 500 hp that include flywheels, provide RPM vs Torque curve, RPM vs Current curve, and acceleration time for entire connected load inertia.
7. Motor windings with imbedded heaters with external connections for connection to 120 VAC power. Provide self-regulating heaters to prevent moisture condensation in windings during prolonged periods of non-use.
8. Winding temperature sensors: One positive temperature coefficient (PTC) thermistor or resistant temperature detector (RTD) per phase embedded in the winding for a total of three (3) sensors. PTC thermistors shall be wired in series, RTD shall be wired individually. All wires clearly labeled at the termination point.
9. Normally closed thermostat, one per winding phase, connected in series.

Provide wiring diagrams for internal sensors and switches on the outside of the motor. Clearly label all such sensor and switch wires for connection to the control system.

Integral thermal and fluid leakage sensors and switches shall have separate contacts from the overload protection systems.

Warranty

All equipment described in this section and provided under this contract shall be warranted against defects in materials and workmanship for a period of two years after date of project acceptance.

Following motor installation, furnish services of a qualified manufacturer's representative to inspect units and inform Owner, prior to field testing, of any defects or concerns regarding condition of each unit and its installation at the job site. Upon resolution of any defects or concerns (if any) and work performed by the Contractor at their expense, manufacturer's warranty shall then be in full effect with no reservation or qualifications other than those stated in the manufacturer's warranty.

Upon completion of motor installation, manufacturer's authorized representative shall provide written certification that equipment is fully warranted as installed. A combined pump-motor warranty will be acceptable in lieu of separate warranties.

Maintenance

Provide any special tools required for motor maintenance. Provide enough lubricant for one service change (not applicable for submersible motors).

Part 2 - Products

Accessories

All motors are to include an engraved non-corrosive metal nameplate on the exterior of the motor (duplicate shipped separately if submersible), readily accessible without requiring any disassembly. The nameplate shall include, at a minimum, the following information. Common abbreviations shown in brackets [].

- Manufacturer's name

- Motor type [TYPE]
- Model Number [MN, MODEL, MOD.NO]
- Serial Number [SN, SERIAL, SER NO]
- Frame size [FRAME]
- NEMA design letter [DESIGN]
- Insulation class or rated temperature rise [INS, CLASS]
- Nominal Power (hp) [HP, OUTPUT]
- Time rating [RATING]
- Locked rotor kVA code [CODE]
- Service Factor [SF]
- Voltage [VOLTS]
- Phase [PH]
- Frequency (Hz) [CYCLES]
- Full load amps [FLA]
- Full load speed (rpm) [SPEED, FL RPM]
- Nominal Efficiency (%) [NEMA NOM EFF]
- Date of Manufacture
- Special ratings (Inverter duty, NFPA, Class 1 Division 1, UL, etc.)
- Thermal protection (if sensors or switches are included)

Connect motor and pump shaft with manufacturer's recommended coupling, complete with non-release protection (if non-reversing ratchet is not specified), to prevent pump shaft from unscrewing in the event of phase or flow reversal. Non-submersible motors heavier than 50 pounds shall have lifting lugs.

Finishes

Pump motors shall be furnished with a prime coat or finished epoxy coat of the manufacturer's standard finish. Stainless steel casings need not be coated. Motors with only a primer coating shall be finish coated in the field with a product suitable for the environment and the motor temperature range, submit to Owner for approval.

Part 3 - Execution

Examination

Provide all lifting equipment necessary for installation of the motors.

Installation/Construction

Install units in accordance with manufacturer's specifications and direction.

Field Quality Control

Installation shall be supervised and approved by manufacturer's representative prior to operating or field testing units. A field test shall be conducted and/or supervised by the pump or motor manufacturer's representative after the piping and controls have been installed. Upon completion of installation and testing, manufacturer's representative shall provide written certification that equipment is fully warranted installed.

Contractor is responsible for calibration, startup, and initial performance to meet specifications herein. A field test shall be made to give an indication of the performance of the new motor when it is operating under actual field conditions and to establish the acceptance of the motor furnished and installed. The field test shall be observed by the Engineer after the piping and controls have been installed. Testing shall be completed in accordance with the requirements provided above.

The Contractor shall provide calibrated and certified measuring devices to measure voltage, current, and power factor for each pump motor after they have been installed. The manufacturer's representative shall provide proper, calibrated instrumentation to verify maximum completed unit vibration amplitude.

The following data shall be collected for each motor:

- Motor current (amps), voltage, and power factor vs. Flow (gpm) at points specified by the Owner which may include shutoff head, throttled flow at 50-percent, and full flow.
- Vibration at design point.
- Vibration vs. Speed (variable speed motors only).

Repair and retest units failing field test. If unit fails second field test, unit will be rejected, and supplier shall furnish a unit that will perform as specified.

11.40 GATES

11.40.02 Manual Chain Link Gates

Part 1 - General

References

See plans for gate details. If not shown on plans, gates shall conform with sections 8.12.3(1) and 9.16.1(1)E of the Standard Specifications.

11.90 OTHER EQUIPMENT

11.95 Heating, Ventilating, and Air-Conditioning

11.95.05 Common Work for HVAC

Part 3 – Execution

Install HVAC units per strict conformance with manufacturer recommendations. Provide brackets and support frames to properly support the HVAC equipment meeting manufacturer requirements.

11.95.34 HVAC Fans

11.95.34.6 Roof Ventilator

Part 1 – General

Design and Performance Requirements

Minimum performance 3,745 cfm at 0.25" water gauge. Maximum speed 1,075 rpm. Required roof opening must not exceed 48 inches square.

Related Sections

Division 17.53.2 - Cooling Thermostat

Submittals

Product information including specifications, sizing information, performance curves, dimensional drawings, accessories, colors, and other information relevant to this project.

Part 2 – Products

Manufactured Unit

Roof ventilators equal to Loren Cook, model ACED 180.

Roof ventilators shall be an exhaust fan suitable for mounting on the roof exterior and at the slope shown on the plans.

Permanently lubricated, ball-bearing fan motors designed for continuous operations.

All exterior metals to be aluminum.

Include motorized backdraft damper and bird screen.

Finishes

Finish shall be manufacturer's standard baked enamel, Kynar or approved equal. Color will be chosen by the Owner during the submittal process.

Part 3 – Execution

Installation

Install per manufacturer's instructions. Provide curb and flashing as needed for weather-tight assembly. Control ventilators as shown on the Plans. Provide power disconnect switch for each unit.

11.95.83.33 Radiant Space Heaters

Part 1 – General

Design Requirements

Heater(s) shall be suitable for installation in the environment where installed.

Furnish and install wall-mounted space heater(s) as shown on the Plans.

Part 2 – Products

Manufacturers

Heaters shall be as specified on the Plans. Equals will be accepted.

Components

Space heaters shall be electric air element type of the size and location shown on the Plans. Provide with a universal mounting bracket, a disconnect switch and mounting hardware. Provide contactors in heater to interface with control relays and 480V power supply.

Provide with a built-in thermostat having an adjustable range from 40 to 90 degrees Fahrenheit. Set thermostat at 60 degrees Fahrenheit unless specified otherwise on the Plans.

Part 3 – Execution

Installation

Mount bottom of heater(s) 6-feet, 6-inches from finished floor unless specified otherwise on the Plans. Provide clearance from walls, ceiling and obstacles as recommended by the manufacturer.

Division 12

Furnishings – Division Not Used

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Division 13

Special Construction

13.00 GENERAL

This division covers that work necessary for supplying, fabricating and installing all furnishings and accessories as described in these specifications and as shown on the Plans.

Sections in these specifications titled “*Common Work for . . .*” apply to all following subsections whether directly referenced or not.

13.11 Groundwater Sources

13.11.10 Disinfection of Water Supply Wells

Part 3 – Execution

Installation/Construction

During construction, open wells shall be protected at all times. The well pump shall be disinfected prior to installation and the well shall be disinfected prior to pumping, all in accordance with AWWA A100 and C654. The well shall be flushed prior to connection to the water distribution system.

The flushed water shall be dechlorinated prior to entering the storm drainage system.

Field Quality Control

A water quality sample will be taken prior to construction and it will be the project baseline water quality sample. After the well is properly disinfected and flushed, a water quality sample will be taken by the Owner and the water quality must be equal to or better than the baseline sample. The Contractor shall not connect the pump to the distribution system prior to acceptance of the bacteriological test by the Engineer.

Division 14

Conveying Systems – Division Not Used

Division 15

Mechanical

15.00 GENERAL

This division covers the work necessary for furnishing and installing mechanical appurtenances and accessories as described in these Specifications and shown on the Plans.

Sections in these specifications titled “*Common Work for . . .*” shall apply to all following subsections whether directly referenced or not.

15.05 Common Work for Mechanical

Part 1 - General

Summary

Provide the necessary piping, plumbing, fittings, and appurtenances to make all piping systems complete, tested, and ready for operation as specified herein and as shown on the Plans. Some fittings that are necessary for the complete piping system installation and operation may not have been shown. Provide fittings, pipe, and appurtenances necessary, whether shown on the Plans or not, to make all piping systems complete, tested, and ready for operation.

Some pipe supports, thrust blocking, and tie rods are not shown on the Plans. Provide pipe supports, thrust blocking, and tie rods for pipes as required by accepted design criteria to support and restrain the loads encountered.

Related Sections

- Division 10.14.23 Panel Signage

References

All products in contact with drinking water to be low-lead (less than 0.25 percent) content in compliance with NSF/ANSI 372.

Submittals

Submittal information shall be provided to the Owner for the following items:

- Ductile iron pipe and fittings
- Copper pipe and fittings
- Brass pipe and fittings
- PVC pipe and fittings
- Isolation valves
- Control valves
- Flow meters
- Level sensors
- Pressure gauges

- Other mechanical components listed in this division or required by the Engineer

Part 2 – Products

Materials

All valves, meters, hydrants, specialties, appurtenances, and other such mechanical and plumbing components that are of similar purpose shall be of a single manufacturer and model line. Do not “mix and match” unless specifically stated otherwise or allowed by the Engineer. The intention of this requirement is to maintain consistency across all components installed on the project for function, maintenance, aesthetics, and details of installation.

Part 3 - Execution

Field Quality Control

Pressure gauges used for testing and commissioning shall be in good working order and scaled appropriately for the test. Scale range shall not exceed 200% of the test pressure. For example, for a 250 psi test, the gauge scale shall not exceed 500 psi. The Owner has the right to reject any gauges that are suspect in their accuracy.

If any components that have been approved by the Owner are not rated for the specified system test pressure, remove or isolate those components during pressure testing in a method acceptable to the Owner. Said components must still be pressure tested in their permanent configuration at their individual test pressure rating.

Cleaning

Potable Water Systems

After preliminary purging of the system, chlorinate entire potable water system in accordance with AWWA C651 for flushing and disinfecting water mains, and in accordance with all other pertinent rules and regulations. Operate each valve during chlorination period to provide contact. Retention time shall be 24 hours minimum, or 48 hours if the water temperature is less than 41° F. Total retention time shall not exceed 3 days after which the chlorinated water shall be immediately flushed out.

Upon completion of disinfection, thoroughly flush the entire potable water system at a velocity of 3 feet per second, allowing four complete exchanges of contents. Do not discharge chlorinated material to storm or surface water systems without thoroughly neutralizing the chlorine residual remaining in the water in accordance with AWWA C655 for field dechlorination.

For pipe and fittings that cannot be disinfected as described above, such as those used for final connections to live systems, swab with 200 ppm chlorine solution or immerse in a 50 ppm chlorine solution.

After final flushing and before the water pipe is connected to or placed in service, the Contractor shall request that the Owner arrange to have samples collected for bacteriological testing. At least one sample will be collected from each branch of the pipe. A copy of the test results shall be delivered to the Contractor for review. The Contractor shall not connect the

water pipe to the existing distribution system prior to acceptance of the bacteriological test by the Engineer.

The Owner will pay the laboratory fee for the initial bacteriological test. The Contractor will pay for future testing if the initial test results are unsatisfactory.

15.10 BURIED PIPE INSTALLATION

Part 1 – General

Site Conditions

Existing soils are unclassified except where specifically identified on the Plans or specification.

Part 3 - Execution

Preparation

Pothole ahead of pipe-laying a sufficient distance at located utility crossings and where noted on the plans to allow room to make vertical adjustments as necessary to avoid existing utilities. Should the Contractor fail to pothole identified utility crossings, any subsequent adjustments necessary shall not be cause for cost or time claim. If the area potholed is in a travelled area and will be reopened to traffic more than one day in advance of pipelaying through the zone, the hole shall be patched with hot or cold mix, the cost of which shall be incidental.

Provide the results of potholing to the Owner no less than two working days in advance of utility installation. Provide a written record of size, materials, and locations for found utilities to an accuracy of 0.5 foot horizontal and 0.1 foot vertical. Failure to record locations clearly and legibly will result in non-payment.

Installation

Install pipes to the depth shown on the trench detail, unless superseded by depth shown on the profile. Unless specified otherwise, install pipe to the following tolerances:

- Pressure pipes: 0.5 feet horizontal, 0.2 feet vertical. Regardless of vertical tolerance, do not create new high points not otherwise shown on the plans.
- Gravity pipes: 0.5 feet horizontal, 0.03 feet vertical. Regardless of vertical tolerance, do not lay pipe with reverse slope.

All non-metallic pipe, including service and air valve lines, shall include a tracer wire taped every 5 feet to the top of the pipe. Loop tracer wire to the surface in accessible locations such as valve boxes, meter vaults, or other surface access. If no access is available for more than 1,500 feet, provide a valve box specifically for the tracer wire. Wire shall be solid UF, 12AWG minimum for 2,000 foot runs and less, or 10AWG for runs longer than 2,000 feet.

Keep openings in pipe closed during the progress of work. Install plugs to prevent water and debris from entering pipe. No payment will be made to clean pipes.

15.11 Open Trench Pipe Installation

15.11.11 Pressure Pipe Installation

Part 1 - General

References

Use materials and installation methods in accordance with the latest edition of the Uniform Plumbing Code and local codes and regulations that are applicable.

Scheduling

Connections to live mains shall be made only after contacting the Owner 48 hours prior (not including weekends or holidays). Connections to live mains may only be performed on Tuesdays, Wednesdays, or Thursdays unless permission is obtained otherwise from the Owner. Connections shall not be performed on Owner recognized holidays.

Service to customers shall not be interrupted for more than 8 hours and must occur between the hours of 8:00 AM and 5:00 PM. The Owner will notify customers no less than 24-hours in advance of service interruption. If, in the opinion of the Owner, the Contractor has not adequately scheduled the work to occur within these timeframes, the Owner may cancel the service interruption. No time or monetary compensation will be provided for such cancellation.

Part 3 - Execution

Installation

Install pipes in accordance with the manufacturer's recommendations. Use types and sizes of pipes as specified herein and/or as shown on the Plans. Where small pipe sizes are omitted from the Plans and not mentioned in the specifications, use sizes corresponding to code requirements and as required by equipment and plumbing fixtures and appurtenances. Properly size any undesignated pipe sizes for the functions to be performed.

Lay pipe and supports at proper lines and grades. Follow the piping runs shown on the Plans as closely as possible, except for minor adjustments to avoid architectural and structural features. Make major relocations, if required, in a manner acceptable to the Owner.

Keep openings in pipes closed during progress of work.

Form thrust blocking so that bolts, joints, gaskets, and flanges of adjacent joints are clear of concrete allowing bolts and joints to be dismantled without removing concrete. All concrete blocking shall have a minimum compressive strength of 4,000 psi unless identified otherwise in Division 3 or on the Plans.

Pipe passing through concrete walls or slabs shall be made watertight.

Trenches shall be excavated to a sufficient width to allow for pipe installation, compaction equipment, and shoring when necessary. Maximum trench width shall not exceed 36-inch plus OD for 4-inch and larger pipe, or 24-inch plus OD for 3-inch and smaller pipe for pay items or related materials including but limited to crushed surfacing, patching, import bedding, import backfill, and rock excavation.

Bedding shall be mechanically compacted in lifts no greater than 8-inches from base to springline and from springline to top of pipe using a jumping jack or sheepsfoot. Hoe-packs, sheepsfoots, and vibratory rollers shall not be used within 12-inches directly above the pipe. Compact trench backfill in lifts not exceeding 18-inches loose-thickness.

Flanged Joint Assembly

1. Bolt holes of flanges shall straddle the horizontal and vertical centerlines of the pipe. Clean flanges by wire brushing before assembling. Clean flange bolts and nuts by wire brushing; lubricate bolts with graphite or oil.
2. Insert the nuts and bolts (or studs), finger tighten, and progressively tighten diametrically opposite bolts uniformly around the flange to the proper tension. Bolts shall have minimum of two threads showing beyond the nut.
3. Tighten joints carefully to prevent strain upon valves, pumps, and other equipment.
4. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or re-tighten the bolts and nuts, and retest the joints. Replace the gasket if damaged.

Field Quality Control

Make no permanent connections to the existing water system until the new water main has been tested and approved by the Owner. No temporary connections of the untested, unapproved new water main to the existing water system shall be made without the installation of a double check valve assembly between the new water main and the existing water system. The Contractor shall verify the size, material, and location of the existing main at the connection point prior to installing the new water main.

The Contractor shall provide all labor and equipment for earthwork, traffic control, trench safety, and materials for connections. The Contractor will provide the labor to make the final connection to the existing water system.

15.13 Above Grade Mechanical Installation

15.13.02 Exposed Piping Installation

Part 1 – General

Summary

This section is for exposed major pressure pipe systems such as booster stations, lift stations, treatment facilities, control valve vaults, etc. Testing of minor service plumbing systems shall follow the IPC/UPC.

Part 3 - Execution

Installation

When systems include drain ports that operate automatically, provide ancillary drainage plumbing. Route pilot, air valve, pump seal, and other drains to the structure drain using schedule 40 PVC with diameter equal to the device drain outlet diameter, but no smaller than 1/2-inch. Copper pipe may be used only with Owner approval. Multiple drain lines may be

connected together if approved by the Owner. Secure to fixed structures or large pipe using pipe clamps. Do not install drain pipe where it will be a tripping hazard or interfere with normal maintenance. Slope downwards to termination. Terminate the outlet two times the drain pipe diameter above the drain grate or funnel and cover end with #24 stainless or aluminum screen. Install a union near the start of each drain pipe to allow disassembly without cutting.

Preparation

Provide all personnel and equipment required and complete all tests required to demonstrate the integrity of the finished installation for the approval of the Owner and all agencies having jurisdiction.

Secure the pipe and fittings to prevent movement under pressure. Furnish and install temporary blocking where permanent blocking is not required and remove it after testing.

All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and other equipment necessary for performing the test shall be furnished and operated by the Contractor. Gauges used in the test may be required by the Owner to be certified for accuracy at a laboratory.

Tests/Inspection

Hydrostatic Pressure Testing

Test all water systems and appurtenances with a hydrostatic test pressure equal to that specified under Division 1.81.40 of these Specifications. If not stated, the hydrostatic testing pressure shall be 150 psi over working pressure or 250 psi, whichever is greater. The Owner has the right to require more stringent test criteria than stated in this specification or in the pressure rating section if the Owner determines that field conditions warrant such measures.

Fill the piping systems with water and allowed to stand under pressure for a minimum of 24 hours to allow air to escape and allow the lining of the pipe to absorb water. The Owner will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation. The Contractor is responsible for the proper disposal of any waste, including water.

Visible leakage is unacceptable and shall be corrected. Should the test section fail to meet the specified pressure test successfully, the Contractor shall locate and repair the defects and then retest the pipeline at his own expense.

Prior to calling out the Owner to witness the pressure test, the Contractor shall have all equipment completely set up and ready for operation and shall have successfully performed the test to assure that the pipe is in a satisfactory condition. The Owner shall witness the test. If the test does not pass inspection for any reason, additional trips required to witness another test shall be done at the Contractor's expense.

Before applying the specified test pressure, expel air completely from the system.

The test shall be accomplished by pumping the piping system up to the required pressure; stop the pump for a minimum of 15 minutes up to a maximum of 60 minutes as directed by the Owner, and then pump the system up to the test pressure again. During the test, the section being tested will be observed to detect any visible leakage. A clean container shall be used for

holding water for pumping pressure on the system being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l (ppm).

Sections to be tested shall be isolated and pumped to test pressure. Test pressure shall be sustained for a minimum of 60 minutes with no loss in pressure throughout the test duration with Owner present and on site throughout test duration. If test results show drop of pressure, Contractor shall repair leaks and retest until testing is passed in presence of Owner. Owner shall bleed off pressure from pump to piping connection once test is passed to verify system piping was tested.

15.18 Buried Piping Inspection and Testing

15.18.02 Buried Pressure Pipe Inspection and Testing

Part 3 - Execution

Preparation

Provide all required personnel and equipment and complete all tests required to demonstrate the integrity of the finished installation for the approval of the Owner and all agencies having jurisdiction.

Backfill the pipeline trench sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and sufficiently cured to reach design strength before testing. Furnish, install, and remove temporary blocking where permanent blocking is not required and remove it after testing.

Furnish and operate all pumps, gauges, plugs, saddles, valves, miscellaneous hose and piping, and other equipment necessary for performing the test. Pressure gauges shall be legible, accurate (+/- 3% of scale), and scaled appropriately for the test. Scale range shall not exceed 200% of the test pressure. For example, for a 250-psi test, the gauge scale shall not exceed $2 \times 250 = 500$ psi. Gauge face must be no smaller than 2.5-inch diameter. Gauges used in the test may be required to be certified for accuracy at a laboratory by the Owner and the Owner has the right to reject any gauges that are suspect in their accuracy.

Tests/Inspection

Water Main Flushing

The pipeline, valves and other components not already flushed by polypig shall be flushed or swept clean. Flushing shall allow four complete exchanges of water and remove any obvious debris.

The following blow off or hydrant sizes are the minimum required for flushing with a supply pressure of 40 psi minimum and no more than 20 feet of hose is used, unless stated otherwise.

Main Diameter	Flow at 2.5 fps	Blowoff and Backflow Device Diameter	Hydrant Ports ≤ 20' Hose	Hydrant Ports 21' – 100' Hose
8"	400 gpm	(1) 2"	(1) 2.5"	(2) 2.5"
12"	900 gpm	(2) 2" or (1) 3"	(2) 2.5" or (1) 4"	(1) 4"

16"	1,600 gpm	(4) 2", or (2) 3" or (1) 4"	(1) 4"	(1) 2.5" and (1) 4"

Hydrostatic Pressure Testing

Cover any exposed pressurized PVC or HDPE pipe to protect from direct sunlight if the air temperature is above 70°F.

Test all pipelines and appurtenances under a hydrostatic test pressure equal to that specified under Division 1.81.40 of these Specifications. If not stated, the hydrostatic testing pressure shall be 150 psi over working pressure or 250 psi, whichever is greater, measured at the low point of the test section. The Owner has the right to require more stringent test criteria than stated in this Specification or in the pressure rating section if it is determined that field conditions warrant such measures.

An acceptable test of pipe and fittings buried under or adjacent to concrete slabs or other structures must be performed prior to construction of the structure.

The Owner will furnish the water necessary to fill the pipelines and for testing at a time of day when sufficient quantities of water are available for normal system operation.

Fill the pipelines with water and allow to stand under pressure for a minimum of 24 hours to allow air to escape and allow the lining of the pipe to absorb water. The Contractor is responsible for the proper disposal of any waste, including water.

Fittings and sections of pipe that cannot be pressure tested, such as connections to the existing system, shall be left exposed for a visual inspection under system pressure. Any visible leakage shall be corrected by the Contractor to the satisfaction of the Owner regardless of the allowable leakage specified herein. Should the test section fail to meet the specified pressure test successfully, the Contractor shall locate and repair the defects and then retest the pipeline at their expense.

Prior to calling out the Owner to witness the pressure test, the Contractor shall have all equipment completely set up, ready for operation, and have successfully performed the test to assure that the pipe is in a satisfactory condition. The Owner shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness another test shall be done at the Contractor's expense.

Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and appurtenances.

The test shall be accomplished by pumping the main up to the required pressure; stop the pump for a minimum of 15 minutes up to a maximum of 60 minutes as directed by the Engineer, and then pump the main up to the test pressure again. During the test, the section being tested shall be observed for visible leakage. A clean container shall be used for holding water for pumping pressure on the main being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l (ppm).

Sections to be tested shall normally be limited to 1,500 feet. The Owner may require that the first section of pipe, not less than 1,000 feet in length, installed by each of the Contractor's crews be tested in order to qualify the crew and/or the material. Pipe laying shall not continue more than an additional 1,000 feet until the first section has been tested successfully.

Sections to be tested shall be isolated and pumped to test pressure. Test pressure shall be sustained for a minimum of 60 minutes with less than 2-percent (5 psi) loss in pressure throughout the test duration with Owner present and on site throughout test duration. If test results do not comply, Contractor shall repair leaks and retest until testing is passed in presence of Owner. Owner may bleed off pressure from pump to piping connection once test is passed to verify system piping was tested.

15.18.03 Valve Testing

Part 3 - Execution

Testing

All valves shall be pressure tested. Do not exceed the rated working pressure of the valve when operating the valve. Bleed off test pressure prior to operating. Check all valve bonnet fasteners for tightness.

Post-Installation

Test all valves for water tightness under differential working pressure. To perform this test, pressurize pipe section with valve in place, close valve and relieve pressure on seat side of the valve. The valve shall not pass water during a 5-minute test period.

Operate all valves at least once from closed-to-open-to-closed positions while valve is under working (not test) pressure.

15.18.05 Gravity Pressure Test Method

Part 3 - Execution

Testing

All gravity pipelines, including all connected side sewers, shall be tested for water tightness in accordance with the provisions of section 7-17.3(2)B of the Standard Specifications. No other test procedures will be allowed except by written approval of the Engineer. Whenever groundwater is encountered in the sewer construction, an approved water level monitoring device shall be installed at each manhole.

15.20 PIPE AND FITTINGS

15.21 Common Work for Pipe and Fittings

Part 2 - Products

Components

Under no circumstance shall the fasteners be of lesser strength or higher corrosive potential than the materials being connected. If dissimilar metals are adjacent (for example: stainless steel flange connecting to ductile iron flange) a dielectric insulation kit shall be used.

Fasteners for pipe and fittings: Per AWWA standards unless otherwise specified. All relevant subsections of AWWA C100, C200, and C500. All bolts and studs shall be long enough so

that no less than two threads extend beyond the face of the nut. Non-submerged flange bolts to be ASTM A307 Grade A, zinc plated.

Finishes

For conditions other than submerged, all nuts and bolts shall be zinc plated, and suitable for above and below grade locations as required. Where above grade/exposed piping is specially coated, the connecting nuts and bolts shall be coated using the same system unless directed otherwise by the Owner.

Part 3 - Execution

Construction

All piping and related equipment to be joined shall be connected as shown on the Plans, specifications, as recommended by the manufacturer or as required by standard industry practices if not otherwise specified.

Steel and stainless steel threads shall be protected against galling using steel thread sealing tape equal to Cobas steel thread sealing tape. Tape shall be specific to the steel type used.

15.21.02 Shackle (Threaded Rod) Restraints

Part 1 - General

Definitions

Anchor fastener: The item which connects to the fitting and which the shackle rod passes through. Such as a 90° eye bolt or shackle plate.

Weathering steel: Steel alloy designed to resist corrosion. Often referred to using the genericized trade name Cor-Ten.

Design Criteria

Unless shown otherwise on the plans, use the following shackle rod sizes for 250 psi test pressure.

Pipe Size	Minimum Number (#) and Diameter of Rods		
	Undocumented steel or SS (30 ksi minimum yield)	SS cold drawn (35 ksi minimum yield)	Weathering Steel (45 ksi minimum yield)
4"	(2) at 1/2"	(2) at 1/2"	(2) at 1/2"
6"	(2) at 3/4"	(2) at 3/4"	(2) at 3/4"
8"	(3) at 3/4" or (2) at 1"	(3) at 3/4" or (2) at 1"	(2) at 3/4" or (2) at 1"
10"	(5) at 3/4" or (3) at 1"	(4) at 3/4" or (2) at 1"	(3) at 3/4" or (2) at 1"
12"	(7) at 3/4" or (4) at 1"	(6) at 3/4" or (3) at 1"	(4) at 3/4" or (3) at 1"
Contact Engineer for other sizes or pressure.			

Submittals

Provide submittal for anchor fastener which includes strength rating in pounds. For shackle plates, include dimensional drawing.

For high strength rods (cold drawn or weathering steel), provide submittals showing rod material and yield strength.

Part 2 - Products

Components

Anchor fasteners must be a steel alloy. Ductile iron, cast iron, or any material deemed brittle in the opinion of the Owner are not allowed.

Verify anchor fastener is appropriate for anchor location.

All buried shackled thrust restraint systems shall be stainless steel or weathering steel. Exposed shackles, such as in a vault or mechanical room, may be non-weathering steel but if so, must be coated with epoxy paint system. Clean rust prior to painting.

Material (* = weathering steel)	Yield Strength	Corrosion Resistant
Type 304/316 SS	Low (30 ksi)	Yes
ASTM A36	Low (36 ksi)	No
ASTM A588 *	Med (45 ksi)	Yes
ASTM A709 GR 50W *	Med (50 ksi)	Yes
ASTM A242 *	Med (50 ksi)	Yes
ASTM A307	High (60 ksi)	No
ASTM F3125 A325 Type 1	High (90 ksi)	No
ASTM F3125 A325 Type 3 *	High (90 ksi)	Yes

All components of any stainless steel or weathering steel system shall include only stainless steel or weathering steel components. Bolts, nuts, washers, rods, and other components shall be one material and not intermixed.

Shackle systems must provide a mechanism to prevent unthreading. Exposed shackles shall use double nuts. Buried shackle systems may use double nuts, single nut with tack weld, or single nut with center punch on outside rod thread.

Provide washers at anchor fasteners. Install anchor fasteners on the opposite side of the flange or mechanical joint from the rod.

Part 3 - Execution

Installation

For standard elongation restraint, space shackles roughly equally around the pipe.

When restraint is intended to allow deflection movement without expansion, such as at a pump or tank connection, concentrate rods along the neutral axis of deflection. In other words, if vertical deflection is allowed, place rods along horizontal axis. Confirm proper orientation with Owner.

Nuts shall be finger tightened to snug, then tightened by wrench one full turn. Do not overtighten.

Field Quality Control

For high strength rod, labels from packaging showing rod material must be given to the Owner in the field. If package labels are not available, Owner has the right to assume rods are not high strength and may require installation of additional rods and field coating.

15.22 Metal Pipe and Fittings

15.22.02 Ductile Iron Pipe and Fittings

Part 1 - General

Design Requirements

Ductile iron pipe shall have thickness designed in accordance with ANSI/AWWA C150/A21.50 and shall be based on laying conditions and internal pressures to meet the requirements of Division 1.81.40 unless listed as more stringent below.

The pipe thickness shall not be less than that of Class 55 pipe for non-flanged pipe.

The pipe thickness for fire hydrant runs shall not be less than Class 52.

Flanged joints shall conform to ANSI Standard B16.1 and be of the class shown on the plans.

Part 2 - Products

Manufactured Units

Pipe shall be cement-lined and asphaltic coated in accordance with ANSI Standard A21.4 (AWWA C104) unless otherwise specified and shall conform to ANSI Standard A21.51 (AWWA C151).

Rubber gasket pipe joints are to be push-on-joint (Tyton) or mechanical joint (MJ) in accordance with ANSI Standard A21.11 (AWWA C-111), unless otherwise specified.

When requested, furnish certification from the manufacturer of the pipe and gasket being supplied that inspection and all of the specified tests have been made, and the results comply with requirements of this standard.

Ductile Iron Fittings

All fittings shall be ductile iron where possible. Steel fittings will not be accepted where ductile iron is called out on the plans. Ductile iron fittings shall be short-body, cement-lined, and for the pressure rating noted in Division 1.81.40. Metal thickness and manufacturing processes shall conform to applicable portions of ANSI Standards A21.20, A21.11, B16.2, and B16.4.

Standard cement lining shall be in accordance with ANSI Standard A21.4 (AWWA C104).

Mechanical joint (MJ), ductile iron, compact fittings 3-inches through 24-inches, and 54-inches through 64-inches shall be in accordance with AWWA C153.

Flanged pipe spools shall be fabricated from minimum Class 53 wall thickness pipe and conform to ANSI/AWWA C115/A21.15 with the exception that flanges shall be fabricated from ductile iron unless otherwise specified in the Contract Documents. Interior shall be cement lined.

Ductile iron flange (FL) fittings shall be in accordance with AWWA C110 and fabricated from ductile iron unless otherwise specified in the Contract Documents with a bolt pattern to match adjacent pipe. Gasket material for flanges shall be Styrene Butadiene Rubber (SBR, Buna-S), neoprene, nitrile rubber (NBR, Buna-N), chlorinated butyl, or cloth-inserted rubber. Gaskets shall be full-face. Gaskets shall be a minimum 1/8-inch thick.

Do not use SBR, nitrile, or neoprene in fittings used for air transport in wastewater treatment systems.

Type of ends shall be specified as mechanical joint (MJ), restrained joint (RJ), true restrained joint (TRJ), plain end (PE), or flanged (FL).

Finishes

For above grade and exposed pipes, including those inside structures, prepare surfaces and coat the exterior per Division 9.91.13.13.

Part 3 - Execution

Installation

Install ductile iron water mains in accordance with AWWA C600. Provide tools and equipment, including any special tools required for installing each type of pipe used.

The amount of deflection at each pipe joint shall not exceed 3-degrees per joint (11 inches over 18 feet), or the manufacturer's printed recommended deflections, whichever is less.

15.22.06 Copper Pipe and Fittings

Part 1 - General

Design Requirements

Copper piping and tubing shall meet the requirements of ASTM B-88. Solder fittings shall meet the requirements of ANSI B16.22. Flared fittings per ANSI B16.26 and allowed only for working pressure less than 150 psi. Lead content of solder shall be no more than 0.2 percent.

Part 2 - Products

Materials

Buried, not under structures:

Type K soft pipe with compression fittings (Ford Quick-Joint, Mueller 110, or equal).

Buried, under structures:

Type K soft pipe with compression fittings (Ford Quick-Joint, Mueller 110, or equal).

Type K hard pipe with soldered fittings.

Exposed, interior:

Type K or L hard pipe with soldered fittings.

Soft pipe may be used only where approved by the Owner or shown on the plans.
Soldered fittings for all sizes. Flared fittings only on 1/2-inch and smaller soft pipe.

Concealed, interior:

Type K or L hard pipe with soldered fittings.

Type K or L soft pipe with soldered fittings (any size) or flared (1/2-inch and smaller).

Fittings encased in concrete or CMU block: Soldered only.

Part 3 - Execution

Installation

Under structures, use unbroken pipe lengths to avoid fittings whenever possible.

Runs shall be parallel and perpendicular with floors and walls unless positive drainage is required. When Owner allows soft copper for exposed pipe, straighten any curved or bent pipe for straight sections longer than 6-inches.

15.22.08 Brass/Bronze Pipe and Fittings

Part 1 - General

References

Brass to be low-lead content in compliance with NSF/ANSI 372 to have no more than 0.25 percent lead content.

Brass nipples: ASTM B687

Brass fittings: ANSI/ASME B16.15 (threaded) Class 125 lb. (up to 200 psi water), 250 lb. (up to 400 psi water); B16.18 (soldered).

Part 2 - Products

Materials

Brass pipe, nipples, and fittings to have threaded ends.

15.23 Non-Metal Pipe and Fittings

15.23.05 PVC Pipe and Fittings – Solvent Weld

Part 2 - Products

Materials

Polyvinyl chloride (PVC) material for pipe fittings and couplings shall conform to ASTM D-1784, Type 1, Grade 1, with 2,000 psi design stress. Pipe shall be Schedule 40 or 80 in accordance with ASTM D-1785, as shown on the Plans.

All pipe shall be white unless shown otherwise on the Plans.

Part 3 - Execution

Installation

For exposed locations that will not be painted, primer and glue must be applied carefully and not allowed to run. Areas where primer/glue has run more than 1/4-inch past the joint will be cleaned, painted, or replaced by the Contractor at the discretion of the Owner.

15.23.06 Polyvinyl Chloride (PVC) Pipe and Fittings for Gravity Sewer – Push on Joint

Part 1 - General

Design Requirements

Pipe and fittings shall be solid green and meet the requirements of ASTM D3034 for 4-inch to 15-inch Standard Dimension Ratio (SDR) 35, and ASTM F679 PS 46 for 18-inch to 48-inch.

Part 2 - Products

Materials

Provisions must be made for contraction and expansion at each joint with a rubber ring. The bell shall consist of an integral wall section with a solid cross-section rubber ring, factory assembled, securely locked in place to prevent displacement during assembly. Standard laying lengths shall be 20 feet and 14 feet plus or minus 1-inch. At manufacturer's option, random lengths of not more than 15 percent of total footage of each size may be shipped in lieu of standard lengths.

All fittings and accessories shall be as manufactured by the pipe supplier or approved equal and have bell and/or spigot configurations compatible with that of the pipe.

15.23.10 Corrugated Polyethylene Pipe

Part 1 - General

Design Requirements

Size shall be as shown on the Plans. Piping shall be able to withstand AASHTO H-20 traffic loads with the soil bury depth.

Corrugated polyethylene pipe (CPE) for storm pipe shall be dual-wall style and comply with APWA WSDOT Standard Specifications Sections 7-04 and 9-05.20.

Part 3 - Execution

Installation

Installation shall comply with WSDOT 7-04 for storm sewers unless shown otherwise on the Plans.

15.23.12 PVC Pipe for Drain, Waste, and Vent (DWV)

Part 2 – Products

Design Requirements

Polyvinyl chloride for drain waste and vent (PVC-DWV) material for pipe fittings and couplings shall conform to ASTM D-1784, Type 1, Grade 1, with 2,000 psi design stress. Pipe shall be Schedule 40 or 80 in accordance with ASTM D-1785 and D2665 as shown on the Plans. Pipe shall be dual labeled.

Cellular core PVC shall conform to ASTM F891. Fittings and installation for cellular core PVC shall be per ASTM D2665.

Part 3 - Execution

Installation

Pipe bedding shall be clean granular material with no organics and no rocks larger than 1/2-inch for angular rock or 3/4-inch for round-rock. Any cellular core pipe that is damaged in any way shall be removed and replaced with sound pipe.

15.30 VALVES

15.31 Common Work for Valves

Part 1 – General

Design and Performance Requirements

Valves noted on the Plans or in other parts of the Specifications shall meet the requirements herein. Valves shall be designed for the intended service.

Valve suppliers shall review the design and certify that the valve provided in the submittal is appropriate for the application and will operate as shown and described. Any discrepancies from the design and the valves shall be brought to the Engineer's attention during the bidding process. Valves that do not operate as specified and per normal industry standards shall be replaced or modified so that they operate within the design parameters at the Contractor's expense.

Pressure rating shall be per Division 1.81.40 unless shown otherwise.

Part 2 – Products

Components

If shear pins are installed with any valve, the manufacturer shall certify the shear pin(s) to fail between 95 to 99 percent of the operator shaft failure torque. Provide concrete supports for operators where required, as shown on the Plans.

Buried valves shall be equipped with an AWWA 2-inch wrench nut with a minimum of 10 turns required to close the valve, unless otherwise noted on the Plans. Exposed valves shall be equipped with lever actuator for valves 2 inches and smaller, or handwheel actuator for valves 3 inches and larger, unless otherwise noted on Plans.

Buried valves where the operator nut is more than 3 feet below the valve box lid shall be provided with a solid shaft valve nut extension to reach between 18-inches and 30-inches of the ground surface. Extension shall attach to the nut with a set screw. Diameter of extension shall be appropriate for the valve size and length of extension, but under no circumstances shall be less than 1 inch for 4-foot-long extension rods, or 1.25 inch for rods longer than 4 feet. Extension shall function without excessive twisting.

Part 3 - Execution

Installation

Install valves in strict accordance with the manufacturer's instructions and as shown on the Plans. Verify alignment and adjustments after installation. Provide buried valves with all operators or valves boxes installed so that wrenches or operators perform freely and without binding or other interference. Bed and backfill buried valves according to the requirements of the pipe to which they are attached.

15.32 Isolation Valves

15.32.02 Resilient Wedge (Seat) Gate Valves

Part 1 – General

Design Requirements

All gate valves for water lines 3-inches to 48-inches shall be of the resilient, wedge-type, and shall meet or exceed the performance requirements of AWWA C509 or AWWA C515-Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service, unless shown otherwise. Valves shall be suitable for installation with the type and class of pipe being installed. Valve opening direction shall be counter-clockwise. Valves shall be rated for 250 psi working pressure.

Part 2 – Products

Components

The wedge shall be fully encapsulated with vulcanized SBR rubber or EPDM. Ends as shown on the plans. All exterior valve body bolting (bonnet, stuffing box, gear box) shall use Cor-Ten, 304 (18-8) SS, or 316 SS bolts and nuts. Buried valves shall have a non-rising stem (NRS). Non-buried valves on fire protection systems shall have outside stem and yoke (OS&Y). Other valves as shown on the plans.

Unless shown otherwise on the plans, buried valves 14-inches and larger shall be installed horizontally with enclosed right angle (bevel) gear actuator and valves 20-inches and larger shall be equipped with 2-inch gate valve bypass system. Confirm configuration with the Owner prior to ordering.

Part 3 - Execution

Field Quality Control

Where buried valves will be installed in a horizontal orientation and for buried valves 16-inch and larger in any orientation, operate the valve over the full range of travel in both directions

prior to installation in the presence of the Owner to verify gate travels smoothly and without binding. Service or replace valves that do not travel smoothly.

Installation

Install valves in strict accordance with manufacturer's instructions and as shown on the Plans. Verify alignment and adjustments after installation. Provide buried valves with all operators or valve boxes installed so that wrenches and operators perform freely and without binding or other interference. Bed and backfill buried valves according to requirements of the pipe to which they are attached.

15.32.07 Gate Valves – Small Diameter

Part 2 – Products

Manufactured Units

Gate valves 2 inches and smaller for steel or brass pipe shall be Crane No. 438 or equal with non-rising stem, screwed bonnet, solid wedge disc, bronze construction and threaded ends.

Gate valves 2 inches and smaller for copper piping shall be Crane No. 1320 or equal with stem, screwed bonnet, solid wedge disc, bronze construction and solder or screw ends.

15.33.09 Duckbill Elastomeric Check Valves

Part 1 – General

Summary

Duckbill Elastomeric Check Valves shall be provided on the well overboard pipe discharge end as shown on the plans..

Submittals

Submit product literature including information on performance and operation valve, materials of construction, dimensions/weight, elastomer, flow data, headloss data, and pressure ratings.

Upon request, provide shop drawings that clearly identify the valve dimensions.

Performance Requirements

When line pressure inside the valve exceeds the backpressure outside the valve by no more than 6-inches of head, the line pressure forces the bill of the valve open, allowing flow to pass. When backpressure exceeds the line pressure, the bill of the valve is forced closed. Valves shall seal upon flow reversal drip tight.

The valve shall be designed to open with a minimum head pressure of 6-inches of water column.

Design Requirements

All components shall be National Sanitation Foundation (NSF) Standard 61 compliant. Flange ends shall conform to ANSI B 16.10, Class 150#.

Part 2 – Products

Manufactured Unit

Check Valves are to be all rubber and of the flow operated check type with a connection end as shown on the plans. The port area shall contour down to a duckbill, which shall allow passage of flow in one direction while preventing reverse flow. The valve shall be one-piece rubber construction. Valves must be self-supporting with no sag in both empty and filled conditions. The bill portion shall be thinner and more flexible than the valve body. The bill-slit-height of the duckbill valve must be larger than the nominal pipe diameter to allow for least restrictive full pipe flow area. Backup rings and any metal components shall be 316 stainless steel. Company name, plant location, valve size and serial number shall be bonded to the check valve.

Manufacturer

Valves shall be equal to those manufactured by ProCo, 710 Series ®, Cla-Val, Rubber-Flex™ Duckbill Check Valve RF DBF or Red Valve, Tideflex® Series 35.

Part 3 – Execution

Installation

Valve shall be installed as shown on the plans.

15.34 Pilot-Operated Control Valves

15.34.01 Common Work for Pilot-Operated Control Valves

Part 1 – General

Submittals

Valve suppliers shall review the design and certify that the valve provided in the submittal will operate as described and within the conditions specified. Any discrepancies from the design and the specified valves shall be brought to the Owner's attention during the submittal process.

Performance Requirements

Valves shall be designed for the intended service. Install valves in strict accordance with manufacturer's instructions and as shown on the Plans.

Valves that do not operate as intended shall be replaced or modified so that they operate within the design parameters at the Contractor's expense.

All valves shall be rated for the pressures shown in Division 1.81.40, unless stated otherwise within the individual valve specification.

Part 2 – Products

Manufactured Units

Valves shall be diaphragm-actuated, hydraulically-operated valves and shall have a cover chamber sealed from the body by a flexible, synthetic rubber diaphragm. Control of the valve shall be from direct-acting, adjustable spring-loaded diaphragm valve(s) and/or solenoid

valve(s) as appropriate for the valve function. Pilot controls shall be selected appropriately for the system operational pressure range. Double chamber valves shall be used where independent operating pressure or absolute speed control is required. Double chamber valves shall also be used where line pressure is insufficient to operate the pilot system and a second pressure source is available. All pump control valves shall be double chamber. Valves to be globe or angle style with flanged or threaded ends as shown on the Plans.

Components

Provide brass or SS nameplates on all valves indicating valve size, inlet side (or flow direction), valve model and control pilot adjustment ranges.

Provide valves with all pilots, solenoids and controls preassembled to operate the valve in its intended function. Solenoids shall be powered by 120 VAC current. Provide each valve with stainless steel trim. Diaphragm shaft shall be stainless steel.

Provide a single point valve position limit switch assembly for the following valves.

- Check Valve, SPDT Switch
- Deep Well Pump Control Valve, SPDT Switch

Limit switches equal to Cla-Val X105L and mounted on the valve position indicator. Variable position indicators shall be equal to ClaVal model X117D.

The following valves shall include speed controls on the opening and closing pilots.

- Check Valve
- Deep Well Pump Control Valve

A strainer shall be provided on all valve pilots to prevent clogging by debris in the water.

Finishes

Provide all hydraulic control valves with an epoxy coating on the interior flow path and exterior body. Interior epoxy shall be certified for potable water use.

Field Quality Control

The valve manufacturer's representative shall inspect the installation prior to operating or field testing. A field test shall be conducted and/or supervised by the valve manufacturer's representative after the piping and controls have been installed. Upon completion of installation and testing, manufacturer's representative shall provide written certification that equipment is fully warranted installed.

15.34.11 Check Valves – Pilot-Operated Control

Part 2 – Products

Manufacturers

Valves shall be equal to Cla-Val Model 81-02 check valve.

Manufactured Units

Check valve control shall be designed to permit flow whenever inlet pressure exceeds outlet pressure. When outlet pressure exceeds inlet pressure, valve shall close drip-tight to prevent reverse flow. Working pressure range is 0 psi to 180 psi.

15.34.21 Deep Well (Overboard) Pump Control Valves - Pilot-Operated

Part 2 – Products

Manufacturers

Valves shall be equal to Cla-Val Model 61-02 deep well pump control valve.

Manufactured Units

Overboard pump control valves will be open at pump start. The valve closes slowly based upon the closing speed setting. When the pump is called to stop the valve solenoid is de-energized and the valve opens slowly. When the valve reaches the fully open position, a limit switch signals the pump to stop.

Pressure from the system side of the control valve shall be used for pilot valve operation. Valve opening and closing speed shall be independently adjustable from 5 seconds to 2 minutes.

Pump-side pressure will range from 0 psi (pump off) to 180 psi (shutoff head).

15.35 Air Valves

15.35.02 Air Valves – Clean Water

15.35.02.01 Combination Air and Vacuum Valves – Clean Water

15.35.02.03 Air Release Valve for Vertical Turbine Pumps – Clean Water

Part 2 – Products

Manufacturers

Air valves for vertical turbine pumps shall be equal to APCO Model No. 140DAT.

Manufactured Units

Air valves for vertical turbine pumps shall be air/vacuum valve with double acting throttling (DAT) device and water diffuser. Provide air valve's body and cover fabricated from cast iron. Provide internal parts of materials including: stainless steel float, Buna-N seat, brass water diffuser, cast iron baffle, brass float stem and stem guide and bushing, and stainless-steel seat retaining screw.

Part 3 – Execution

Installation

If not detailed on the Plans, valves shall be attached to water main via tap, brass pipe, and an isolation ball valve and fittings as necessary. Outlet shall be provided with a brass male by female threaded return bend to direct air away from any mechanical or electrical components.

15.40 PIPING SPECIALTIES

15.40.01 Dismantling Joint

Part 1 – General

Design Criteria

Dismantling joint shall be accessible and capable of repeated installations and removals and capable of the testing and working pressures as specified in Division 1.81.40. Joint adjustment range of no less than 2-inches for 12-inch diameter and smaller pipe, and 3-inches for 14-inch diameter and larger pipe. Joint assembly to include limiting rods to prevent pull-out.

Part 2 – Products

Manufacturers

Dismantling joint shall be Romac DJ400 with limit rods or equal.

Part 3 – Execution

Installation

Install per the manufacturer's instructions. Set the assembly at the midpoint of the adjustment range unless specifically called out otherwise on the Plans.

15.40.03 Pipe, Valve, and Conduit Supports

Part 1 - General

Summary

This section includes providing pipe supports, hangers, guides, and anchors.

Related Sections

- Division 1.81.30 Seismic Restraint
- Division 5.05.23 Bolts and other Connectors

References

Pipe supports furnished under this section shall comply in all respects with the requirements of the following standards.

- ANSI/ASME B31.1 Power Piping
- ANSI/MSS SP-58 Pipe Hangers and Supports - Materials, Design and Manufacture

- ANSI/MSS SP-69 Pipe Hangers and Supports - Selection and Application

Performance Standards

Piping systems, including connections to equipment, shall be properly supported to prevent deflection and stresses. Supports shall comply with ANSI/ASME B31.1, except as otherwise indicated.

Size hanger rods, supports, clamps, anchors, brackets, and guides in accordance with ANSI/MSS SP 58 and SP 69.

Support plumbing drainage and vents in accordance with the Uniform Plumbing Code.

Submittals

Pipe Hanger/Support Design Calculations

Shop drawings of engineered pipe hangers/supports, including details of concrete inserts. Drawings shall include location plan showing location of the hanger/support in relation to the structure and/or equipment.

Part 2 – Products

Manufacturers

Pipe supports, hangers, guides, and anchors shall be Anvil, Unistrut, Tolco, Standon, or equal.

Flange supports shall be equal to Standon Adjustable Model S89 Flange Support. Pipe supports shall be equal to Standon Adjustable Model S92 Pipe Support. Both flange and pipe supports shall be equal to those manufactured by Material Resources, Hillsboro, Oregon.

Components

Provide and install all equipment necessary for complete support systems including, but not limited to, base, riser pipe, anchor bolts, hanger rod, support cradle or clamp, and fasteners.

Except as otherwise noted, pipe support components shall comply with the types in ANSI/MSS SP-58.

Engineered Supports: Pipe hangers, supports for piping and conduits (raceways), and all spring support assemblies shall be completely engineered.

Pipe Hangers: Pipe hangers shall be capable of supporting the pipe in all conditions of operation. Pipe hangers shall allow for free expansion and contraction of the piping and prevent excessive stress on the equipment. Hangers shall have a means of vertical adjustment after erection. Hangers shall be designed so that they cannot become disengaged by any movement of the pipe. Hangers subject to shock, seismic disturbances, or thrust imposed by the actuation of the safety valves shall include hydraulic shock suppressors. All hanger rods shall be subject to tensile loadings only.

Hangers Subject to Horizontal Movement: At hanger locations where lateral or axial movement is anticipated, suitable linkage shall be provided to permit movement. Where horizontal pipe movement is greater than 1/4-inch, or where the hanger rod deflection from the vertical is greater than 4 degrees from the minimum to maximum temperature, the hanger

rod and structural attachment shall be offset in such a manner that the rod is vertical in the maximum temperature position.

Thermal Expansion: Wherever expansion and contraction of piping is expected, a sufficient number of expansion loops or joints shall be provided, with rolling or sliding supports, anchors, guides, pivots and restraints. They shall permit the piping to expand and contract freely in directions away from the anchored points and shall be structurally suitable to withstand all loads imposed.

Heat Transmission: Supports, hangers, anchors, and guides shall be designed and insulated so that excessive heat shall not be transmitted to the structure or other equipment.

Freestanding Piping: Freestanding pipe connections to equipment, including chemical feeders and pumps, shall be firmly attached to fabricated steel frames made of angles, channels or I-beams anchored to the structure. Exterior, freestanding overhead piping shall be supported on fabricated pipe stands, consisting of pipe columns anchored to concrete footings, with horizontal, welded steel angles, and U-bolts or clamps installed to secure piping.

Point Loads: Any meters, valves, heavy equipment and other point loads on PVC, fiberglass and other plastic pipes shall be supported on both sides according to the manufacturer's recommendations to avoid pipe stresses. Supports on plastic and fiberglass piping shall be equipped with extra wide pipe saddles or stainless-steel shields. No support shall have metal pieces in contact with plastic process piping.

Noise Reduction: To reduce noise transmissions in the piping systems, copper tubes shall be wrapped with a 2-inch-wide strip of rubber fabric at each pipe support, bracket, clip, and hanger.

Finishes

Unless otherwise noted, all fabricated pipe supports, other than stainless steel or non-ferrous supports, shall be blast-cleaned after fabrication and hot-dip galvanized in accordance with ASTM 123. Other than stainless steel and non-ferrous supports, supports shall be coated in accordance with Division 9.90.

Part 3 - Execution

Installation

Piping shall be rigidly anchored to walls, slabs, and ceilings by means of suitable pipe supports, wall brackets, or pipe hangers.

Pipe supports, hangers, brackets, anchors, guides, and inserts shall be installed in accordance with the manufacturer's installation instructions and ANSI/ASME B31.1. All concrete inserts for pipe hangers and supports shall be coordinated with the formwork.

Stand-on Pipe Support: Adjust support, secure to pipe and secure to floor as recommended by the manufacturer.

Riser Supports: Risers shall be supported on each floor with riser clamps and lugs, independent of the connected horizontal piping.

Support Spacing: Pipe supports shall be placed to meet the following maximum spacing, unless otherwise noted or shown on the Plans: maximum vertical support spacing of 5 feet, and

maximum horizontal support spacing of 10 feet. Support shall be provided at horizontal bends, base of risers (vertical bends), floor penetrations, connections to pumps, blowers, and other equipment, valves and appurtenances. Support spacing shall meet the local plumbing code where applicable. Support spacing may be increased from that noted above provided adequate calculations are provided supporting the change.

Support Anchorage: Concrete anchors shall be as specified in Division 3, Concrete Anchors. All channel strut type supports shall have a minimum of 2 anchors per support.

Suspend pipe hangers from hanger rods, secure with double nuts.

Securely anchor plastic pipe, valves and headers to prevent movement during operation of valves. Anchor plastic pipe between expansion loops and direction changes to prevent axial movement through anchors.

Provide ductile iron elbows or tees supported from floors with base fittings. Support base fittings with metal supports, or when indicated on the Plans, concrete piers.

Do not use chains, plumbers' straps, wire, or similar devices for suspending, supporting or restraining pipes.

Install riser clamps at floor penetrations and where indicated on the Plans.

Field Quality Control

Pipe supports and hangers shall be positioned in such a way as to produce an orderly, neat piping system. All hanger rods shall be vertical, without offsets. Hangers shall be adjusted to line up groups of pipes at the proper grade for drainage and venting, as close to ceilings or roofs as possible, without interference with other work.

Properly support, suspend or anchor exposed pipe, fittings, valves and appurtenances to prevent sagging, overstressing or movement of piping and to prevent thrusts or loads on or against connected pumps, blowers or other equipment.

15.40.04 Dielectric Fittings and Adapters

Part 2 – Products

Dielectric Isolating (Insulating) Flange Joints

Flange insulation shall include a full-face insulating gasket, a full-length insulating sleeve for each bolt, and two insulating washers and two steel bearing washers for each flange bolt.

Sleeves and Washers

Insulating sleeves and washers shall be Pyrox G-10. Both the insulating washers and the steel washers shall fit over the outside diameter of the sleeve and shall fit within the bolt facing of the flange.

Gaskets

Gaskets shall be full faced Styrene Butadiene Rubber (SBR), Nitrile (Buna-N), Neoprene, polytetrafluoroethylene (PTFE), or compressed vegetable fiber. Gaskets shall have adequate dielectric properties, 200V/mil minimum, and shall be suitable for the operating and test pressures of the pipe system. Gaskets shall NSF-61 approved. No hard rigid gasket (e.g.

phenolic or epoxy-fiberglass (G-10)), even if full-faced elastomeric coated (e.g. neoprene-coated phenolic) or with elastomeric sealing element such as an O-ring or flat band.

For gaskets used at ductile iron pipe flange joints, provide American Toruseal Flange Gasket (yellow only) has sufficient dielectric characteristics to meet the 200V/mil minimum requirement.

Dielectric Isolation Joint Assembly

An insulating joint assembly shall consist of 2 flange by plain end or 2 flange by mechanical joint (FLG x PE or FLG x MJ) adapters, a full face insulating gasket, with full length insulating sleeves, 2 insulating washers, and 2 steel bearing washers for each flange bolt.

Flange Connection

Submittals for flange connections shall address suitability of gasket, bolts, washers, nuts, and flange characteristics for the specified pipe type and pressure, considering gasket compression, bolt strength, and required torque.

Part 3 - Execution

Installation

Provide dielectric adapters between dissimilar types of metal pipes, valves and fittings (e.g. copper to stainless steel). Flange isolating kits shall be used when dissimilar metal flanged pipe is connected. The following connections do NOT require dielectric isolators.

Metal	Connecting to
Bronze/brass	Copper or ductile iron
Ductile iron	Mild steel, bronze or brass

15.40.08 Valve Box – Cast Iron

Part 2 - Products

Components

Cast iron valve boxes shall be a complete unit composed of the following:

- Valve box
- Lid with recessed handle
- Extension stem for operator nuts more than 3 feet below grade

Valve box assembly shall be adjustable to accommodate variable trench depths. Valve box assembly shall be rated for continuous traffic loading.

Part 3 - Execution

Installation

Valve boxes shall be provided and installed for all buried valves. Install box plumb with surface and straight so that keys and operators do not bind.

15.40.11 Joint Restraints – Wedge Style

Part 1 - General

Summary

This specification is for wedge-action (tooth) style restraints. This type of restraint shall not be used where the Plans or specifications require True Restrained Joints (TRJ). Other terms used for TRJ may include “Bead-locked” or “Fabricated Restrained Joints”.

Performance Requirements.

All naturally unrestrained joints subject to unbalanced forces shall be restrained to resist testing and operational forces. Restraints shall be rated for the maximum testing and operational pressures. Restraints shall be designed specifically for the material and purpose of the pipe and joint. Provide the quantity of restraints required for fully restraining all working and testing forces.

Submittals

Provide manufacturer’s information describing applicability and performance ratings.

Quality Assurance

The Contractor is responsible for verifying compatibility of the pipe and restraint system proposed in their bid.

Part 2 - Products

Manufacturers

Mechanical Joints: EBAA Iron “Mega-Lug”, Romac “Romagrip”, or approved equals.

Push-on Joints: US Pipe Field-Lok 350 (ductile iron), Ransom ReiberLok (PVC), EBAA Iron 1900 (PVC), or approved equals.

If the Owner has construction standards addressing the type of restraints allowed, those standards shall take precedent over this specification unless specifically identified otherwise on the Plans.

Components

Set-screw type restraints are not permitted.

Finishes

Restraints in all buried applications, and in exposed areas when not being field coated, shall be coated at the factory with fusion bonded polyester based coating (e.g. Romac Romabond, EBAA Mega-bond, Ford Armorguard E-Coat) or approved equal.

Part 3 - Execution

Preparation

Verify that the pipe surface where the restraints will affix is not damaged or corroded prior to installation. Any such damaged pipe shall be cut off and disposed of. Clean any dirt or debris from the surface of the pipe.

Installation/Construction

Install per the restraint manufacturer's instructions. Bolted style restraints shall be tightened in an alternating pattern in stages, do not tighten circumferentially. If bolted restraint does not come with break-off head bolts, a torque wrench must be used. If pipes require deflection at the joints, perform the deflection prior to final tightening of the restraints. Do not exceed the manufacturer's maximum deflection recommendations.

Initial setting of wedges may use any commonly used hand tools until the wedge touches the pipe surface. Impact tools are not allowed for wedge engagement and final torqueing.

Installation of restrained joint push-on pipe that will be deflected must be installed per the manufacturer's instructions. In general, this requires the pipe to be inserted into the bell at a straight alignment, but not pushed home. The pipe can then be deflected. If the manufacturer's instructions provide differing, or additional instructions, those instructions shall be followed.

Bedding material must sands and/or angular gravels for proper soil-to-pipe adhesion and shall not be a clay, rounded gravel, pea gravel, washed rock, or other poorly graded material. Compaction of bedding around restrained pipe shall be performed in maximum 9-inch lifts using mechanical compaction equipment.

Repair

If restraints are removed for any reason, the restraints shall be disposed of and not reused. The section of pipe to which the restraints were secured shall be cut off and disposed of.

15.50 FLOW METERS

15.50.05 Common Work for Flow Meters

Part 1 - General

Design Criteria

Meter body and register shall have a pressure rating in accordance with Division 1.81.40. Materials, coatings, and components shall be appropriate for the fluid being measured. Meters will be installed inside a building with an anticipated ambient temperature range between 40- and 110-degrees Fahrenheit.

Submittals

Meter shall fit in the space provided on the Plans. Meters that do not fit in the space provided must be approved by the Engineer for acceptance along with the Contractor's proposed modifications to accommodate the meter.

Provide information on meter assembly, available and selected options, readout head, remote transmitter, coatings, and dimensions of all equipment.

Part 2 - Products

Components

Each meter shall be equipped with an indicator-totalizer device.

- Electromagnetic Flow Meter with Digital readout head with electronic output per Division 15.51.5

Part 3 - Execution

Installation

Install the meter in strict accordance with the manufacturer's recommendation.

Testing

If a meter approved by the Owner is not rated for the system test pressure, a temporary spool, flange(s), or cap(s) must be installed in place of the meter. A visual leak test will be performed under working pressure with the meter in place.

The Contractor shall prove correct meter and transmitter performance. Should performance not be acceptable, adjust or replace the unit at the Contractor's expense.

15.51 Flow Meter Readout Head

15.51.05 Digital Read Head with Electronic Output

Part 2 - Products

Manufacturers

The flow meter transmitter shall be Siemens SITRANS FMT020, no equals.

Components

The totalizer shall read in units of thousands of gallons.

Readout shall gallons per minute (gpm) for instantaneous flow.

The transmitter shall provide a contact closure (digital pulse) switch and a loop-powered current output (analog) for connection to the instrumentation system. The pulse output shall be plus or minus 2 percent of actual flow with the range specified for each meter.

The current output shall be a 4-20 mA signal that represents the rate of flow through the meter. Scale the transmitter as follows: 0 gpm minimum and 5000 gpm maximum. The current output shall be plus or minus 0.5 percent of full scale of the instrument the transmitter is controlling.

Transmitter shall provide EtherNet/IP communication protocol.

Transmitter electronics shall consist of easily accessible printed circuit boards for convenient maintenance in a wall mountable NEMA 4X (standard) enclosure and connected to the

transducer by cable. The meter manufacturer shall supply an unspliced cable run from the transmitter to the meter tube.

Provide an enclosure with window, that does not negate the enclosure NEMA rating, for viewing the flow rate and totalizing counter on an LCD readout. The transmitter shall display flow rate in gallons per minute, totalized gallons, and an empty pipe indicator.

The electronics shall be NEMA 4X rated. Output shall be 4-20 mA into 800 Ohms with an isolated ground and non-interacting zero and span adjustments. 24 VDC pulse outputs for forward flow shall also be provided. The display and output shall be user scalable for GPM, CFS, or MGD, and shall be password protected.

The meter, electronics, and transmitter shall be RFI shielded to prevent interference from adjacent high noise electrical equipment such as variable frequency drives, electromagnetic starters, transformers, or transfer switches.

Provide the necessary interface between remote instrumentation and the transmitter. Provide a meter with power and signal wiring as recommended by the manufacturer. Ground instrumentation shall be as recommended by the manufacturer.

Part 3 - Execution

Installation

Connect outputs to telemetry or data logging system.

Install the readout head directly on the flow meter.

15.53 Electronic Flow Meters

15.53.03 Electromagnetic Flow Meters

Part 1 - General

Related Sections

- 15.51.05 Digital Read Head with Electronic Output

Design Requirements

Provide an electromagnetic flow metering system suitable for measuring and transmitting flow rate in a full-flowing pipe. The meter shall be suitable for either horizontal or vertical mounting. The system shall operate within the accuracy required over an ambient temperature range of -10 to +120 degrees Fahrenheit and a process temperature range of +15 to +120 degrees Fahrenheit.

Performance Requirements

The flow meter system shall be microprocessor based, utilizing a DC bipolar pulsed coil that automatically re-zeroes after each pulse cycle. System accuracy shall be ± 1 percent of actual flow rate over a fluid velocity range of 1 to 30 feet per second (fps), and within 0.01 fps for velocities less than 1 fps. Repeatability shall be 0.1 percent of full scale or better. System accuracy shall be traceable to NIST using prototype meters of the same configuration.

Part 2 - Products

Manufacturers

The flow meter shall be Siemens SITRANS FMS500, no equals.

Manufactured Units

The meter tube and coil shall be mounted on the pipe between ANSI B16 pipe flanges and rated for working and test pressures as indicated in Division 1.81.40. The meter tube shall be 304 or 316 stainless steel. The meter and cable connection(s) shall be capable of complete submergence without damage. The meter shall include Hastelloy C grounding rings for installation at the inlet. The manufacturer shall verify that the grounding system is appropriate for the proposed use. All wetted parts shall be 316 stainless steel.

When grounding rings are used, select gaskets with an inside diameter large enough that the gasket cannot wrap over the exposed edge of the grounding ring, blocking it from the process fluid.

Finishes

The meter liner shall completely encapsulate all wetted areas except for electrodes. The liner shall be certified by the manufacturer as appropriate for the proposed use. The liner shall be EPDM (for drinking water applications).

The meter supplier shall review the liner material specified and confirm that it is appropriate for this project fluid and process. Provide submittal information that the liner material is fully compatible with the liquid it is carrying.

15.60 PRESSURE MEASUREMENT

15.60.01 Common Work for Pressure Measurement

Part 1 – General

Related Sections

- Division 17 - Electronic Pressure and Level Devices

Design Requirements

Pressure and level measurement devices shall be scaled and rated for the application.

Part 3 – Execution

Installation

All devices shall be installed to be field serviceable without taking the facility out of service. Readouts shall be positioned to be easily read from a standing position and central to the room, unless otherwise allowed by the Engineer.

15.61 Pressure Gauges

Part 1 – General

References

- ASME B40.100 (B40.1 Analog, B40.7 Digital)

Performance Requirements

Analog: Grade 2A (± 0.5 percent of span) unless stated otherwise in the Products section.

Digital: Grade 2A (± 0.5 percent of span) or AR (± 1 percent of reading) unless stated otherwise in the Products section.

Submittals

Provide catalog sheets showing dimensions, pressure range, accuracy and optional accessories.

Part 2 – Products

Manufacturers

Marsh, 3D Instruments, or approved equal.

Materials

Provide gauges per the table below. Gauges completely suitable for measuring potable water with wetted parts of brass, bronze, or stainless steel.

Location	Pump Discharge
Full Scale	0-100 psi
Normal Operating Range	35-50 psi
Analog or Digital	Analog
Surface or Stem Mount	Stem
Connection Size	0.25"
Accuracy Grade	See Perf. Req'ts
Glycerin fill or Dry	Glycerin
Face Size 2.5" or 4.5"	4.5"

Accessories

Unless shown otherwise on the Plans, provide a block and bleed valve for each pressure gauge. Transcat 600/700 series, stainless steel, or approved equal. Do not use in chlorine rooms or chlorination systems.

Part 3 - Execution

Installation

Install gauges where shown on the Plans. Support gauges adequately. Tighten only with the connection hex nut, do not twist the case.

Field Quality Control

Where a new gauge is connected directly to the plumbing of a pressure transmitter, the gauge must read within its accuracy grade compared to the transmitter, unless the transmitter is proven faulty.

If the Engineer suspects any gauge is inaccurate, provide a calibrated gauge for comparison, or other method of verification acceptable to the Engineer.

Replace or calibrate gauges that do not meet the accuracy requirements.

15.70 PLUMBING

15.70.05 Common Work for Plumbing

Part 2 – Products

Components

Joins and Connections

- Steel and Brass: Use factory-cut pipe threads where possible; otherwise, cut pipe ends square, remove all fins and burrs, and cut full-depth tapered threads. Apply joint compound to male threads only and engage so that no more than three threads remain exposed.
- Copper: Make all joints in copper tubing with 95-5 tin-antimony solder applied in strict accordance with manufacturer's recommendations. Flared connections are only allowed in exposed locations.
- Hubless: Install a neoprene gasket and stainless steel clamp and shield coupling joint assemblies with bolts alternatively and incrementally tightened to a minimum 60 inch-pounds torque. Use a single set-point torque wrench manufactured specifically for this purpose. Do not use screwdrivers or other types of wrenches. Re-torque bolts after 24 hours.
- Solvent cement: Use solvent cement approved by pipe and fitting manufacturer and apply in accordance with the manufacturer's installation procedures.

Fixtures and Trim

Use chromium-plated brass bolts, nuts and washers where exposed; otherwise, use brass or bronze bolts, nuts and washers. Make connections gas-tight and water-tight. Do not use bulk material, including putty and plastics, for gaskets.

Trim shall match metal parts used with fixtures. Trim shall be stainless steel, except when provided with plumbing fitting by the manufacturer. Exposed trim shall have a satin type finish. Escutcheons shall be provided at each point where pipe or other fittings enter the wall.

Part 3 - Execution

Examination

Prior to work of this section, carefully inspect installed work of other trades and verify that such work is complete to the point where this installation may properly commence. Verify that plumbing may be installed in strict accordance with all pertinent codes and regulations. In the event of a discrepancy, do not proceed with the installation and immediately notify the Owner.

Installation

Install and locate pipe, fittings and accessories as shown on the Plans.

Waste piping vents shall protrude through the roof. In framed walls, waste piping vents shall be concealed. Provide individual vents for each fixture.

Except for drain grates, do not embed plumbing in concrete or masonry, always surface mount. Where furring exists, conceal in furring unless shown otherwise on the plans. Where plumbing passes through concrete or masonry, provide a sleeve unless specifically shown otherwise on the plans.

Rigidly support wall hung fixtures by means of metal supporting members so that no stress is transmitted to connections.

Do not cut into or reduce the size of any load-carrying member without prior approval of the Engineer. Install pipes to clear all beams and obstructions.

Locate water hammer arresters in accordance with the manufacturer's recommendation.

Provide uniform pitch of at least $\frac{1}{8}$ -inch per foot, or as otherwise noted, for all horizontal waste and drain piping within the building. Pitch all vents for proper drainage.

Cushion all traps and bearings to minimize transfer of sound; firmly anchor all pipes in position.

Vertical stacks shall be supported at floors with clamp anchors as required to relieve joint stresses.

Conceal all piping unless otherwise shown on the Plans.

Provide and conceal air chambers the same size as the branch line at each water connection to a plumbing fixture.

Inspection

Test all plumbing fixtures for proper and smooth operation when in use.

Make sure fixtures are thoroughly clean and free of any foreign material.

15.73 Sewer Fixtures

15.73.02 Building Floor Drains

Part 2 – Products

Manufacturers

Floor drains shall be equal to Wade 1100-series floor drains with adjustable strainers.

Manufactured Units

Building floor drains shall be round-top drains with p-trap, p-trap primer connection, sediment bucket. Provide drain fabricated from cast iron with satin bronze strainers.

Part 3 – Execution

All exposed pipe outfalls from floor drains shall be protected from rodent intrusion by covering end of pipe with woven, 24-gauge, 1/4-inch by 1/4-inch wire mesh. Secure to end of pipe with pipe clamp, exterior-grade concrete mortar or other Engineer-approved patching compound.

15.75 Plumbing Fixtures

15.75.13 Electronic Solenoid Valves

Part 2 – Products

Manufacturers

General Service Solenoid Valves

Electronic solenoid valves for general service shall be equal to ASCO, Red-Hat, Model 8210, 2-way solenoid valves with forged brass body and buna-n seals and discs.

Pre-Lube Water Supply Solenoid Valves

Electronic solenoid valves for general service shall be equal to ASCO, Red-Hat, Model 8212, 2-way solenoid valves with composite body.

Manufactured Unit

Valves shall have normally closed type operation and shall open when solenoid is energized. Solenoid valve shall be pressure rated for 100 psi at 180° F and UL listed for a safety shutoff valve. Solenoid valve shall operate from a 120 VAC, 60 Hz power source.

15.75.16 Brass Ball Valves

Part 1 – General

Performance Requirements

Ball valves rated for 250 psi W.O.G. minimum. Valve to be “full-port” style.

Part 2 – Products

Manufactured Unit

Ends to be threaded, unless specifically shown otherwise on the plans. Include $\frac{1}{4}$ turn lever handle. If available space does not allow handle to operate without interference, replace with tee handle.

15.75.21 Unions

Part 2 – Products

Manufactured Units

As shown on the Plans, unions shall be water tight, capable of pressure forces of the pipe it is connected to, and allow a minimum of $\frac{1}{4}$ -inch of play for installation and maintenance flexibility. Unions shall be threaded to match the pipe it connects and match the pipe material (copper, brass or PVC).

Division 16

Electrical

16.00 GENERAL

The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and components as indicated and implied by the plans and specifications.

Sections in these specifications titled “*Common Work for . . .*” shall apply to all following sections whether directly referenced or not.

The Contractor shall reference Division 1.25 regarding substitutes and “or-equals”.

16.05 Common Work for Electrical

[CSI 26 05 00]

Part 1 - General

Summary

Plans are diagrammatic and indicate general arrangements of systems and equipment, except when specifically, dimensioned or detailed. The intention of the plans is to show size, capacity, approximated location, direction and general relationship of one work phase to another, but not exact detail or arrangement.

Regulatory Requirements

The Contractor shall coordinate and provide all permits, licenses, approvals, inspections by the authority having jurisdiction and other arrangements for work on this project and all fees shall be paid for by the Contractor. The Contractor shall include these fees in the bid price.

Related Sections

See the following sections for items that may be provided and/or installed with other electrical equipment.

- Division 8.90 Motorized louvers/dampers
- Division 10.14 Signs for electrical equipment
- Division 11.20 Pump motors
- Division 11.40.3 Automatic access gate
- Division 11.95.34 Fans
- Division 11.95.83 Space heater
- Division 15.30 Valves with position indication and controls
- Division 15.51 Flow meter transmitters
- Division 17.50 Sensors and controls

Codes and Standards

Provide all electrical work in accordance with latest edition of National Electrical Code, National Electrical Safety Code, Washington State Electrical Code, and local ordinances. If any conflict occurs between government adopted code rules and these specifications, the codes are to govern. All electrical products shall bear a label from a certified testing laboratory recognized by the State of Washington. Recognized labels in the State of Washington are UL, ETL, and CSA-US.

Definitions

Dry Locations: All those indoor areas which do not fall within the definitions below for wet, damp, or corrosive locations and which are not otherwise designated on the Plans.

Wet Locations: All locations exposed to the weather, whether under a roof or not, unless otherwise designated on the Plans.

Damp Locations: All spaces wholly or partially underground, or having a wall or ceiling forming part of a channel or tank unless otherwise designated on the Plans.

Corrosive Locations: Areas where chlorine gas under pressure, sulfuric acid, or liquid polymer are stored or processed. These areas are identified on the Plans.

The words “plans” and “drawings” are used interchangeably in this specification and in all cases shall be interpreted to mean “Plans”.

The word “provide” shall be interpreted to mean furnish and install.

Design Requirements

Unless otherwise noted, provide enclosures as follows:

1. Class 1, Division 1 and 2 Locations: NEMA Type 7
2. Indoors Unclassified Locations: NEMA Type 12
3. Corrosive Locations: NEMA Type 4X
4. Outdoors and/or Wet Locations: NEMA Type 4X
5. Electrical Rooms: NEMA Type 1

Submittals

Provide submittals of each item specified in this division to engineer for approval in accordance with Division 1 of these specifications. Submittals for motor control centers, motor control panels, control panels, instrumentation panels, and pump control panels shall include at a minimum: a wiring diagram or connection schematic, and an interconnection diagram.

Wiring Diagram or Connection Schematic

1. Include all devices in a system and show their physical relationship to each other including terminals and interconnecting wiring in assembly. This diagram shall be in a form showing interconnecting wiring only by terminal designations (wireless diagram).

Interconnection Diagram

1. Show all external connections between terminals of equipment and outside points, such as motors and auxiliary devices. Show references to all connection diagrams which interface to the interconnection diagrams. Interconnection diagrams shall be of the continuous line type. Show bundled wires on a single line with the direction of entry/exit of the individual wires clearly shown. Identify all devices and equipment. Show terminal blocks as actually installed and identified in the equipment complete with individual terminal identification. All jumpers, shielding and grounding termination details not shown on the equipment connection diagrams shall be shown on the interconnection diagrams. Show spare wires and cables.

Provide submittal information for the following items:

1. Service Disconnect
2. Surge Protective Device (SPD)
3. Pump Control Panel
4. Solid State Reduced Voltage Starters (SSRVS)
5. Power Factor Correction Capacitors
6. Distribution Transformers
7. Distribution panel board
8. Branch Circuit Panelboard
9. Circuit Breakers
10. Conduit and Fittings
11. Outlet and Junction Boxes
12. Electrical Handholes and Vaults
13. Wire and Cables
14. High Voltage Conductors
15. Switches and Receptacles
16. Light Fixtures
17. Keyed Switch Box
18. Panic Alarm Button
19. Primary Switch and Cabinet Vault
20. Pad-Mount Transformer
21. Other Electrical Components listed in this Division and/or required by the Engineer.

Project Conditions

Contractor shall keep all power shutdown periods to a minimum. Carry out shutdowns only after a shutdown schedule has been submitted and approved by both the Owner and the Engineer.

Part 2 - Products

Source Quality Control

Provide adequate space and fit for the electrical installation, including, but not limited to, determination of access-ways and doorways, shipping sections, wall and floor space, and space occupied by mechanical equipment. Provide electrical equipment that fits in the areas shown on the Plans. All equipment shall be readily accessible for maintenance, shall have electrical clearances in accordance with National Electric Code (NEC) and shall be installed in locations which will provide adequate cooling.

Do not use equipment exceeding dimensions indicated or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions unless approved by the Owner.

Identification of Listed Products

Electrical equipment and materials shall be listed for the purpose for which they are to be used, by an independent testing laboratory. When a product is not available with a testing laboratory listing for the purpose for which it is to serve, the inspection authority may require the product to undergo a special inspection at the manufacturer's place of assembly. All costs and expenses incurred for such inspections shall be included in the original contract price.

Materials

Use equipment, materials and wiring methods suitable for the types of locations in which they will be located, as defined in Definitions above.

All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

Components

Fasteners for securing to walls, floors, and the like shall meet the requirements of Division 5.05.23.

Accessories

Wire Identification

1. Identify each wire or cable at each termination and in each pull-box using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as approved by the Engineer. Identify each wire or cable in each pull-box

with plastic sleeves having permanent markings. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Finishes

Refer to each electrical equipment section of these specifications for painting requirements of equipment enclosures.

Part 3 - Execution

Installation

General

1. Complete the wiring, connection, adjustment, calibration, testing and operation of mechanical equipment having electrical motors and/or built-in or furnished electrical components in accordance with electrical code, UL listing requirements and manufacturer's instructions. Install electrical components that are furnished with mechanical equipment.
2. Provide the size, type and rating of motor control devices, equipment and wiring necessary to match the ratings of motors furnished with mechanical equipment.
3. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components accessories and equipment which is not shown or specified but which is nonetheless required to make the systems shown and specified properly functional.

Workmanship

1. Assign a qualified representative who shall supervise the electrical construction work from beginning to completion and final acceptance.
2. Provide all labor using qualified craftsmen, who have had experience on similar projects.
3. Ensure that all equipment and materials fit properly in their installations.

Field Services

1. Provide field services of qualified technicians to supervise and check out the installation of the equipment, to supervise and check out interconnecting wiring, to conduct start-up and operation of the equipment, and to correct any problems which occur during testing and start-up.

Installing Equipment

1. Provide the required inserts, bolts and anchors, and securely attach all equipment and materials to their supports.
2. Install all floor-mounted equipment on 3½-inch high reinforced concrete pads.
3. Install all equipment and junction boxes to permit easy access for normal maintenance.

Cutting, Drilling, and Welding

1. Provide any cutting, drilling, and welding that is required for the electrical construction work.
2. Structural members shall not be cut or drilled, except when approved by the Engineer. Use a core drill wherever it is necessary to drill through concrete or masonry. Perform patch work with the same materials as the surrounding area and finish to match.

Metal Panels

1. Mount all metal panels, which are mounted on, or abutting concrete walls in damp locations or any outside walls 1/4-inch from the wall and paint the back side of the panels with a high build epoxy primer with the exception of stainless-steel panels. Film thickness shall be 10 Mils minimum.

Seismic Requirements

1. See Division 01.33.17
1. Balance electrical load between phases as nearly as possible on panelboards, motor control centers, and other equipment where balancing is required.
2. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

Field Quality Control

Minor Deviations

1. The electrical plans are diagrammatic in nature and the location of devices, fixtures, and equipment is approximate unless dimensioned. Based on this, the right is reserved by the owner to provide for minor adjustments and deviations from the locations shown on the Plans without any extra cost. Deviations from the Plans and/or specifications required by code shall also be done, subsequent to Owner's approval, without extra cost.
2. Plans indicate the general location and number of the electrical equipment items. When raceway, boxes, and ground connections are shown, they are shown diagrammatically only and indicate the general character and approximate location. Layout does not necessarily show the total number of raceways or boxes for the circuits required. Furnish, install, and place in satisfactory condition all raceways, boxes, conductors, and connections, and all of the materials required for the electrical systems shown or noted in the contract documents complete, fully operational, and fully tested upon the completion of the project.

Project Record Plans

1. A set of Plans shall be maintained at the job site showing any deviations in the electrical systems from the original design. A set of electrical Plans, marked in red to indicate the routing of concealed conduit runs and any deviations from the original design, shall be submitted to the Owner for review prior to final acceptance.
2. After testing and acceptance of the project the Contractor shall furnish in the O&M manuals an accurate connection schematic and interconnection diagram for every service entrance panel, pump control panel, motor control center, and instrumentation panel provided this project.

Cleanup and Equipment Protection

Equipment Protection

1. Always exercise care after installation of equipment, motor control centers, control panels, etc., to keep out foreign matter, dust debris, and moisture. Use protective sheet metal covers, canvas, heat lamps, etc., as needed to ensure equipment protection.

Cleaning Equipment

1. Thoroughly clean all soiled surfaces of installed equipment and materials upon completion of the project. Clean out and vacuum all construction debris from the bottom of all equipment enclosures.

Painting

1. Repaint any electrical equipment or materials scratched or marred in shipment or installation, using paint furnished by the equipment manufacturer.

Final Cleanup

1. Upon completion of the electrical work, remove all surplus materials, rubbish, and debris that accumulated during the construction work. Leave the entire area neat, clean and acceptable to the Owner.
2. Lamps and fluorescent tubes shall be cleaned, and defective units replaced at the time of final acceptance.

16.10 Electrical Site Work

16.10.1 Common Work for Electrical Site Work

[CSI 33 71 19]

Part 1 – General

Summary

The work included in this section consists of furnishing and installing conduit, fittings, handholes, pull vaults, warning tape, cables, wires, and related items, complete as specified herein and as indicated on the Plans for a complete and functional underground electrical system. Special vaults, grounding, trench backfill requirements may be specified with the particular equipment or electrical system involved.

Related Sections

Wire and cable per Section 16.60.

Raceways and conduit per Section 16.70.

Design Requirements

Materials and equipment shall conform to the respective specifications and standards; and to be the specifications herein. Electrical rating shall be as indicated on Plans.

Part 3 – Execution

Construction

Provide all excavation, trenching, backfill, and surface restoration required for the electrical work.

Excavate to depths as required by Code, particular installation, or as shown on the Plans. Trench width and length as required by the installation or as shown. Trench bottom shall be free of debris and graded smooth. Where trench bottom is rock or rocky or contains debris larger than 1 inch or material with sharp edges, over excavate 3 inches and fill with 3 inches of sand. Separation between new electrical utilities and other utilities shall be 12 inches horizontal and 6 inches vertical minimum, except gas line separation shall be 12 inches both vertical and horizontal. Cross concrete or asphalt only after surface material has been saw cut to required width and removed.

Backfill around raceways shall be 3-inches of pea gravel or sand for systems of 600 volt or less. Provide red marker tape over raceways below grade. Place backfill material to obtain a minimum degree of compaction of 95 percent of maximum density at optimum moisture content. Moisten backfill material as required to obtain proper compaction. Do not use broken pavement, concrete, sod, roots or debris for backfill.

16.10.2 Underground Marking Tape (Detectable Type)

[CSI 33 05 97.23]

Part 2 – Products

Manufacturers

Tape shall be Brady “Detectable Identoline – Buried Underground Tape”, or equal.

Materials

Underground marking tape shall be for location and early warning protection of buried power and communication lines. Tape shall be detectable by a pipe/cable locator or metal detector from above the undisturbed ground. Tape shall be nominally 2 inches wide with a type B721 aluminum foil core laminated between two layers of 5 Mil thickness polyester plastic. The plastic color shall be red for electrical lines and orange for telephone lines.

Part 3 – Execution

Installation

Unless noted otherwise on Plans, install approved underground marking tape 12 inches above and directly over the conduit or raceway in all trenches.

16.10.3 Handholes and Pull Boxes

[CSI 33 71 19.13]

Part 2 – Products

Manufacturers

Handholes and Pull boxes shall be Oldcastle or approved equal unless specified otherwise on the Plans.

Materials

Provide handholes of reinforced precast concrete, or injection molded composite plastic material. Handholes shall include a base, a body, extensions and a cover. Provide handholes with a perimeter of 10 feet or more (e.g., 3 feet by 2 feet) with both pulling irons and cable racks. All hardware shall be stainless steel, or hot-dip galvanized after fabrication; cable racking and hardware, however, shall be non-metallic and corrosion resistant. If no handhole size is shown on the Plans, size units per NEC or provide 12 inches by 24 inches by 18 inches deep, whichever is larger.

All handholes located in areas subject to vehicular traffic or where identified on Plans shall be ASSHTO, H-20 rated in accordance with ASTM C857.

The lids to all pull boxes and vaults shall be permanently marked for its intended use, “signal” for all signal and instrumentation handholes and “electrical” for all power handholes. Letter shall be a minimum of 3-inches high.

Part 3 – Execution

Installation

Conduits entering handholes shall have grounding bushings installed and the conduit ends shall be sealed with Permagum sealing compound. Where conduits enter through sides of handholes, the penetration shall be made watertight. Use a core drill wherever it is necessary to drill through concrete. Perform patch work with the same materials as the surrounding area and finish to match.

Pull boxes shall be provided at least every 150 feet on long straight runs. Spacing shall be reduced by 50 feet for each 90-degree bend.

Install handholes flush with finished grade in all paved areas, roadways and walkways. All handhole edges shall be flush with final surface.

16.15 Grounding and Bonding for Electrical Systems

[CSI 26 05 26]

Part 1 - General

References

Service and equipment grounding shall be per Article 250 of the NEC.

Performance Requirements

Verify that a low-resistance ground path is provided for all circuits so an accidental contact to ground of any live conductor will instantly trip the circuit.

Part 2 - Products

Components

The grounding systems shall consist of the ground rods, grounding conductors, ground bus, ground fittings and clamps, and bonding conductors to water piping and structural steel as shown on the Plans.

System components shall be as allowed in the NEC unless specified otherwise below:

1. Ground Rods: Ground rods shall be cone pointed copper clad Grade 40 HS steel rods conforming to ASTM B228. The welded copper encased steel rod shall have a conductivity of not less than 27 percent of pure copper.
2. Ground Conductors: Buried conductors shall be medium-hard drawn bare copper; other conductors shall be soft drawn copper. Sizes over No. 6 AWG shall be stranded. Coat all ground connections except the exothermic welds with electrical joint compound, non-petroleum type, UL listed for copper and aluminum applications.
3. Ground Rod Boxes: Boxes shall be a 9-inch diameter precast concrete unit with hot-dip galvanized traffic cover. Boxes shall be 12-inches deep minimum. Covers shall be embossed with the wording "Ground Rod".

Part 3 - Execution

General Grounding Installation

When available a UFER ground per latest edition of NEC shall be provided as the primary means to ground the electrical system.

Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.

Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

Provide a ground rod box for each ground rod to permit ready access to facilitate testing.

Provide a ground wire in every conduit carrying a circuit of over 110 volts to ground.

Make embedded or buried ground connections, taps and splices with exothermic welds. Coat ground connections.

Bond metallic water piping at its entrance into each building.

Motor Grounding Installation

Extend equipment ground bus via grounding conductor installed in motor feeder raceway. Connect to motor frame.

When using nonmetallic flexible tubing install an equipment grounding conductor connected at both ends to noncurrent-carrying grounding bus.

Vault and Handhole Grounding

Exposed noncurrent-carrying metal parts of equipment, conductor supports or racks, conduits, and other metal appurtenances, including any metal cover and its supporting ring, shall be bonded together and connected to a common ground. The size of the grounding means shall be as prescribed in the NEC. Where the grounding means is exposed, the grounding conductor shall be not smaller than #8 AWG copper.

Ground Connections

Above grade ground connections shall be exothermic weld, mechanical, or compression-type connectors; or brazing.

Below grade ground connections shall be exothermic weld.

Install all ground connections in strict accordance with connector manufacturer's recommendations and methods.

Testing

Following completion of the grounding electrode system, if installed, measure ground resistance at each ground rod using the three-rod method. Submit results to engineer prior to final acceptance by the Owner.

Perform testing per NETA Standard ATS paragraph 7.13. Testing methods shall conform to NETA Standard ATS using the three-electrode method for large systems. Conduct tests only after a period of not less than 48 hours of dry weather.

Furnish to the Engineer a test report with recorded data of each ground rod location. See Division 16.95.4.

16.20 SECONDARY ELECTRICAL SERVICE

16.21 Electrical Service

[CSI 26 21 00]

Part 1 – General

Description of Work

Work consists of installation of (2) new electrical service feeds from the main well building via existing transformers TX-03B and TX-05B to new distribution panel boards in Well House 03B and Well House 05B. See the contract drawings for more information.

Scheduling Work with City of Vancouver

The Contractor shall be fully and completely responsible for all scheduling and coordination with The City. The Contractor shall coordinate and schedule power outages, power service for operation and construction, and power service as impact the city's operations.

The Contractor shall:

Install new conductors for secondary service from the designed transformer location to the proposed service entrance panel or switchboard including trenching, backfill, and restoration. Terminate service conductors at the service entrance panel or switchboard.

Install the Service Entrance switchboard panel, as shown on the Plans.

Provide excavation, backfill, and restoration required for installment of the electrical handholes and vaults.

The Contractor shall meet all the standard requirements for working in the right-of-way which includes a utility representative on site during work within the right-of-way. The Contractor shall be responsible for paying all cost for the representative to be on site.

Project Conditions

Before submitting a bid, the Contractor shall become familiar with all the electrical service requirements that may affect the execution of their work.

Standards and Codes

Work involving service installation shall be done in accordance with the service utilities standards and the NEC.

Service equipment shall be listed and labeled by UL as "suitable for use as service equipment".

16.21.2 Electrical Distribution Transformers

[CSI 26 27 13]

The following section includes specifications for dry-type distribution transformers. All equipment shall include equipment conforming to NEMA ST 20.

Manufacturers

Square D, Cutler Hammer, GE, Siemens, or approved equal.

Materials

Complete submittals shall be required to include the following information:

1. Outline and support point dimensions of enclosures and accessories.
2. Unit weights.
3. Voltage, kVA and impedance ratings and characteristics.
4. Loss data, efficiency at 25, 50, 75 and 100 percent rated load.
5. Sound level.
6. K value rating.
7. Tap configuration.
8. Insulation system type and rated temperature rise.

Test reports shall be included to verify all performance data from Factory Acceptance Testing of the equipment.

Dry Type Transformers: NEMA ST 20; factory-assembled, air-cooled dry type transformers; ratings as shown on Drawings. Copper windings only: aluminum is not acceptable.

Insulation system and average winding temperature rise for rated kVA as follows:

1. 1 to 15 kVA: Class 185 insulation, 80 degrees C rise.
2. 16 to 500 kVA: Class 220 insulation, 115 degrees C rise.
3. 501 to 2000 kVA: Class 220 insulation, 150 degrees C rise.

Load Ratings and Transformer Cooling: Load ratings, unless noted otherwise, are assumed to be AA (air convection cooling).

Winding Taps

1. Transformers Less than 15 kVA: Two 5 percent, full-capacity taps below rated voltage on primary winding.
2. Transformers 15 kVA and larger: NEMA ST 20.

Sound Levels: NEMA ST 20 Maximum of 44 dB.

Basic Impulse Level

1. Low-voltage Dry-Type Transformers: 10 kV for transformers less than 300 kVA, 30 kV for transformers 300 kVA and larger.

Ground core and coil assembly to enclosure by means of a visible, flexible copper grounding strap.

Mounting: Transformers 75 kVA and less shall be suitable for wall, floor, or trapeze mounting; transformers larger than 75 kVA shall be suitable for floor or trapeze mounting.

Coil Conductors: Continuous windings with terminations brazed or welded.

Enclosure: NEMA ST 20; Type 1, drip-proof, unless otherwise indicated on Drawings.

•

K-factor: K-factor shall be selected based on the load classification served by the transformer. Standard K-factor minimum to be K-4 for all mixed load applications.

Isolate core and coil from enclosure using vibration-absorbing mounts.

Nameplate: Include transformer connection data.

16.21.3 Fused Service Disconnect Switch

[CSI 26 28 16.16]

Design

The switch shall be heavy duty type, shall be quick-make, quick break, and shall be horsepower rated. The switch shall have blades as required to open all ungrounded conductors. The disconnect shall have a minimum available fault current withstand rating of 42,000 amperes unless noted otherwise on the Plans.

Service equipment shall meet the requirements of the serving utility and shall be suitable for use as service equipment. Service entrance disconnects shall be furnished with a UL service entrance label.

Manufacturers

Materials, equipment and accessories specified in this section for the service disconnect switch shall be products of:

1. Eaton (Cutler Hammer)
2. General Electric
3. Schneider Electric (Square D)
4. Siemens
5. Or approved equal

Acceptable Fuse Manufacturers are Bussman, Gould-Shawmut Littlefuse and Reliance.

Materials

The switch shall be pad-lockable in the OFF or ON position.

The enclosure shall be NEMA 3R rated unless noted otherwise on the Plans. The enclosure shall have interlocking cover to prevent opening door when switch is closed. The interlock shall include a defeating scheme. The enclosure shall be pad-lockable.

Fusible disconnects shall be as above with additional fuse space and clips to accept Class RK1 fuses.

Spare Fuses

Provide one (1) set of spare fuses for each size provided on job. Spare fuses shall be stored on-site at the end of the project.

16.21.4 Circuit Breaker Service Disconnect Switch

[CSI 26 28 16.13]

Design

The switch shall be heavy duty type, shall be quick-make, quick break, and shall be horsepower rated. The switch shall have blades as required to open all ungrounded conductors. The disconnect shall have a minimum available fault current withstand rating of 42,000 amperes unless noted otherwise on the Plans.

Service equipment shall meet the requirements of the serving utility and shall be suitable for use as service equipment. Service entrance disconnect shall be furnished with a UL service entrance label.

Manufacturers

Materials, equipment, and accessories specified in this section for the service disconnect switch shall be products of:

- Eaton (Cutler Hammer)
- General Electric
- Schneider Electric (Square D)
- Siemens
- Or approved equal

Materials

The switch shall be pad-lockable in both the OFF or ON position.

The enclosure shall be NEMA 3R rated unless noted otherwise on the Plans. The enclosure shall have interlocking cover to prevent opening door when switch is closed. The interlock shall include a defeating scheme. The enclosure shall be pad-lockable.

Circuit breakers shall be molded case thermal-magnetic type and meet molded case circuit breaker specifications covered in Division 16.55.16.

16.30 BASIC PANEL EQUIPMENT AND DEVICES

16.31 Operating and Indicating Devices

[CSI 26 09 00, 40 78 00]

Part 1 - General

Operating and indicating devices minimum rating shall be NEMA 13. Operator devices mounted in outdoor panels, corrosive areas or where exposed to moisture shall be NEMA 4X.

16.31.2 Run Time Meters

[CSI 26 09 13.22, 40 78 13.22]

Manufacturers

HECON GO series or equal.

Manufactured Units

Hour meter (elapsed time meters) shall be 2-inch by 1-inch nominal size, rectangular case type for flush panel mounting. The meter face shall be of the style that most closely resembles the panel indicating instruments if provided and shall have black trim with white or aluminized face. The meters shall have a 6-digit non-resettable register with the last digit indicating tenths of an hour.

16.31.4 Indicating Lights

[CSI 26 09 13.31, 40 78 16]

Manufacturers

Heavy-Duty, Oil-Tight Type:

- Eaton/Cutler-Hammer, Type 12350T
- Square D Co., Type K
- Allen Bradley, Type 800T
- General Electric Co., Type CR 104P

Heavy-Duty, Watertight, and Corrosion-Resistant Type:

- Eaton/Cutler-Hammer, Type E34
- Square D Co., Type SK
- Allen Bradley, Type 800H
- General Electric Co., Type CR 104P

Manufactured Units

Indicating lights shall be NEMA type 4/4X/13, corrosion resistant, water-tight, oil-tight, full voltage, push-to-test, high visibility 28 chips LED type. Pilot lights shall be rated for the proper operating voltage. Appropriate lens caps shall be provided as shown on Plans.

16.31.5 Selector Switch

[CSI 26 09 16.21 40 78 19.21]

Manufacturers

Heavy-Duty, Oil-Tight Type:

- Eaton/Cutler-Hammer, Type 12350T
- Square D Co., Type K
- Allen Bradley, Type 800T
- General Electric Co., Type CR 104P

Heavy-Duty, Watertight, and Corrosion-Resistant Type:

- Eaton/Cutler-Hammer, Type E34
- Square D Co., Type SK
- Allen Bradley, Type 800H
- General Electric Co., Type CR 104P

Manufactured Units

Selector switches shall be NEMA type 4/4X/13, corrosion-resistant/watertight/oil-tight, type selector switches with contacts rated for 10 amperes continuous at proper operating voltage. Operators shall be black knob type. Units shall have the number of positions and contact arrangements and spring return function (if any) as shown on Plans. Units shall be single-hole mounting, accommodating panel thicknesses from $\frac{1}{16}$ -inch minimums to $\frac{1}{4}$ -inch maximum.

16.31.6 Pushbuttons

[CSI 26 09 16.23, 40 78 19.25]

Manufacturers

Heavy-Duty, Oil-Tight Type:

- Eaton/Cutler-Hammer, Type 12350T
- Square D Co., Type K
- Allen Bradley, Type 800T
- General Electric Co., Type CR 104P

Heavy-Duty, Watertight, and Corrosion-Resistant Type:

- Eaton/Cutler-Hammer, Type E34
- Square D Co., Type SK
- Allen Bradley, Type 800H
- General Electric Co., Type CR 104P

Manufactured Units

Pushbuttons shall be NEMA type 4/4X/13, corrosion-resistant/watertight/oil-tight, type push buttons with momentary contacts rated for 10-ampere continuous at proper operating voltage. Button color shall be as specified in control panels and shall have a full guard. Pushbutton contact arrangements shall be as shown on Plans. Size of push buttons as indicated on the Plans.

Special Functions

Pushbutton for “emergency stop” applications shall have maintained contacts and red mushroom head operators.

16.32 Panel Relays

[CSI 26 09 16, 40 78 53]

Part 1 – General

General

Relays shall be provided as necessary to perform switching functions required of control panels and other control circuits as shown on the Plans and described in the technical specifications. Appropriate relay type and associated contacts shall be selected based on the application from the control wiring diagrams or the functional description. Where timing relays and control relays require additional contacts, provide auxiliary control relays properly sized for the application.

All contacts and relays shall be NEMA rated and UL recognized.

The electrical life expectancy for the relay shall be over 500,000 operations at 120V AC, 10 amp; (over 200,000 operations at 120V AC, 10 amp for SPDT, 3PDT, and 4PDT). The mechanical life expectancy for the relay shall be over 50,000,000 operations.

16.32.1 Control Relays

[CSI 26 09 16.31, 40 78 53.21]

Manufacturers

- Square D Class 8501, Type K or R
- Allen Bradley 700 Type HA or HB
- IDEC RH Series; or equal

Manufactured Units

Relays for general purpose use shall be DPDT or 3PDT, 10-amp contacts with the appropriate coil voltage for the application. Relays shall be plug-in type with matching socket. All relays shall have LED indicators to signal when the coil is energized. Relay coils shall be rated for continuous duty.

Manufactured Units

Signal circuit switching shall be accomplished with analog signal switching relays and shall be provided to switch either 4 to 20 MA DC or 1 to 4V DC signals. Units shall have double-throw dry circuits in a break-before-make configuration rated for 15VA minimum. All units shall have LED indicators to signal when the coil is energized. Units shall be sealed to prevent entry of contamination in the form of dust, dirt or moisture.

16.32.3 Time Delay Relays

[CSI 26 09 19.35, 40 78 53.25]

Manufacturers

- Allen-Bradley 700 Type HR
- IDEC GE1, RTE or GT3 Series; or equal

Manufactured Units

Time delay relays shall be multi-function, multi-range with plug-in base, pin style terminations timing and timed out LED indicators, and calibrated scales. Relays shall have minimum 0.5 seconds to 60 minutes, 8 selectable timing ranges, 5-amp contacts. Select coil voltage for the application. Units shall be sealed to prevent entry of contamination in the form of dust, dirt, or moisture.

Appropriate relay shall be selected based on application from the control wiring diagrams.

Minimum accuracy (plus or minus) shall be as follows:

1. Repeat accuracy – ½ percent.
2. Timing change over full voltage range – ½ percent change over full temperature range.
3. Scale tolerance – 5-percent.

16.32.5 Phase Fail Relay (PFR)

[CSI 26 09 19.37, 40 78 53.27]

General

Motor Control Centers (MCC) and Motor Control Panels shall be provided with phase fail relays wired as indicated on the Plans for shutdown of 3-phase motors and/or remote indication of incorrect voltage conditions.

Manufacturers

Units shall be Square D 8501 or Allen Bradley 700-N or equal.

Manufactured Units

A UL listed 3-phase power fail relay shall interrupt the control power in the event of phase loss, phase reversal, undervoltage and phase unbalance. It shall have primary fuse protection. Contacts shall be rated for 15A resistive at 120 VAC. The 3-phase power fail relay shall automatically reset when proper power is re-applied. Phase Fail Relays shall be Square D Class 8430 type MPD or equal.

Installation

Provide an interposing relay to provide a N.O. contact for each motor control circuit to serve as a shutdown contact, one (1) spare N.O. contact, and one (1) spare N.C. contact. Control relays for use with phase fail relays shall be heavy duty, industrial type with field convertible contacts. Unit shall be able to operate up to eight (8) contacts per relay.

Part 3 – Execution

Installation

Provide adjustable time relays on all alarm and shut down circuits to prevent nuisance tripping of other alarm points. Time delay relays for these functions may not be shown on the Plans; however, provide as required on all circuits.

Provide additional form C contacts over and above the number indicated on the Plans for all relays provided.

The 120 VAC relays shall not be interchangeable with other voltages to prevent a hazardous interchange of relay voltages.

Provide DIN mounted or panel mounted type depending on application.

16.35 Control Panel Accessories

16.35.1 Terminal Blocks

[CSI 26 05 83 or 26 27 26]

Part 2 – Products

Manufactured Units

Terminal blocks shall be one-piece, molded, plastic blocks with screw-type terminals and barriers rated for 600 volts. Terminals shall be double-sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, clearly visible with the protection cover removed.

Part 3 – Execution

Installation

All wires between panel-mounted equipment and other equipment shall be terminated at terminal blocks. Switches shall be terminated at the terminal blocks with crimp-type,

pre-insulated, ring-tongue lugs. Lugs shall be of the appropriate size for their terminal block screws and for the number and size of the wires terminated. All wires shall be labeled with the circuit number and common function.

16.35.2 Nameplates

[CSI 26 05 53, 10 14 23]

Part 2 – Products

Manufactured Units

Standard nameplates shall be made of $\frac{1}{16}$ -inch thick machine engraved laminated phenolic having black letters not less than $\frac{3}{16}$ -inch high on white background. One-inch high lettering shall be used for the large nameplates required for the control panels and motor control centers.

Part 3 – Execution

Installation

Nameplates shall be provided on all electrical devices including but not limited to motor control equipment, MCC cubicles, control stations, junction boxes, panels, motors, instruments, switches, indicating lights, meters, and all electrical equipment enclosures. Each motor control center compartment and control panel shall have a nameplate designating the equipment and its identifying number and size or rating. Data shall be as shown on the Plans and reviewed via the submittal process. Nameplates shall have name, number and/or function as is applicable for clear identification.

Provide one large nameplate for each motor control center and/or control panel identifying the equipment as indicated on the Plans.

Nameplates on steel panels shall be secured with stainless steel drive screws. Where it is proposed that nameplates will be secured with pressure sensitive tape or bonding cement, the process and samples shall be submitted to the Engineer for acceptance.

Nameplates shall be provided for identifying all operator interface (lights, switches, etc.) and other devices that are located outside or inside the panels.

Nameplates shall be provided for identifying all relays and devices that are located inside the panels.

Special Functions

Provide warning nameplates on all panels and equipment, which contain multiple power sources. Lettering shall be white on red background.

16.36.1 Surge Protection Device (SPD)

[CSI 26 43 13, 40 78 56]

Part 2 – Products

General

The SPD shall be compatible with the electrical system voltage, current, system configuration, and intended applications.

Manufacturers

The Service Track series SPD shall be manufactured by Joslyn or a pre-approved equal. Approved manufacturers are as follows:

- Joslyn Service Track series
- Innovative Technology Protector series

Manufactured Units

Protect the electrical service with an SPD device as shown on the Plans. The SPD shall be mounted in the pump station and connected with the shortest conductors possible. The SPD shall meet the following:

1. Provide surge current withstand up to 160 kA per phase.
2. Short circuit current rating of 200 kAIC.
3. A ten-year free replacement warranty.
4. Enhanced UL 1283 Transient Tracking Filter.
5. NEMA 4 – weatherproof steel enclosure
6. Status indicator lights for each phase and one service LED.

16.36.2 Power Factor Correction Capacitors

[CSI 26 35 33]

Part 2 – Products

Manufactured Units

Furnish and install automatic power factor correction capacitor equipment as specified herein and shown on the associated electrical plans. The supplier of the motor control panel shall provide the automatic power factor control equipment.

Individual capacitors shall be provided with the following features:

1. NEMA 1 enclosures designed for wall mounting unless provided in the MCC.
2. Pressure sensitive interrupters for cell protection.
3. Discharge resistors.
4. Current limiting fuses and blown fuse indicators in each phase.

Power factor correction capacitors shall be coordinated with the motor to provide 0.92 to 0.95 power factor. The motor control panel supplier shall coordinate with the motor manufacturer to correctly size the power factor correction capacitors.

Part 3 – Execution

Installation

A 3-phase contactor shall be provided and wired to the line side of each solid-state starter to connect the power factor correction capacitor into the circuit when the motor is running at full speed. Control wiring shall be provided from the starter controls.

16.40 LOW VOLTAGE MOTOR CONTROL EQUIPMENT

[CSI 26 29 00]

16.41.1 Standard Motor Starter Units

[CSI 26 29 13.13]

Part 1 - General

Design Requirements

Each unit shall consist of a motor circuit protector and a magnetic starter. The combination shall have an interrupting rating of not less than 42,000 amperes symmetrical at 480 volts. Each unit shall have a control terminal board and other components as shown on Plans.

Starters shall be of NEMA, not IEC design. That is, starters shall have molded coils, replaceable contacts, and metal mounting plate. Starters shall have provisions for accepting up to seven (7) auxiliary contacts and one (1) overload alarm contact.

All starters shall be size 1 or larger and no intermediate sizes (such as 1³/₄) will be acceptable.

Pilot devices shall be per Division 16.30 Basic Panel Device and Equipment.

Part 2 – Products

Manufactured Units

Overload protection is to be provided by a solid-state overload relay that shall be self-powered. Each overload shall be adjustable over a full 2:1 FLA adjustment range. A tamper-proof cover shall be provided. The standard overload shall provide Class 20. The overload relay must provide phase loss protection. The overload must be ambient insensitive. The overload relay must have trip-free, normally closed contact with a visible trip indication and N.O. isolated alarm contact. The overload shall have a method of being manually tripped for test purposes. Size the overload heaters to protect the motor installed with allowance for power factor correction, if applicable.

Terminal blocks shall be mounted within the unit and located near the front for accessibility. They shall not be located at the rear of the vertical wireway. Power terminal blocks shall be provided. On non-plug-in (frame mounted) units, terminal blocks need not be pull-apart style. On plug-in units, control terminal blocks shall be pull-apart style.

Starter units shall contain the number of auxiliary contacts, unit-mounted devices, indicating lights, control relays, and other devices as shown on the Plans.

16.41.2 Solid State Reduced Voltage Starters

[CSI 26 29 13.16]

Part 1 - General

Scope

This specification describes the performance, functional specifications and fabrication details for a digital reduced voltage, stepless, solid state motor starter that shall provide a selectable voltage ramp, current limit or torque ramp (all standard) method of soft starting 3-phase AC induction motors.

The motor starter shall be self-contained and house the solid-state controller, motor overload protection (Class 10 through Class 30 selectable), an integral bypass contactor and a disconnect means as required on the plans, in one enclosure or motor control center section.

The SSRVS control shall be integrated with a pump control valve system as shown on the Plans.

Related Documents

Drawings and general provisions of the Contract shall apply to this section.

Submittals

Submit shop drawings and product data for approval and final documentation in the quantities listed according to the Conditions of the Contract. All transmittals shall be identified by customer name, customer location and customer order number.

Units shall be shipped with a complete set of documentation to include the following items:

1. Complete schematics and wiring diagrams
2. Enclosure outline drawings
3. System instruction manuals
4. Contactor and disconnect system data, if applicable
5. All drawings shall be done in AutoCAD and shall be available on electronic medium.
6. All of the above will be required at the time of approval.

Codes and Standards

Manufactured Unit(s) shall meet the codes listed in the NEC.

Stand-alone units shall be combination starters with circuit breakers and shall be UL listed for use in combination with the specific associated circuit breaker per applicable UL-508 standards. If used in Motor Control Centers, the complete starter units will be UL listed under UL-845 as part of the MCC.

Quality Assurance

The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of sixty (60) years. When requested by the Engineer, an acceptable list of

installations with similar equipment shall be provided demonstrating compliance with this requirement.

The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.

All incoming material shall be inspected and/or tested for conformance to quality assurance.

Power semiconductors shall be fully tested for proper electrical characteristics (dv/dt, di/dt, etc.).

All subassemblies shall be inspected and/or tested for conformance to vendors engineering and quality assurance specifications.

Printed circuit boards shall be burned in for a minimum of 48 hours at 60 degrees Celsius.

The complete unit shall be functionally tested under load before shipment to assure proper operation per specification. Complete test reports shall be available upon request

Spare Materials

Provide one (1) set of (3) of each size power fuse utilized.

Provide one (1) spare control relay for each unique relay utilized on the project.

Part 2 – Products

Manufacturers

The SSRVS shall support Profinet/Profibus communications shall be manufactured by Siemens. No alternative is approved.

The SSRVS units shall be of the same manufacturer and supplier as the MCC as required for interface with the master control system to provide a totally integrated, operable , and functionally integrated system .

Design

Power Ratings

Input: 200 – 460V ± 15 percent, 3 phase 50 / 60Hz (selectable) ± 10 percent. Unit(s) will operate with any incoming phase sequence.

Output: Reduced voltage 3 phase AC derived from phase-angle fired inverse-parallel thyristors, ramped to full voltage.

Current Rating(s): Shall be, at a minimum, capable of the motor Full Load Amps for the Horsepower(s) indicated on the Plans, including any Service Factors.

1. Current ratings of starter chassis must be based on manufacturer's data showing they were tested at 50 degrees Celsius.

Output Overload Capacity: Shall be as follows, based upon motors indicated on the Plans and specified elsewhere:

1. For units used on motors where Class 10 overload protection is required, the soft starter shall be capable of delivering 550 percent of the motor FLA for 10 seconds.

2. For units used on motors where Class 20 overload is required, the soft starter shall be capable 550 percent of motor FLA for 20 seconds
3. If the motor is capable of Class 30 protection, the soft starter shall be capable of delivering 550 percent current for 30 seconds.
4. Continuous duty rating shall be for the motor FLA plus + 15 percent.
5. Lighter duty rated starters are not acceptable

SCCR (Short Circuit Current Rating) Listing: Combination starter units shall be UL listed to withstand the Available Fault Current of the system as indicated on the Plans or as determined prior to installation. For retrofit applications, both the soft starter and circuit breaker shall be supplied so that the SCCR rating of the combination is capable of withstanding the Available Fault Current. SCCR ratings in combination with the Circuit Breaker shall be published and supplied by the manufacturer with submittals.

Control Power: 120VAC, 60Hz provided by a Control Power Transformer with primary and secondary fusing, adequate to operate all associated devices in each starter.

Power Devices (SCRS)

PIV Ratings: Minimum 2.5 times nominal line voltage.

Protection: RC snubber network circuits on each phase assembly and MOV protective devices on the gate circuits.

Efficiency: 99.7 percent through SCRs, 99.97 percent when bypass is engaged.

Bypass Contactor

All units shall have an integral Bypass Contactor to shunt motor power around the SCRs when at full speed. The soft starter shall include all necessary control circuitry to accomplish this without the need for external timers and engage the Bypass Contactor only when the microprocessor has determined that the motor has reached speed.

1. Overload Protection shall be integral and continuous so that it is always in the motor circuit, even when the Bypass Contactor is engaged.
2. Decel Interlocking shall be integral to allow the soft starter to automatically disengage the Bypass Contactor when a Decel command is given.
3. Where shown on the plans, the SSRVS shall be provided with an external Bypass Contactor with high security key selector switch. The external Bypass contactor shall meet all of the above control and protection conditions.

Isolation Contactor

Where shown on the Plans, an isolation contactor shall be provided between the RVSSS and the motor as shown on the Plans. The isolation contactor and the manual bypass contactor shall be interconnected to prevent both contactors from being closed at the same time.

Product Features

The starter shall be complete with standard features and adjustments as follows:

Acceleration Control shall be fully adjustable in programming to match any application. As a minimum, starter shall come complete with the following settings:

1. Ramp Type: To ensure maximum flexibility in matching any unforeseen load conditions in the field, the starter shall provide all of the following methods of closed loop acceleration ramp control:
 - a) Voltage Ramp
 - b) Current Limit Only (Current Step)
 - c) Closed Loop Torque
 - d) In addition, the soft starter shall be capable of being programmed to start the motor Across-the-Line for testing purposes. To avoid problems in commissioning once the field application conditions are known, any starter that has limited ramp choices will not be acceptable.
2. Starting Torque: Initial torque output shall be programmable as either Voltage or Torque output depending on the selected ramp profile, and adjustable between 50-200 percent of motor Full Load Torque.
3. Maximum Current Limit: To ensure acceptability to power conditions and reliability of starting under any circumstance that the motor can function in, a Current Limit function shall be available in all starting ramp modes, adjustable between 150 and 550 percent of the unit rating. Starters which do not provide Current Limit in all starting modes will not be acceptable.
4. Ramp Time: The time between Initial Torque and Full Output shall adjustable between 1 and 360 seconds.
5. Kick Start: To provide for starting of difficult loads, the starter shall include a Breakaway Pulse (Kick Start) feature that will apply a high output for a short time on initial start command. The Kick Start voltage level shall be adjustable from 40 – 100 percent voltage, for 0.1 to 2 seconds max.
6. Slow Speed Jog: For checking rotation at start-up or other testing procedures, the starter shall provide a programmable Slow Speed Jog feature, initiated by the Operator Interface or via input. The Slow Speed Jog output shall be programmable as a percentage of the base motor speed, not exceeding 21 percent.
 - a) Slow Speed Reverse: For testing purposes or to provide for special applications as indicated on the drawings, the soft starter shall be capable of rotating the motor in the reverse direction upon command from the operator interface or via inputs. This feature shall be integral to the soft starter or modifications shall be provided to accommodate it.

Deceleration Control (Controlled Ramp Down)

To facilitate the controlled deceleration of pumps and other loads, Decel Torque Control and/or Pump Control shall be built in and selectable with the following adjustments, all of which are independent of any Acceleration Ramp settings:

1. Deceleration Ramp Time: adjustable from 0 – 360 seconds to allow gentle controlled deceleration in excess of the natural coast-to-stop time of the load.
2. Stop Torque Level, adjustable from 10-100 percent to automatically turn off the starter when the output torque has reached a desired level, i.e. when a check valve has closed.

Selectable Ramp Profiles

To accommodate changeable conditions, the starter shall provide 3 separately adjustable ramp profiles, selectable via a dry contact closure. Each ramp will provide all of the above features.

Motor and Load Protection shall be integral to the starter assembly. All current referenced protection features shall be automatically calculated from the motor nameplate FLA as entered by the user. All time-based protection features shall have retentive memory so that they remain active should the power fail and be restored. Starter shall provide the following functions:

1. I2t Thermal Overload shall be provided by the on-board microprocessor control based on inverse time-current trip curves as defined by NEMA trip curve Classes. The trip curves classes shall be programmable from between Class 5 and Class 30 and the starter shall be UL listed to provide each individual class. As the most important protection feature of a starter, the overload protection shall be based on a Motor Thermal Model retained in memory and provide the following features:
 - a) Retentive Thermal Memory shall be used to ensure that the overload protection does not lose track of motor temperature after the power is lost or shut down. Upon reapplication of power, the microprocessor shall be updated as to the motor thermal state. This feature shall be capable of being over ridden for emergency re-start applications.
 - b) Manual or Automatic Reset shall be selectable in programming to provide for automatic reset in unattended remote applications.
 - c) Thermistor Input shall be provided in case the motor or equipment arrives with integral Thermistors to monitor temperature. The Thermistor input shall provide for a motor thermal temperature monitoring that will bias the Motor Thermal Model mentioned above based on actual motor temperature.
 - i. The Thermistor monitoring circuit shall detect broken or shorted field devices or wiring.
 - ii. Units without this feature shall provide external Thermistor Protection Relays if necessary and provide a way for the soft starter to display a Thermistor Trip independently of a Motor Overload trip.

Phase-Loss Protection shall be standard and shut down the starter if current through any leg drops to 20 percent of the programmed motor FLA or less, independent of line voltage levels.

For purposes of testing with smaller motors, each starter shall be capable of having the motor FLA adjusted down to 20 percent of the unit Max Amp rating so that this feature will not trip if a load less than 20 percent of that setting is connected (i.e. 4 percent of unit maximum rating).

Phase Current Imbalance shall be used to bias the Motor Thermal Model so that the tripping curve reflects the additional motor heating caused by the imbalance.

The “Pick-up Point” of this feature shall be programmable or able to be defeated so that nuisance tripping can be avoided.

Ground Fault Protection shall be included which will prevent a start-up if any phase is connected to Ground or trip while running.

Over Current / Shear Pin Protection shall be provided. This Over Current trip shall be adjustable at lower levels than the Thermal Overload protection for the purpose of protecting mechanical components from undue shock when rapid unexpected load changes occur.

Adjustment level shall be from 50 percent to 150 percent of the programmed motor FLA

Under Current / Load Loss Protection shall shut down the starter on an adjustable Under Current condition. This shall be programmable as follows:

Adjustment level shall be from 19 percent to 100 percent of the programmed motor FLA

Over and Under Voltage Protection will cause a trip if the voltage dips or surges beyond the unit tolerance limits for both the line voltage and the control voltage, differentiating the trip cause between the two systems on the Operator Interface Display.

Starter Protection shall be provided to maintain reliability of both the equipment and the circuit components, with the following features:

1. Shorted SCR / Welded Contactor Detection shall be standard. This function must automatically prevent the next start when at least one SCR is shorted, or the Bypass Contactor is welded.
2. Starter Overtemp Trip shall be built-in and protect the SCRs from excessive heat build-up in the heat sink. This function shall also detect a broken wire or defective sensor.

Input / Output features shall be as follows:

1. Four (4) Inputs shall be provided for the control and option selection of the starter as follows. All input and control devices shall be 24VDC control from a built-in power supply, requiring only dry contact closures. All I/O termination points shall incorporate easily removable terminal blocks to facilitate quick change-out or troubleshooting isolation in the field.
 - a) Input commands shall be programmable for any one of the following functions; Motor Right (Fwd), Motor Left (Rev), Parameter Set 1, 2, or 3, Trip Reset, Quick Stop, Slow Speed, Emergency Restart, and Local Override for allowing local control when using Serial Communications as the control point.
2. Four (4) Output Relays shall be provided; three outputs shall be Form A (SPST), the fourth shall be Form C (SPDT), all rated for 240VAC, 3 Amps max.
 - a) Each relay shall be fully programmable for any one of the following functions; PIO Output 1, PIO Output 2, Input Status (1-4), Run up (Accelerating), Operation/bypass, Coasting down, On time motor (Running), Motor-on commanded, DC braking Contactor, Group warning (no trip), Group error (Fault trip), Bus error, Device (starter) error, Power on, Ready to start.

- b) Operator Interface panel shall be included which provides simple to use adjustment and status indication on a dead-front shroud of the starter. This panel shall be capable of being remotely mounted up to 10 feet away from the starter chassis, such as on the front door of the enclosure.
- c) Adjustments shall be made by keypad with tactile feedback keys for high noise environments. No binary coded dipperswitches shall be used for programming. Pass code protection shall be available to prevent unauthorized changes to the programming.
- d) Graphical User Display shall be backlit LCD for long life and visibility in low contrast environments. Display shall have a minimum of 4 lines of alpha-numeric characters, programmable in 4 languages and capable of displaying all digits in displayed parameter so that operators do not need to calculate current values over 999A.

Metering functions shall be provided through the Alpha-Numeric Display for indicating the following:

- 1. Output Current for each individual phase. Indicating range to be 0.0 – 9999 amps.
- 2. Voltage: Phase-to-phase and Phase-to-ground voltages shall be available for display
- 3. Frequency, for use in generator operation diagnostics.
- 4. Motor Thermal Status to indicate heat build-up in the motor. Range shall be 0 – 100 percent of the motor thermal capacity and count up towards 100 percent while heating.
- 5. Elapsed Time shall indicate the number of hours that the starter has been in a Run condition, maximum 100,000 hours.
- 6. Start Counter, indicating the number of Run commands given.

Serial Communications shall be available as an optional feature and supplied as indicated on the Plans.

- 1. Communications protocol shall be Ethernet/IP.
- 2. PC interface and software shall be available either through the local programming port via USB connection, or over the Ethernet/IP connection (if installed).

Historical Data shall be recorded and displayed, plus made available for communication. It shall be retained in non-volatile memory for viewing by service personnel later.

- 1. History shall include fault conditions experienced by the starter and peak running details.

Mechanical Construction

Enclosure shall contain the digital solid-state controller and disconnect means (optional) as required.

- 1. Rating shall be as indicated on the Plans.
 - a) NEMA 1 enclosed units shall be ventilated, with fan forced cooling where necessary. Cooling fans shall be impedance protected and ball bearing construction for continuous use.

- b) NEMA 3R enclosed units shall be either ventilated or provided with an external enclosure and any necessary cooling accessories as determined by the manufacturer, depending on sizing, to meet the ambient operating conditions as indicated elsewhere.
- c) 4/12 enclosed units shall be sealed to prevent ingress of contaminants and supplied with any necessary cooling accessories as determined by the manufacturer, to meet the ambient operating conditions as indicated elsewhere.
- d) Power Terminations shall be made on factory supplied mechanical lugs of sufficient size to accommodate the required wire for the line and load. Lugs are to be clearly marked as Line (L1, L2, L3) and Load (T1, T2, T3) and with appropriate tightening torque specifications.

Control Terminations to the soft start main unit shall be on terminal strips that can be removed easily without the need to special tools.

Part 3 - Execution

Installation

The Contractor shall install all equipment in accordance with the contract Plans and manufacturers recommendations and manuals.

- 1. Install enclosed controllers where indicated, in accordance with manufacturer's instructions.
- 2. Install fuses in fusible switches.
- 3. Select and install overload heater elements in motor controllers to match installed motor characteristics.
- 4. The FLA motor amps shall be input into the starter memory via the keypad
- 5. Adjust all circuit breakers, switches, access doors and operating handles for free mechanical and electrical operation as described in manufacturer's instructions.
- 6. Clean interiors of all enclosed electrical equipment to remove construction debris, dirt and shipping materials.
- 7. Repaint scratched or marred exterior surfaces to match original finish.

Factory Testing

The following standard factory tests shall be performed on the equipment provided under this section. All tests shall be in accordance with the latest version of UL and NEMA standards.

- 1. All printed circuit boards shall be functionally tested via fault finder bench equipment prior to unit installation.
- 2. All final assemblies shall be load tested.

Field Quality Control

Provide the services of a qualified factory-trained manufacturer's representative to assist the Contractor in installation and start-up of the equipment specified under this section. The manufacturer's representative shall provide technical direction and assistance to the

Contractor in general assembly of the equipment, connections, adjustments, tuning of the system operation, and testing of the assembly and components contained herein.

The following minimum work shall be performed by the Contractor under the technical direction of the manufacturer's service representative.

1. Inspection and final adjustment.
2. Check proper operation and function of controllers/starters and spare parts.

Field Testing

A qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been installed, adjusted, and tested in accordance with the manufacturer's recommendations.

The Contractor shall provide three (3) copies of the manufacturer's field start-up report before final payment is made.

Training

A qualified factory-trained manufacturer's representative shall provide a quantity of (1) two-hour session of on-site training instruction.

The instruction shall include the operational and maintenance requirements of the motor controller.

The basis of the training shall be the installed controller, the engineered drawings and the user manual. At a minimum, the training shall:

1. Review of the engineered drawings identifying the components shown on the Plans.
2. Review starting/stopping options of the controller.
3. Review the pump control option of the controller.
4. Review the maintenance requirements of the controller.
5. Review operation of the Human Interface for programming and monitoring the controller.
6. Review safety concerns with operating the controller.

16.50 PANELBOARDS

[CSI 26 24 00]

16.52 Panelboards

[CSI 26 24 16]

Part 1 - General

Description of Work

This section covers the furnishing and installation of all panelboard equipment complete.

Quality Assurance

Provide products specified in this Section that are listed and labeled as defined in NEC Article 100.

Standards and Codes

All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.

All material and equipment specified herein shall conform with all applicable NEMA, ANSI, and IEEE standards.

All materials and equipment specified herein, and their installation methods shall conform to the latest published version of the NEC.

Part 2 – Products

Manufacturers

Materials, equipment, and accessories specified in this section shall be products of:

- Eaton/Cutler-Hammer
- Schneider Electric/Square D Company
- Siemens

Components

Panelboard Type

1. Panelboards shall be rated at proper voltage and current for intended use with bus bars of copper. Panels shall be 1-phase, 3 wire or 3-phase, 4-wire, 100 percent neutral, with equipment ground bar unless noted otherwise. Panelboards shall be dead front.

Wire Terminations

1. Panelboard assemblies, including protective devices, shall be suitable for use with 75 degrees Celsius or greater wire insulation systems at NEC 75 degrees Celsius conductor ampacity in accordance with UL 486E.

Load Current Ratings

1. Unless otherwise indicated, load current ratings for panelboard assemblies, including bus and circuit breakers, are non-continuous as defined by NEC. Continuous rating shall be 80 percent of non-continuous rating.

2. Where indicated “continuous”, “100 percent”, etc., selected components and protective devices shall be rated for continuous load value shown.
3. The following interrupting capacity shall be considered minimum. Other ratings shall be as specified on the Plans.

240V and 208Y/120V Panelboards	22,000 AIC symmetrical
480V/277V Panelboards	40,000 AIC symmetrical

Overcurrent Protective Devices

1. In accordance with NEMA AB 1, NEMA KS 1, UL 98 and UL 489, protective devices shall be adapted to panelboard installation.
2. Panelboards shall be capable of device replacement without disturbing adjacent devices and without removing main bus.
3. Spare Spaces: Cover openings with easily removable cover.
4. When not identified on Plans, provide minimum of 18 single-pole breaker spaces.

Circuit Breakers

1. Provide thermal-magnetic unless otherwise indicated, quick-make, quick-break, molded case, of indicating type showing ON/OFF and TRIPPED positions of operating handle. Mount breakers in all panelboards so that the breaker handles operate in a horizontal plan.
2. The bus connection shall be bolt-on circuit breakers in all panelboards. In power distribution panelboards, 225-ampere frame sizes and greater may be plug-in type where individual positive locking devices require mechanical release for removal.
3. Trip Mechanism:
 - a) Individual permanent thermal and magnetic trip elements in each pole.
 - b) Test button on cover.
 - c) Variable magnetic trip elements with a single continuous adjustment 3X to 10X for frames greater than 100 amps.
 - d) Two and three pole breakers shall have common trip.
 - e) Automatic opens all poles when overcurrent occurs on one pole.
 - f) Calibrated for 40 degrees C ambient, unless shown otherwise.

Ground Fault Circuit Interrupter (GFCI)

1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 5-mA ground fault with 0.025 second (UL 943, class A sensitivity, for protection for personnel).
2. Ground fault sensor shall be rated same as circuit breaker.
3. GFCI shall have a push-to-test button and a reset button.

Equipment Ground Fault Interrupter (EGFI)

1. Where indicated, equip breaker as specified above with ground fault sensor rated to trip on 30-mA ground fault (UL listed for equipment ground fault protection).

Cabinets for Each Panelboard

1. Cabinets shall be flush, or surface mounted as indicated on the Plans with tight closing doors without play when latched. Where two cabinets are located adjacent to each other in finished areas, provide matching trim of the same height.
2. Provide cabinets of sufficient dimensions to allow for future expansion and addition of circuit breakers within the panelboards as indicated on the Plans.
3. Provide locks for each cabinet door. All electrical distribution equipment locks are to be keyed identically.
4. Fasten panelboard with machine screws with oval countersunk heads, finish hardware quality, with escutcheons or approved trim clamps. Clamps assessable only when dead front door is open are acceptable. Surface mounted panelboards with fronts greater than 48 inches vertical dimension shall have trim hinged at the right side in addition to the hinged door over dead front.
5. Material for Type 1, Type 3R, and Type 3S cabinets shall be code-gauge, hot-dip galvanized sheet steel with reinforced steel frame.
6. Finish all enclosures with rust inhibitor primer followed by manufacturer's standard gray baked enamel or lacquer.

Bus

1. Material for internal bus shall be full size copper throughout length. Provide for mounting of future protective devices along full length of bus regardless of number of units and spaces shown. Machine, drill and tap as required for current and future positions.

Feeder Lugs

1. Main and neutral feeder lugs shall be replaceable, bolted mechanical or crimp compression type.

Equipment Ground Terminal Bus

1. Provide copper equipment ground terminal bus with suitably sized provisions for termination of ground conductors. The terminal bus shall be bonded to the enclosure.
2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
3. Provide individual termination points for all other grounding conductors such as feeder, grounding electrodes, etc.

Neutral Terminal Bus

1. Provide copper neutral terminal bus with suitably sized provisions for termination of neutral conductors. The neutral bus shall be isolated from the enclosure.

2. Provide individual mechanical termination points no less than the quantity of breaker pole positions.
3. Provide individual termination points for all other neutral conductors.
4. Termination points shall be bolted crimp compression lugs for conductors 6 AWG or larger.

Part 3 – Execution

General

Install in accordance with NECA 407, NEMP PB 1.2 and manufacturers' written installation instructions.

Installation

Install securely, plumb, in-line and square with walls.

Install top of panelboard trim 72 inches above floor, unless otherwise shown. Install panelboard so tops of protective device operating handles are no more than 72 inches above the floor.

Install filler plates in unused spaces.

System of Numbering and Bus Arrangement

System numbering and bus arrangement shall be as shown on the panel schedule on the Plans.

Panelboard Nameplate

Provide engraved plastic nameplate with 1/2-inch high characters for panel identifications (for panel name) attached with screws to each panelboard front. Include voltage, phase and wire (i.e., 208Y/120, 3-phase, 4-wire) in 3/8-inch characters.

Circuit Index

Provide as-built information for each branch circuit panelboard by circuit with its proper load designation.

Ground Fault Protection

Install panelboard ground fault circuit interrupter devices in accordance with installation guidelines of NEMA 289.

16.55 Switches and Protective Devices

[CSI 26 18 00 (medium voltage) 26 28 00 (low voltage)]

16.55.1 Common Work for Switches and Protective Devices

[CSI 26 18 05, 26 28 05]

Part 1 - General

Design Requirements

Overcurrent devices shall be NEMA rated.

Extra Materials

Provide one fuse for each ungrounded conductor and a minimum of one spare fuse per phase of each ampacity and voltage used on the project. Deliver fuses to Owner at the completion of the project.

Part 3 – Execution

Installation

Overcurrent protection devices and safety switches shall be centered 60 inches above the finished floor unless noted otherwise on the Plans.

16.55.2 Fuses

[CSI 26 18 16, 26 28 13]

Part 1 - General

Design Requirements

Fuses shall be of the type and amperage indicated on the Plans. The voltage rating shall be appropriate for the application indicated. The fuse types indicated on the Plans imply a certain set of fuse characteristics. No substitutions of fuse types will be allowed without Engineer approval.

Part 2 - Products

Manufacturers

Fuses shall be:

- Bussman,
- Gould Shawmut
- Littlefuse
- Reliance
- Or Equal

Materials

Fuses in motor circuits which are indicated but not sized, shall be provided with Manufacturer's recommended size based on the actual motor installed. In-line or integrally-mounted fuse clips shall be provided on all control power or low-voltage transformers.

16.55.3 Molded Case Circuit Breakers

[CSI 26 28 16.14]

Part 1 - General

Design Requirements

Breakers shall have the interrupting rating and trip rating indicated on the Plans. All breakers shall be calibrated for operation in an ambient temperature of 40 degrees Celsius.

Part 2 - Products

Manufactured Units

Molded case circuit breakers shall be quick-make and quick-break type with wiping type contacts. Each breaker shall be provided with arc chutes and individual trip mechanisms on each pole consisting of both thermal and magnetic trip elements. Two and three pole breakers shall be common trip. Molded case circuit breakers shall be trip-free. Each breaker shall have trip indication independent of the "ON" or "OFF" positions.

16.55.4 Instantaneous Magnetic Trip Breakers

[CSI 26 28 16.15]

Part 1 - General

Design Requirements

The magnetic trips shall be adjustable and accessible from the front of all these breakers.

Part 2 - Products

Manufactured Units

Breakers in motor circuits which are indicated but not sized, shall be provided with Manufacturer's recommended size based on the actual motor installed. Where indicated on the Plans and in the combination motor starter/motor control center schedule, furnish instantaneous magnetic trip only circuit breakers for motor short circuit protection.

16.55.5 Disconnect Switches

[CSI 26 28 16.17]

Part 1 - General

Design Requirements

Furnish and install disconnect switches conforming to NEMA KS 1, type HD, sized for the ampere and voltage as shown on the Plans and as required by the NEC and nameplate requirements of the equipment served.

Part 2 - Products

Manufactured Units

The switches shall be 600-volt type and horsepower rated. Auxiliary contacts shall be provided as indicated on the Plans.

Part 3 – Execution

Installation

Provide additional disconnects if required by Code.

16.60 CONDUCTORS

16.61 Low Voltage Wire and Cable

[CSI 26 05 19]

Part 1 - General

Design Requirements

This section is for power and control conductors for 600 volts or less.

All conductors shall be copper. Wire or cable not shown on the Plans or specified, but required, shall be of the type and size required for the application and in conformance with the applicable code.

Part 2 - Products

Materials

Conductors

1. Solid and stranded copper wire shall be 600-volt Type THW, THWN, or THHW, Class B stranding, sizes #14 AWG, #12 AWG, and #10 AWG only. Use of THHN insulation shall not be allowed. Aluminum conductors shall not be allowed.
2. Stranded copper wire shall be 600-volt Type XHHW, Class B stranding, sizes #8 AWG and larger. Aluminum conductors shall not be allowed.

Splices

1. For Lighting Systems and Power Outlets: Wire nuts shall be twist-on type insulated connectors utilizing an outer insulating cover and a means for connecting and holding the conductors firmly.
2. All Equipment: Crimp type connectors shall be insulated type, suitable for the size and material of the wires and the number of wires to be spliced and for use with either solid or stranded conductors.
3. Division 16 Equipment and Power Conductors: Bolted pressure connectors shall be suitable for the size and material of the conductors to be spliced.
4. All Equipment: Epoxy splice kits shall include epoxy resin, hardener, mold, and shall be suitable for use in wet and hazardous locations.

Terminations

1. Crimp type terminals shall be self-insulating sleeve type, with ring or rectangular type tongue, suitable for the size and material of the wire to be terminated, and for use with either solid or stranded conductors.
2. Terminal lugs shall be split bolt or bolted split sleeve type in which the bolt or set screw does not bear directly on the conductor.
3. Wire Markers shall be plastic sleeve type. Wire numbers shall be permanently imprinted on the markers.

Finishes

Color Coding: Provide color coding for all circuit conductors. Insulation color shall be white for neutrals and green for grounding conductors. An isolated ground conductor shall be identified with an orange tracer in the green body. Ungrounded conductor colors shall be as follows:

1. 120/208 Volt, 3 Phase: Red, black and blue.
2. 277/480 Volt, 3 Phase: Yellow, brown and orange.
3. 120/240 Volt, 1 Phase: Red and black.

Part 3 – Execution

Location (Installment) Schedule

Provide the following conductors for the following applications:

1. Use stranded copper conductors for all power and control circuits unless noted otherwise on plans or below. Size as noted on the Plans.
2. Contractor may use solid copper conductors for lighting and receptacle circuits using screw-type terminals. Size as noted on the Plans.
3. Size #14 AWG wire or smaller shall not be allowed on power circuits.

Installation

Conductor Splices

1. Splices: Install all conductors without splices unless necessary for installation, as determined by the Engineer. Splices when permitted shall be completed using an approved splice kit intended for the type of conductor and the application. The splice shall be in accordance with the splice kit manufacturer's instructions.
2. Underground Splices: All underground outdoor splices when approved by Engineer shall be completed in an accessible pullbox or handhole using an approved watertight epoxy resin splice kit rated for the application up to 600 volts. Splices will not be allowed to be buried directly.

Conductor Identification

1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pullbox, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as favorably by the Engineer.
2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: For all circuits 150 volts to ground or more and for all motor circuits over ½ horsepower, test cables per NETA Paragraph 7.3.1. The insulation resistance shall be 20 megohms or more. Submit results to Engineer for review.

16.63 Signal Cable

[CSI 27 15 00]

Part 2 - Products

Materials

Twisted Shielded Pairs (TSP)

1. Cable shall conform to IEEE 383, UL 13, and UL 83 and shall be type PLTC cable suitable for direct burial. Each TSP shall consist of two #16 AWG, 7-strand copper conductors per ASTM B8 with 15 Mils PVC insulation and individual conductor jacket of nylon. Conductors shall be twisted with 2-inch or shorter lay, with 100 percent foil shielding and tinned copper drain wires. The cable shall have an overall PVC jacket with a thickness of 35 Mils. The insulation system shall be rated at 90 degrees Celsius and for operation at 600 volts.

Multiple (Twisted) Shielded Pair (MSP) Cables

1. Each MSP cable shall conform to IEEE 383, UL 13, and UL 83 and shall consist of the number of pairs shown on the Plans of #20 AWG, 7-strand copper conductors per ASTM B8 with 15 Mils PVC insulation and individual conductor jacket of nylon. Conductors shall be twisted with 2-inch or shorter lay, with 100 percent foil shielding and tinned copper drain wires. The MSP cable itself shall have, in addition, an overall foil shield, tinned copper drain wire, and an outer PVC jacket. Thickness of the jacket shall be 50 Mils for 8 or fewer pairs, 60 Mils for 10 to 16 pairs, and 70 Mils for 18 or more pairs. The insulation system shall be rated at 90 degrees Celsius and for operation at 600 volts.

Cat 5E Ethernet Cable

1. The Ethernet cable shall be shielded 600V UL rated. The use of a 300V rated cable is not acceptable. All Ethernet cable terminating outside of a telemetry panel shall be grounded at the telemetry panel only.
2. Ethernet cables shall be industrial type Ethernet cable and UL listed for installation in the Motor Control Center. Ethernet cables shall be Allen-Bradley Ethernet Cable with metal In-cabinet RJ45 Connectors, no substitutions.

Fiber Optic Cable

1. Fiber optic cable shall be OM2 50/125 multimode fiber cable. Cable jacketing shall be orange and OFNR riser rated for vertical-run and general use. Provide cable with high grade PVC molded strain relief. Each fiber optic cable shall have an ST type connector for termination at Ethernet switches and fiber optic patch panels. Cables shall be listed and marked in accordance with the requirements of the NEC.

Special Cables

1. Use only coaxial cable recommended for specific applications such as radio antenna systems and computer networks as required by the manufacturer or system supplier.
2. Special cables such as triaxial (coax), twin-axial, and low capacitance computer grade cables shall be supplied where shown on the Plans or as required by the manufacturer or supplier. Deviations must be favorably reviewed by the Engineer.

Part 3 - Execution

Installation

Cable Installation

1. Cables shall be continuous from initiation to termination without splices.
2. Cable shielding shall be grounded at one end of the cable only. Bonding shall be to a single ground point only. Bonding from cable to cable in multiple run installations shall not be permitted.
3. Install instrumentation cables in separate raceway systems with voltages not to exceed 30 volts DC.

Conductor Identification

1. Except for interior lighting and receptacle circuits, identify each wire or cable at each termination and in each pull box, junction box, handhole, and manhole using numbered and lettered wire markers. All electrically common conductors shall have the same number. Each electrically different conductor shall be uniquely numbered. Identify panelboard circuits using the panelboard identification and circuit number. Identify motor control circuits using the equipment identification number assigned to the control unit by the motor control center manufacturer and the motor control unit terminal number. Identify other circuits as shown in the circuit schedule as determined by the Engineer.
2. Conductors between terminals of different numbers shall have both terminal numbers shown at each conductor's end. The terminal number closest to the end of the wire shall be the same as the terminal number.

Testing

Insulation Resistance Tests: Perform insulation resistance on all circuits. Make these tests before any equipment has been connected. Test the insulation with a 500 Vdc insulation resistance tester with a scale reading 100 mega ohms. The insulation resistance shall be 20 mega ohms or more. Submit results to Engineer for review.

16.70 RACEWAYS, BOXES, AND FITTINGS

[CSI 26 05 33]

16.71 Raceways

[CSI 26 05 33.23]

Part 1 – General

Design Requirements

Conduit sizes not noted on Plans shall be in accordance with NEC requirements for the quantities and sizes of wire installed therein.

Grounding of the raceway, junction boxes, fittings and any other boxes is the responsibility of the Contractor. Ground conductors, bushings, connections, clamps and other materials as needed to ground the raceway system is the responsibility of the Contractor. All raceways shall be grounded in accordance with the NEC.

Part 2 – Products

Components

Conduit and Fittings

1. Galvanized Rigid Steel (GRS): Rigid conduit shall be steel, hot dipped galvanized inside and out. The GRS must meet USA Standards Institute C80-1 Underwriters Laboratories Standard UL6 and carry a UL label. Use cast threaded hub fittings and junction boxes for all rigid conduit except in locations not permitted by the NEC.
2. PVC Coated Rigid Steel Conduit (PVC-GRS): PVC coated conduit shall meet the GRS standard above plus have a 40 Mil PVC factory applied PVC coating.
3. Nonmetallic Conduit: Nonmetallic Conduit shall be rigid PVC, Schedule 40 (PVC-40) or 80 (PVC-80). PVC conduit installed above grade shall be Schedule 80 extra heavy wall 90 degree Celsius. UL listed for aboveground use and UV resistant. Conduit shall be gray in color. Fittings shall be of the same material as the raceway and installed with solvent per the Manufacturer's instructions. Conduit, fittings, and solvent shall all be manufactured by the same Manufacturer.
4. Flexible Metal Conduit (Flex-LT): Flexible conduit shall be interlocking single strip, hot dipped galvanized and shall have a polyvinyl chloride jacket extruded over the outside to form a flexible watertight raceway. Flexible conduit shall be American Brass Company Sealtite Type VA, General Electric Type UA or equal.
5. Electrical Metallic Tubing (EMT): EMT shall be UL 797 and ANSI C80.3; steel tubing, hot dipped galvanized. EMT fittings shall be ANSI/NEMA FB 1; steel, rain tight, insulated throat, compression type.

Conduit and Cable Supports

1. Conduit Supports: Hot dipped galvanized framing channel shall be used to support groups of conduit. Individual conduit supports shall be one-hole galvanized malleable iron pipe

straps used with galvanized clamp backs and nesting backs where required. Conduit support for PVC or PVC coated rigid steel shall be one-hole PVC or epoxy coated clamps or PVC conduit wall hangers.

2. Ceiling Hangers: Ceiling hangers shall be adjustable galvanized carbon steel rod hangers. Unless otherwise specified, hanger rods shall be 1/2-inch all-thread rod and shall meet ASTM A193. Hanger rods in corrosive areas and those exposed to weather or moisture shall be stainless steel.

Wireways

1. General: Wireways shall consist of prefabricated channel-shaped, lay-in trough with hinged covers, associated fittings and supports. Straight section shall not be longer than 5 feet. Use 45-degree elbow and tees at all transition points. Cross-sectional dimensions shall be as indicated on the Plans. Fittings shall consist of elbows, tees, crosses and closing plates as required. Wireways shall be designed for continuous grounding.
2. Finish: Rust inhibiting primer and manufacturers standard paint inside and out except of stainless-steel type.
3. Standards: UL 870, NEMA 520
4. Watertight (NEMA 4X rated) Wireway
 - a) 14-gauge Type 304 or 316 stainless steel bodies and covers without knockouts and 10-gauge stainless steel flanges.
 - b) Cover: Fully gasketed and held in place with captive clamp type latches.
 - c) Flanges: Fully gasketed and bolted.
5. Dust-tight (NEMA 12 rated) Wireway
 - a) 14-gauge steel bodies and covers without knockouts and 10-gauge steel flanges.
 - b) Cover: Fully gasketed and held in place with captive clamp type latches.
 - c) Flanges: Fully gasketed and bolted.

Conduit Sealants

1. Moisture Barrier Types: Sealant shall be a non-toxic, non-shrink, non-hardening, putty type hand applied material providing an effective barrier under submerged conditions.
2. Fire Retardant Types: Fire stop material shall be a reusable, non-toxic, asbestos-free, expanding, putty type material with a 3-hour rating in accordance with UL 1479. Provide products indicated by the manufacturer to be suitable for the type and size of penetration.

Part 3 - Installation

Raceway Applications

Galvanized Rigid Steel (GRS) conduit shall be used in all locations unless noted otherwise below or on the Plans.

ABOVE GRADE CONDUITS (non-corrosive areas) shall be:

1. GRS for power and control wiring.

2. GRS for instrumentation and telecommunications wiring.
3. GRS for motor leads from VFDs.
4. EMT for above-grade lighting circuits.

ABOVE GRADE CONDUITS (wet or corrosive areas, NFPA 70 hazardous areas) shall be:

1. PVC-GRS for power and control wiring.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

CONCEALED ABOVE GRADE CONDUITS shall be:

1. GRS for all wire and cable types in wood stud frame walls.
2. PVC-40 for power and control wiring in concrete block or brick walls.
3. PVC-40 for instrumentation and telecommunications wiring in CMU or brick walls.
4. GRS for motor leads from VFDs in CMU or brick walls.

BELOW GRADE CONDUITS IN DIRECT EARTH (not under slabs-on-grade) shall be:

1. PVC-40 for power and control wiring.
 - a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

UNDER SLABS-ON-GRADE CONDUIT shall be:

1. PVC-40 for power and control wiring
 - a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-GRS for instrumentation and telecommunications wiring.
3. PVC-GRS for motor leads from VFDs.

CONCRETE-ENCASED CONDUITS shall be:

1. PVC-40 for power and control wiring
 - a) Sweeps and risers for transition of PVC from below grade to above grade shall be PVC-GRS.
2. PVC-40 for instrumentation and telecommunications wiring.
 - a) Sweeps and risers for transition of PVC from concrete-encasement to above grade shall be PVC-GRS.
3. PVC-GRS for motor leads from VFDs.

ALL CONNECTIONS TO VIBRATING EQUIPMENT OR MOTORS shall be:

1. Liquidtight flexible metallic conduit for indoor, non-corrosive areas and all motor leads from VFDs.
2. Connection to equipment outdoors or in corrosive areas shall be with non-metallic liquidtight flexible conduit (except for motor leads from VFDs shall be flexible metallic.)

Installation

All conduits shall be concealed in the floor, walls, ceiling slab, or beneath the floor slab. Surface mounted conduit will not be accepted unless noted otherwise on the construction Plans.

Size of Raceways:

1. Raceway sizes as shown on the Plans, if not shown on the Plans, then size in accordance with NFPA 70.
2. Unless specifically indicated otherwise, the minimum raceway size shall be:
 - a) Conduit: $\frac{3}{4}$ -inch
 - b) Wireway: 4-inch by 4-inch

All raceways shall contain a separate grounding conductor.

Spare conduits shall contain one $\frac{3}{16}$ -inch diameter nylon pull rope.

Conduit routing is shown diagrammatic on the Plans. Contractor is responsible for routing the conduits in a neat manner, parallel and perpendicular to walls and ceilings.

Location of conduit ends are shown approximately. Contractor is responsible for ending conduits in location that will not conflict with electrical equipment. Route conduit ends to facilitate ease of equipment maintenance. Conduits extending from the floor to a device shall be located as close as possible to avoid creating a hazard.

Conduit shall not be routed on exterior of structures except as specifically indicated on the Plans.

Where water cannot drain to openings, provide drain fittings in the low spots of the conduit run.

Securely fasten raceways at intervals and locations required by NEC, or the type of raceway employed.

Provide all required openings in walls, floors and ceilings for conduit penetration.

1. Do not install one (1) inch and larger raceways in or through structural members (beams, slabs, etc.) unless approved by Engineer.
2. New Construction: Avoid cutting openings, where possible, by setting sleeves or frames in masonry and concrete, and by requesting openings in advance.
3. Existing Construction: Core drill openings in masonry and concrete. Avoid structural members and rebar.

Conduit encasement or embedment in the earth shall be separated from the earth by at least 3-inches of concrete unless otherwise shown on the Plans. Plastic conduit spacers shall be

located five feet on centers. The spacers shall be secured to the conduits by wire ties. The conduits shall be watertight.

Analog signal conduits shall be separated from power or control conduits. The separation shall be a minimum of 12-inches for metallic conduits and 24-inches for nonmetallic conduits.

Install explosion-proof seal-offs in hazardous areas shown on the Plans and as required by the NEC.

Plastic raceway joints shall be solvent cemented in accordance with recommendations of raceway manufacturer.

All conduit openings not encased in a panel shall be sealed with duct seal.

Wireway Installation

1. Straight sections and fittings shall be solidly bolted together to be mechanically rigid and electrically continuous. Dead ends shall be closed. Unused conduit openings shall be plugged.
2. Wireways shall be supported every 5 feet minimum.

16.72 Boxes and Enclosures

16.72.2 Outlet and Junction Boxes

[CSI 26 05 33.16]

Part 1 – General

Design Requirements

In corrosive areas, all junction boxes shall be NEMA 4X.

Outlet boxes and switch boxes shall be designed for mounting flush wiring devices.

Outlet boxes shall not be less than 4-inch square and 1½-inch deep. Ceiling boxes shall withstand a vertical force of 200 pounds for five minutes. Wall boxes shall withstand a vertical downward force of 50 pounds for five minutes.

Part 2 – Products

Materials

Use cast boxes with threaded hubs for all rigid and intermediate conduits. Steel boxes may be used with rigid and intermediate conduits where cast boxes are not allowed by the NEC. All boxes shall be of proper size to accommodate devices, connectors, and number of wires present in the box. Boxes shall be readily accessible.

Cast box bodies and cover shall be cast or malleable iron with a minimum wall thickness of ⅛-inch at every point, and not less than ¼-inch at tapped holes for rigid conduit. Bosses are not acceptable. Mounting lugs shall be provided at the back or bottom corners of the body. Covers shall be secured to the box body with No. 6 or larger brass or bronze flathead screws. Boxes shall be provided with neoprene cover gaskets. Outlet boxes shall be of the FS types. Boxes shall conform to FS W-C-586C and UL 514.

Sheet metal boxes shall conform to UL 50, with a hot-dipped galvanized finish conforming to ASTM A123. Boxes and box extension rings shall be provided with knockouts. Boxes shall be formed in one piece from carbon-steel sheets.

Non-metallic boxes shall be hot-compressed fiberglass, one-piece, molded with reinforcing of polyester material, with a minimum wall thickness of ⅛-inch.

Finishes

Where only cast aluminum is available for certain types of fixture boxes, an epoxy finish shall be provided.

16.72.3 Watertight Enclosures

[CSI 26 05 33.17]

Part 2 – Products

Manufacturers

The watertight enclosure shall be equal to Hoffman.

Materials

Watertight enclosures for vault electrical outlets shall be molded from fiberglass reinforced polyester material. A hinged cover shall be gasketed and opened with quick release latches. The conduit penetrations shall be sealed watertight.

Part 3 – Execution

Installation

An epoxy plug shall be installed in the conduit to prevent the migration of water into the conduit. The enclosure shall be NEMA rated and installed per all applicable codes.

16.75 Wiring Devices

[CSI 26 27 26]

16.75.1 Common Work for Wiring Devices

[CSI 26 27 26]

Part 3 - Execution

Installation

Wiring Devices

1. Position of Outlets: All outlets shall be centered with regard to building lines, furring and trim, symmetrically arranged in the room or outside the structure. Device outlets shall be set plumb and shall extend flush to the finished surface of the wall, ceiling or floor without projecting beyond the same.
2. Unless otherwise noted, wall mounted outlet devices shall generally be 24-inches above the floor, 18 inches in architecturally treated areas, above process piping near process valve boards. Switches shall be 48 inches above the finished floor unless otherwise noted.

Installation of Wall Plates

1. Interior Dry Locations: Install plates so that all four edges are in continuous contact with the finished wall surfaces. Plaster filled will not be permitted. Do not use oversize plates or sectional plates.
2. Exterior and/or Wet Locations: Install plates with gaskets on wiring devices in such a manner as to provide a rain tight weatherproof installation. For receptacle devices, these plates shall maintain the weatherproof rating with an attachment plug inserted and be rated extra-duty. Cover type shall match box type.

Testing

After installation of receptacles, circuits shall be energized, and each receptacle tested for proper ground continuity, reversed polarity, and/or open neutral condition.

GFI receptacles shall be tested with the circuits energized. Devices shall be tested with a portable GFI receptacle tester capable of circulating 7.5 milliamperes of current, when plugged in, between the “hot” line and “ground” to produce tripping of the receptacle. Resetting and tripping shall be checked at least twice at each GFI receptacle.

Submit results of all field testing to the Engineer for review.

16.75.2 Receptacles

[CSI 26 27 19]

Part 1 – General

Design Requirements

Receptacles shall be heavy duty, high abuse, grounding type conforming to NEMA configurations, NEMA WD1 and UL 514 Standards.

Part 2 – Products

Materials

Single and Duplex Receptacles

1. Indoor Clean Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-15P plug caps. Receptacles shall be Hubbel 5362, General Electric 4108-2, or equal. Color shall be brown in industrial areas and ivory or white in office and laboratory areas.
2. Outdoor, Process, or Corrosive Areas: Receptacles shall be duplex, 20 amp, NEMA 5-20R, and shall accept NEMA 5-15P and 5-20P plug caps. Receptacle and plug caps shall be corrosion resistant, marine duty with yellow polycarbonate weatherproof lift covers. Receptacles shall be Hubbell 53CM62/53CM21 or equal.

GFI Receptacles

1. Device shall be rated 20 amp, 2-pole, 3-wire, 120-volt, conforming to NEMA WD1.10 configuration. Device shall have a test and reset push buttons. GFI device shall be Hubbell 5362 or equal.

Surface Multiple Outlet Assemblies

1. Units shall have outlets on center-to-center spacing as shown on the Plans. Assembly shall conform to Article 353 of the NEC.

16.75.3 Line Voltage Switches

[CSI 26 27 26.21]

Part 2 – Products

Manufacturers

- Sierra Electric
- Monumental Grade, Catalog No. 5721
- Daniel Woodhead 1900 series
- Or Equal

Materials

Line Voltage Types: Switches shall be rated 20 amps at 120 or 277 volts AC only. Units shall be flush mounted, self-grounding, quiet operating toggle devices. Handle color shall be brown in industrial areas and white or ivory in office or laboratory areas. Units shall conform to Federal Specifications W-S-896 D and E, UL 20, and NEMA WD1 standards.

16.75.4 HOA (Hand-Off-Auto) Lighting Switches

[CSI 26 27 26.23]

Part 2 – Products

Manufacturers

- Bryant No. 4925 or Equal

Materials

HOA Switch (Lighting): Switches shall be rated 20 amps at 120 volts AC, 3-position toggle, positive action with “center-off” maintained contact, double pole.

16.75.5 Plates

[CSI 26 27 26.31]

Part 1 – General

Design Requirements

Plates shall be of the style and color to match the wiring devices, and of the required number of gangs. Plates shall conform to NEMA WD1, UL 514, and ANSI C73. In noncorrosive indoor areas, device plates shall be made of sheet steel, zinc electroplated with chrome finish.

Device plates in corrosive or outdoor areas shall be corrosion-resistant/marine-duty type with weather protective double doors. Device plates for explosion-proof equipment shall be factory provided with the equipment.

Part 2 – Products

Manufacturers

As manufactured by

- Crouse-Hinds
- Appleton
- Or Equal

Components

Device plates shall be provided with engraved laminated phenolic nameplates with 1/8-inch white characters on black background. Nameplates for switches shall identify panel and circuit number and area served. Nameplates for receptacles shall identify circuit and voltage if other than 120 volts, single-phase.

16.85 Lighting

[CSI 26 50 00]

16.85.1 Common Work for Lighting Fixtures

[CSI 26 50 05]

Part 1 - General

Design Requirements

Fixtures shall be a standard, cataloged item general description as called for on the Plans. All fixtures shall be UL approved and so labeled. Provide suitable supports and mountings.

Part 2 – Products

Manufacturers

As shown on Plans. Equals will be accepted.

16.85.2 Lamps

[CSI 26 06 50 or 26 50 06.13]

Part 1 - General

Design Requirements

Provide all lamps as specified. Refer to the Lighting Fixture Schedule on the Plans for the ordering information on lamps. Fluorescent lamps shall be standard type, not energy efficient type due to low temperature conditions. Lamps shall be new at the time of acceptance.

Lamps shall be provided for all lighting fixtures.

Warranty

Lamps that fail within 90 days after acceptance by the Owner shall be replaced at no cost to the Owner.

Part 2 – Products

Manufacturers

Approved manufacturers:

- Westinghouse
- Sylvania
- G.E.

16.85.3 Fixtures

[CSI 26 06 50.16 or 26 50 06.16]

Part 1 - General

Design Requirements

Fixtures shall be of the types, wattages, and voltages shown on the Plans, comply with UL 57, and shall be UL classified and labeled for intended use. Fixtures for use in hazardous locations shall be UL listed per UL Standard 844.

16.95 Testing

[CSI 26 08 00]

16.95.1 Common Work for Testing

[CSI 26 08 05]

Part 1 - General

Submittals

Test reports shall be submitted to the Engineer prior to final acceptance in accordance with Division 1.33 of these specifications.

Scheduling and Coordination

The Contractor shall inform the Engineer in advance of testing in accordance with the requirements listed in Division 1 of these specifications.

Prior to scheduling the testing, the Contractor shall have satisfied themselves that the project area is properly cleaned up; all patching and painting deemed necessary properly completed; and all systems, equipment and controls are functioning as intended.

Part 2 - Products

Source Quality Control

Submit reports of factory tests and adjustments performed by equipment manufacturers to the Engineer prior to field testing and adjustment of equipment. These reports shall identify the equipment and show dates, results of test, measured values and final adjustment settings. Provide factory tests and adjustments for equipment where factory tests are specified in the equipment specifications. 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.

Part 3 – Execution

Site Testing

Test all circuits for continuity, freedom from ground, and proper operation during progress of the work.

Insulation Resistance, Continuity, and Rotation: Perform routine insulation resistance, continuity and rotation tests for all distribution and utilization equipment prior and in addition to tests performed by the testing laboratory specified herein.

Electric Motors: Perform voltage, current and resistance tests on all motors $\frac{1}{2}$ horsepower and larger installed this project. Insulation resistance readings shall be taken with a 500-volt megger for 30 seconds with the circuit conductors connected to the motor. Verify that an overload condition does not exist.

Conduct special test as required for service and/or system ground.

Arc Flash Study, Protection Device Coordination, and Short Circuit Analysis

[CSI 26 05 73.13, 26 05 73.16, 26 05 73.19]

Provide the services of a recognized independent testing laboratory or coordination analysis consultant for the proper system coordination of the protective devices furnished on this project. Submit the name and the qualifications of the laboratory or consultant for review by the Engineer; qualifications must include professional registration of proposed personnel as electrical engineers.

The protective device on the line side closest to the fault or abnormal conditions shall isolate the problem portion of the system and minimize damage in that portion. The rest of the system shall be maintained in normal service. The coordination shall be in conformance with the recommendations of latest IEEE Standard 242.

Provide an Arc Flash Hazard Study for the electrical distribution system shown on the Plans. The intent of the Arc Flash Hazard Study is to determine hazards that exist at each major piece of electrical equipment shown on the one-line diagrams. This includes switchgear, switchboards, panelboards, motor control centers, generators, transfer switches, and transformers. The study will include creation of Arc Flash Hazard Warning Labels listing all items as required in NFPA 70E-2018. These labels serve as a guide to assist technicians and others in the selection of proper Personal Protective Equipment when working around exposed and energized conductors. The electrical contractor will install the labels. The arc flash hazard study shall consider all operating scenarios during normal conditions alternate operations, emergency power conditions, and any other operations, which could result in maximum arc flash hazard. The label shall list the maximum incidental energy calculated and the scenario number and description on the label.

Submit the analysis that shall include arc flash, impedance, and short circuit calculations, list of any assumptions made and the analysis, the recommended settings of the protective devices, and the system time/current characteristic curves. The submittal shall be completed and submitted in conjunction with the circuit breaker submittal to allow time for review and re-submittal, if necessary, before the implementation of final settings and adjustments by the testing laboratory.

Field Quality Control

General

1. Conduct final test in the presence of Owner and/or their authorized representative. Contractor shall provide all testing instrumentation and labor required to demonstrate satisfactory operation of systems, equipment and controls.

Operational Tests

1. Operational test all circuits to demonstrate that the circuits and equipment have been properly installed, adjusted and are ready for full-time service. Demonstrate the proper functioning of circuits in all modes of operation, and including alarm conditions, and demonstrate satisfactory interfacing with the data acquisition and alarm systems.

16.95.3 Conductor Test Report

[CSI 26 08 13]

Conductor Test Report Page 1 of 1															
PROJECT:										OWNER:					
Contractor Co. Name:										Phone Number:					
Tested by:										Test Date:					
Race- way	V	C	Operating Load Voltage					Insulation Resistance - OHMS							
Label	(1)	(2)	(3)	VAB	VCB	VCA	VAN	VBN	VCN	A-B	B-C	C-A	A-G	B-G	C-G
A															
B															
C															
D															
E															
F															
G															

1. Refer to raceway and wire schedule and one-line diagram for description of feeder identified by label shown on this report
2. Visual Inspection – Check when completed

3. Continuity Test – Check when completed

16.95.4 Ground Electrode Resistance Test Report

[CSI 26 08 15]

Ground Electrode Resistance Test Report	
PROJECT:	OWNER:
Contractor Co. Name:	Phone Number:
Tested by:	Test Date:
Test Meter Type:	
Test Distance-D:	
Soil Conditions:	
Measured Resistance:	
DESCRIPTION OF TEST PROCEDURE, CONDITIONS, RESULTS:	

Division 17

Automatic Control

17.00 GENERAL

This division covers all work necessary for furnishing, installing, adjusting, testing, documenting, and starting-up the Instrumentation and Control (I&C) and Telemetry System. Programmable logic controller (PLC) shall provide local, automatic control of on-site pumps and control valves. Computer-based telemetry system will provide remote control, alarm presentation, and data logging activities at the Owner's headquarters primary control building location.

Sections in these specifications titled “*Common Work for . . .*” shall apply to all following related subsections whether directly referenced or not.

These specifications are an integral part of the contract documents for the I&C and Telemetry portion of this contract. The written descriptions of system performance contained herein are given to assist the Contractor in interpreting the contract plans but are not intended to be all-inclusive. The Contractor shall be aware that all automatic control systems do not require the same components and accessories for complete system operation. Therefore, these specifications do not include all accessories and appurtenances required for a complete system. The Contractor shall, however, provide all accessories and appurtenances to result in a completely operational system as required to meet the functional requirements of these documents. Where specific equipment specifications are given, they are used to represent the level of quality required by these documents.

17.05 Common Work for Automatic Control

[CSI 40 60 05]

Part 1 - General

Summary

The work under this division covers construction specifically described in these specifications. Project Plans will be provided for this project. All work incidental and necessary to the completion of the project described herein shall be completed under the bid item listed in the bid proposal, and no other compensation will be allowed. The work generally consists of the following:

- Detailed system layout and design for the particular equipment bid in accordance with these functional specifications.
- Furnishing of I&C equipment including delivery, storage, software, programming, installation, testing, startup, and documentation.
- Providing operator maintenance manuals for all equipment and devices provided by this Contract.
- Providing system training to the operators of the proposed equipment.

Related Sections

- Division 16 Electrical

References

The project Plans are based on Instrument Society of America (ISA) standards numbers S5.1, S5.2, S5.3, and S5.4. The Contractor is encouraged to be familiar with these standards since the project plans do not contain wiring or ladder diagrams but are based on the functional requirements of the ISA format.

All equipment and materials shall conform to the latest revised editions of applicable standards published by the following organizations:

- American National Standards Institute (ANSI).
- Institute of Electrical and Electronic Engineers (IEEE).
- National Electrical Manufacturers Association (NEMA).
- Underwriters' Laboratories (U/L).
- Instrument Society of America (ISA)

All equipment and materials, and the design, construction, installation, and application thereof shall comply with all applicable provisions of the National Electrical Code (NEC), the Occupational Safety and Health Act (OSHA), and any applicable Federal, State, and local ordinances, rules and regulations. All materials and equipment specified herein shall be within the scope of Underwriter's Laboratory (UL) examination services, be approved by the UL for the purpose for which they are used and shall bear the UL label.

All control panels shall bear a label by UL or by an approved testing authority for the completed assembled panel.

Definitions

Contractor: The Contractor, as distinct from the Control System Integrator, shall install panels and other materials furnished by the Control System Integrator and provide all materials and work necessary and thereby, satisfy all requirements that are within the scope of this section.

Control System Integrator: A single company subcontracted by the Contractor, who shall design and furnish the system, provide the instrument panels; provide the PLCs, RTU, Motor Control Center, ventilation control panel, startup, training services, and other instrument components.

Control System Integrator: A single firm preselected by the Owner and subcontracted by the Contractor, who shall design and furnish the system, provide the instrument panels; provide the PLCs, RTU, Motor Control Center, ventilation control panel, assemble and test the control panel equipment, and program PLCs, computers, and other instrument components and provide start-up and training services. The Control System Integrator for this contract shall be selected during the bidding process for the project documents.

Submittals

All submittals shall be complete, neat, orderly and indexed. Partial submittals will not be accepted. Submittal information shall be provided to the Owner for the following items:

- HVAC Ventilation and Dampener control panel
- Level Transmitter
- Pressure Switch
- Pressure Transmitter
- Level Float
- Wall Mounted Heating and Cooling Thermostat
- Wall Mounted Temperature Monitor and Transmitter
- Photoelectric Smoke Detector
- Air Analyzer for LEL and H₂S gases
- Solenoid Valves for large and big pipe diameters
- Intrusion Door Alarm Switch
- Magnetic Flow meter
- Small Pipe Flow Switch
- Operator in Trouble (Panic) Alarm Push Button Station
- Valve Position Switch
- Dampener Position Switch
- Operation and Maintenance Manuals per Division 1.79.2 and Division 17.94
- Full size nameplate wording schedules, in lettering style proposed for use.

In addition to the requirements of Division 1.33, the Contractor shall develop and submit the following information provided by the Control System Integrator.

Hardware Submittals

Before any components are fabricated, and/or integrated into assemblies, or shipped to the site, the Contractor shall prepare a complete hardware submittal. The Engineer shall require up to five (5) sets, including fully detailed shop drawing, catalog cuts, wiring connections, and such other descriptive matter and documentation as may be required to fully describe the equipment and to demonstrate its conformity to these Specifications. (Alternatively electronic PDF copies may substitute the required printed copies at the discretion of The Engineer.) The decision of the Engineer, upon the acceptability of any submittal, shall be final. Catalog information shall be submitted for all components and equipment, regardless of whether it is of the same manufacture as that listed in the Specifications.

System Plan Submittals

Following approval of the hardware submittal, the Control System Integrator shall prepare complete system interconnect wiring diagrams and panel layout plans for approval.

Plans

The Control System Integrator shall develop all shop drawings required for design, fabrication, assembly and installation of the control system. Shop drawings shall include all plans required in manufacture of specialized components and for assembly and installation of them.

Plans shall be prepared with a CAD program capable of exporting to AutoCAD format and printed on 11-inch by 17-inch media. Plans shall have borders and title blocks identifying the project system, revisions to the plans, and type of plan. Each revision of a plan shall carry a date and brief description of the revisions. Diagrams shall carry a date and brief description of the revisions. Diagrams shall carry a uniform and coordinated set of wire numbers and terminal block numbers in compliance with panel work wiring. Additionally, one set of electronic .DWG files shall be provided to the Owner.

Elementary Diagrams

The Contractor shall provide elementary diagrams for all discrete loops. Loop diagrams shall be prepared in compliance with ISA S5.4 and shall be provided for all analog loops. Elementary diagrams and loop diagrams shall show circuits and devices of a system. These diagrams shall be arranged to emphasize device elements and their functions as an aid to understanding the operation of a system and maintaining or troubleshooting that system. Elementary and loop diagrams shall also show wire numbers, wire color codes, signal polarities, and terminal block numbers.

Panel Fabrication and Arrangements Plans

The Contractor shall provide arrangement plans of all panel front- and internal-mounted instruments, switches, devices, and equipment indicated. All panel mounting details shall be shown. Outer dimensions of all panels shall be included on the plan. Deviations from approved arrangements require approval prior to installation.

Arrangement plans shall be drawn to scale using standard Architectural or Engineering scales.

Site Conditions

Specified instrumentation and control equipment shall be modified, if necessary, to make it suitable for operation in the ambient conditions specified in Division 16. All equipment and devices shall be protected from environmental hazards including moisture, humidity, temperature exposure, and dust ingress prior to being installed and placed into service. All equipment damaged or otherwise reduced from factory new condition prior to being placed into service shall be replaced with a brand-new unit prior to completion of the installation.

Warranty

In addition to any other warranties required by the specifications, the entire PLC system will be warranted against defects in materials, workmanship, and software functions for a period of one (1) calendar year following the successful completion of the Functional Acceptance Test (FAT). The Contractor or designated service organization will be available on 24-hour notice to correct any system problems without charge to the Owner during the warranty period. In addition, the Contractor will provide four 2-day site visits during the warranty period

to perform inspection and calibration of the equipment or other work at the request of the Owner.

Extra Materials

The Contractor shall supply sufficient spare parts, components, and assemblies to replace *any* defective or malfunctioning control component provided in this system. Control components are considered any device or combination of devices without which normal automatic control as outlined in this specification cannot be accomplished, and includes:

1. Two (2) spares of each part, component, or assembly, if more than ten (10) of those components are normally in use in the system.
2. One (1) box of each fuse type provided on this project. If ten (10) or more of a fuse type is provided for the project, then two (2) spare boxes shall be provided.
3. One (1) spare circuit breaker of each rating type provided on this project.
4. One (1) spare relay of each rating type provided on this project.
5. One (1) spare of each type of DC power supply and UPS module.
6. One (1) spare of each type of PLC module and processor.
7. One (1) spare radio.
8. One (1) spare lamp per color is used on the equipment panels in the project.

Spare part components shall be packaged for at ease of field installation by non-trained personnel, so that no soldering or special skills are required for installation. All spare parts shall be delivered in a hinged plastic box that is purposefully made for this contract. The box shall have a parts list permanently attached to the inside lid which lists all parts and refers to them by numbered code visible on the outside of the package. Fragile components shall be adequately protected with cut foam. Electronic components shall be wrapped in ultra-violet inhibiting file. The exterior of the box shall be labeled "Telemetry Spare Parts – Water Department." Provide the box with lifting handles.

Part 2 – Products

Components

These Specifications list major instruments required to provide the process instrumentation system. All instrument functions specified on this list shall be provided by the Control System Integrator. Any additional instruments required to complete the instrument loops because of certain characteristics of the equipment selected by the Control System Integrator shall be provided. Such additional instruments shall be provided and included in the original contract price even though not specified in the instrument index or on the Plans.

The following systems utilize automatic control:

- Pump controls
- Valve controls
- Engine generator set controls

- Chemical treatment controls
- Exhaust Fan controls
- Ventilator controls
- Heater controls

Accessories

Provide all accessories required to furnish a complete control system that meets the requirements of the Plans and Specifications.

Source Quality Control

Material shall be new, free from defects, and of the quality specified. All equipment and materials utilized in the system shall be the products of Manufacturers with at least five (5) years of experience in the manufacture of similar equipment. Similar items in the system shall be the products of the same Manufacturer. All equipment shall be of industrial grade and of standard construction, shall be capable of long, reliable, trouble-free service, and shall be specifically intended for control and monitoring of operation of motor-driven pumps and equipment. All equipment shall be of modular design to facilitate interchangeability of parts and to assure ease of service.

Part 3 - Execution

Installers

Installation shall be performed by the workers who are skilled and experienced in the installation of I&C and Telemetry systems.

Installation

Installation and testing procedures shall be as specified in these and subsequent sections of this division.

The control system shall be installed in accordance with the installation plans and instructions prepared by the Control System Integrator.

Installation shall include all elements and components of control system and all conduit and interconnecting wiring between all elements, components, sensors, and valve operators.

Equipment shall be located so that it is readily accessible for operation and maintenance.

Field Equipment

Equipment shall be provided as specified on the Plans such that ports and adjustments are accessible for in-place testing and calibration. Where possible, equipment shall be located between 48 inches and 60 inches, unless specified otherwise on the Plans, above the floor or a permanent work platform. Instrumentation equipment shall be mounted for unobstructed access, but mounting shall not obstruct walkways. Equipment shall be mounted where shock or vibration will not impair its operation. Support systems shall not be attached to handrails, process piping or mechanical equipment except for measuring elements and valve positioners. Instruments and cabinets supported directly by concrete or concrete block walls shall be spaced out not less than $\frac{5}{8}$ -inch by framing channel between instrument and wall.

Steel used for support of equipment shall be hot-dip galvanized after fabrication. Support systems including panels shall be designed in accordance with the Seismic Restraint and Anchorage section of Division 1.81 of these specifications and to prevent deformation greater than 1/8-inch under the attached equipment load and an external load of 200 pounds in any direction.

Electrical Power Connection

Electric power wiring and equipment shall be following Division 16. Power disconnect switches shall be provided within sight of equipment and shall be labeled to indicate opened and closed positions and specific equipment served. "Within sight of" is defined as having a clear unobstructed view from the equipment served and within 50 feet of the equipment served. Disconnect switches shall be mounted between 36 inches and 72 inches above the floor or permanent work platform. Where equipment location is such that the above requirements cannot be met by a single disconnect switch, two switches, one at the equipment and one at the work platform, shall be provided.

Signal Connection

Electrical signal connections to equipment shall be made on terminal blocks or by locking plug and receptacle assemblies. Jacketed flexible conduit shall be used between equipment and rigid raceway systems except that flexible cable assemblies may be used where plug and receptacle assemblies are provided and the installation is not subject to mechanical damage in normal use. The length of flexible conduit or cord assemblies shall not exceed 2 feet. Flexible cable, receptacle and plug assemblies shall be used only where specified.

17.06 Control System Integrator

[CSI 40 61 13]

Part 1 - General

Division of Responsibility

All instrumentation and industrial electronic systems shall be provided under the supervision of a single Control System Integrator, chosen by the Contractor, which is regularly engaged in the design and installation of such systems of similar scope and complexity. The Control Systems Integrator shall be one and the same as the Contractor as a Subcontractor. The assignment of specific responsibilities herein to the Control System Integrator shall not, in any way and under any conditions, diminish the Contractor's full and complete responsibility for all work performed and all materials installed under the contract. The contract between the Contractor and the Control System Integrator shall specifically require that the Control System Integrator conform to and meet all requirements specified in the contract documents.

The assignment of a Control System Integrator that is an equipment supplier shall not be acceptable.

Control System Integrator's Responsibility

The Control System Integrator shall be solely and completely responsible for the final design and assembly of the entire control system. Responsibilities include:

- Provision of, and the detailed design of, custom control panels and the motor control center. The plans show general layout of the control panels. The Integrator shall provide detailed scaled design of all components on and in the control panels and determine specific requirements.
- The design of all interconnecting wiring of control equipment including remote control panels, packaged equipment panels, mechanical equipment with control components, etc.
- Testing of the control panels in the Control System Integrator's shop.
- Coordinate with the Contractor for specific requirements and locations of raceway penetrations and field wiring in control panels.
- The Control System Integrator shall supply the Contractor with all necessary detailed installation plans and/or written instruction for installation of all control components and sensing devices for proper system operation.
- Coordinate with the Control System Programmer who has been selected by the Owner and are under separate contract with the Owner, to allow in-shop testing of the programming of all control devices and to execute the functions listed in the control strategies.
- Develop an assembly and testing schedule, with the Control System Programmer to allow for testing of all new programs in the Control System Integrator's shop.
- Provide installation assistance.

General and Electrical Contractor's Responsibilities

The General and Electrical Contractor shall be responsible for the following equipment and services:

- Review of the Control System Integrator's submittals and wiring diagrams for coordination with space requirements, raceway requirements of field wiring, etc.
- Supply the Integrator with submittals of equipment related to the control system that the Integrator must include in their submittals and integrate. Such as motors, packaged control panels that the Integrator does not build, etc.
- Installation of the control panels provided by the Control System Integrator.
- Installation of the interconnecting wiring in accordance with these documents and the Control System Integrators wiring diagrams.
- Installation of I&C and Telemetry System components in accordance with these documents and plans or instructions of the Control System Integrator.

Part 3 – Execution

Installers

The Control System shall be designed, constructed, programmed and commissioned by full time employees with a minimum of 5 years of experience (minimum of 1 year with Integrator).

Integrators List

The Control System Integrator shall be selected by the Contractor from the following acceptable companies (Alphabetical Listing):

- Industrial Systems, Inc. – Portland, Oregon
- L2 Systems LLC – Everett, Washington
- Olsson Industrial Electric – Springfield, Oregon
- Pacific Electrical Contractors (ORPAC) – Medford, Oregon
- Quality Control Corporation (QCC) – Lynnwood, Washington
- S&B Inc. (Stead & Associates) – Bellevue, Washington
- Systems Interface Inc. – Bothell, Washington
- Taurus Power and Controls, Inc. – Kent, Washington
- Technical Systems, Inc. – Lynnwood, Washington
- The Automation Group (TAG) – Eugene, Oregon

Alternative Integrators

Alternate Control System Integrators not listed above shall be considered for acceptability by the Owner based on following qualifications:

1. The Control System Integrator shall be an instrument and control system manufacturing company.
2. The Control System Integrator's manufacturing and assembly facility shall be located within a 300-mile drive from Water Station 1, E Reserve Street and NE Plain Boulevard in Vancouver.
3. The Control System Integrator shall be specialized in the design, assembly, testing, installation and service of municipal water and wastewater control and communication systems in the Pacific Northwest for at least five years.
4. The Control System Integrator shall employ technicians and engineers with documented experience in the design, assembly, testing, installation, operation, calibration, trouble-shooting, service and repair of control, and communication systems for municipal water and wastewater utilities.
5. The Control System Integrator shall have completed the design, assembly, testing and installation of control systems that include the instruments and devices cited on the Plans by specific manufacturer's name.

An alternate Control System Integrator selected by the Contractor shall be subject to the approval by the Owner. Prior to placement of purchase orders for services and equipment, the Contractor shall provide the following information about the selected alternate Control System Integrator for review by the Owner:

1. Description of ownership and organization of Integrator.

2. Resumes of principals and/or key employees who will be working directly in the engineering, assembly, testing and commissioning of the system for this project.
3. Description of expertise in design, assembly, testing and installation of control systems for municipal utility facilities.
4. Description of municipal control systems designed, assembled and installed in the last 5 years. Description shall include:
 - Names of employees involved in each system.
 - Detailed description and plans of each system.
 - Cost of each system.
 - Names and telephone numbers of persons involved in operation and maintenance of each system.
 - Description of the service capabilities normally provided by the company including resumes of employees assigned to field service and listing of service equipment.
 - Additional information that may assist the Owner in ascertaining the company's general ability to perform the work. The acceptability of the Integrator will be determined solely by the Owner.

Approval of Personnel and Alternatives

The Contractor and the selected Control System Integrator shall anticipate that the Owner may withhold approval of the selected Integrator or employee if, in the opinion of the Owner, the Control System Integrator or employee does not have the experience, capability or an acceptable performance and execution record of similar projects in the past.

Neither the Contractor or Control System Integrator or employee not approved by the Owner, shall be entitled to an extension of time or to any claim for damages because of extra and unanticipated costs, hindrances, delays or complications caused by or resulting from the Owner not approving any Control System Integrator or employee for whatever reason.

17.07 Control System Programmer (Control System Programmer Contracted Directly by Owner)

[CSI 40 68 66]

Part 1 - General

Division of Responsibility

The Control System Programmer shall be selected and Contracted for the control system programming by the Owner. The Control System Programmer Contracted by the Owner is RH2 Engineering, Inc., who may be contacted at (425) 951-5386. It is the responsibility of the Control System Programmer to provide PLC programming that will accomplish control of the proposed and modified systems as described in the Specifications and Plans.

Control System Programmer's Responsibility:

The Control System Programmer Responsibilities include:

- Develop a testing schedule to allow for testing of all new telemetry panel programs.
- Notify the Control System Integrator of all components needed to test equipment panels.
- Software testing of the control panels in the Control System Integrator's shop.
- Programming of the PLC, operator interface, and HMI Computer System.
- Provide required software startup, troubleshooting, and commissioning services needed to complete implementation of programs.

17.08 System Description

[CSI 40 61 96]

Part 1 – General

Summary

The I&C and Telemetry system functions required are specified on the Plans and in subsequent sections of this Division.

Design and Performance Requirements

The system shall be designed to provide the control capabilities and functions indicated and implied by the Plans and these Specifications and to provide trouble-free operation with minimum maintenance. The system shall readily enable manual operation of any and all functions in the event of failure of any one component.

The control system shall be designed and assembled by the Control System Integrator to provide:

- Control of motor driven pumps, equipment, and processes.
- Monitoring of operation of motor driven pumps, equipment, and processes.
- Indication of operating status of motor driven pumps, equipment, and processes.
- Monitoring and indication of pressures, temperatures, levels, and flows, as indicated and implied by the Plans and Specifications.
- The capabilities indicated and implied by the Plans and Specifications.

The I&C and Telemetry System shall be designed and assembled by the Control System Integrator to be an integrated system composed completely of components which are specifically designed and used for and in conjunction with control and operation of motor-driven pumps and process control equipment. The Control System Integrator shall supply all interfacing equipment, appurtenances and accessories and all such devices that may be required for proper interfacing as part of the control system.

Project Conditions

The control system for the Water Station 1 Wet Well Nos. 3B and 5B Facilities shall be a Remote Telemetry Unit (RTU) based system that consists of existing and new RTUs linked to the existing Master Telemetry Unit (MTU) via Profibus communications. The MTU is located at the Well House 03B and Well House 05B with a computer based Human Machine Interface (HMI).

RTU sites included in this project are:

1. W03B-CP001
2. W05B-CP001

Part 2 – Products

Manufacturers

The telemetry components of the RTU shall be furnished by The Owner, and provided for contractor installation and integration on site.

Components

The I&C and Telemetry System shall include the instruments, control devices, Remote Telemetry Unit, Human Machine Interface, input and output devices, sensors, interfacing devices, cabinets, enclosures and other components indicated and implied by the Plans and Specifications.

The following is a list of the RTUs, Control Panels, Pressure and Level Assemblies, and Motor Control Centers to be provided by the Control System Integrator:

- Telemetry Panels
- Pump Control Panel
- Pump Station Discharge Pressure Assembly

Part 3 – Execution

Preparation

The Control System Integrator shall be responsible for the coordination and integration of control system with the motor control and other related equipment. The Control System Integrator shall communicate directly with the Manufacturer(s) and Supplier(s) of all related equipment to determine all details of the equipment, which may influence or affect the control system. The Control System Integrator shall determine all requirements for and shall cause integration of the control system into a unified operating system. The Control System Integrator shall define all requirements for all interfacing equipment and shall supply all appurtenances, accessories and all such devices, which may be required for proper interfacing as part of the control system.

The Control System Integrator shall be responsible for obtaining submittal information on equipment supplied by other disciplines and to integrate them into the control system to form a complete working package as outlined by the contract documents.

Installation

The system shall be completely assembled in the shop by the Control System Integrator. All components and equipment shall be pre-wired to the maximum extent possible. This includes all devices and functions not marked as “future” on The Contract Drawings and Diagrams.

All Process Control shall be done within the control panels unless specifically listed on the Plans as other.

Functional Descriptions

These functional descriptions describe the control strategy for each loop in the facilities. These descriptions are intended to be an extension of the Plans that are provided as part of the design contract documents.

Well Level Transmitter:

Shall list the level from bottom of the well depth to a top of the well. The top of the well will be considered the zero (0) point for process measurement purposes. A value of 4mA on the loop will correspond to a bottom of the well or a maximum depth. While a value of 20mA will correspond to the top of the well depth on the loop signal from the measurement element. A value of 0mA will correspond to an error signal, or an invalid signal that serves as an error or fault of measurement.

Flow Meters:

Shall measure the range for flow from the maximum expected to a minimum expected rate of flow through the process piping. A value of 4 mA will correspond to a minimum value expected. A value of 20 mA will correspond to the maximum value expected by the process piping. Any value of 0 mA will correspond to an invalid value that is outside of the expected measurement range and be used to signal a need to service the meter.

Pressure Transmitter:

Shall measure the pressure within the process pipe. A maximum value of pressure permitted by the process piping will correspond to a value of 20 mA signal from the pressure transmitter. A minimum value of 4 mA signal from the pressure transmitter will correspond to no pressure difference between outside ambient conditions. A value of 0 mA will signal an error value, or no value read and be used to signal that maintenance and inspection of the transmitter is required.

Room Temperature Transmitter:

Shall measure the ambience room temperature in the pump control building. A maximum temperature of 120 deg F shall correspond to 20 mA output by the transmitter. A minimum temperature of 0 deg F shall correspond to 4 mA output by the transmitter. A value of 0 mA read by the transmitter will be used to indicated an error state by the transmitter to the operator, and a will be used to signal that maintenance and inspection of the transmitter is required.

17.10 PANELS

[CSI 40 67 00]

17.12 Equipment Panels

[CSI 40 67 16, 40 67 19]

Part 1 – General

Related Sections

Division 10.14.23 Panel Signage. All panels shall be labeled.

References

Panels shall meet the requirements of UL-508 for water systems and UL-913 for sewer systems. All panels shall bear the appropriate label. The provider of the panels shall be a UL-508A certified facility. All field modifications shall be in conformance with UL-508 or UL-913.

Design Requirements

Control equipment panels shall be enclosed to the requirements of the National Electrical Manufacturers Association (NEMA) and shall be NEMA 12 for indoor use and NEMA 4X for outdoor use. NEMA 3R may be considered by must be approved by The Engineer prior to procurement of the equipment.

Part 2 – Products

Components

- Enclosure shall be constructed of steel.
- Minimal metal thickness shall be 14-gauge.
- All doors shall be rubber-gasketed with continuous hinge and key locking latch mechanism.
- Wherever practical, enclosures shall be a manufactured item.
- All doors shall be provided with quick-release latches to secure cover.
- Panels shall be sized to adequately dissipate heat generated by equipment mounted in or on the panel.
- Enclosures shall include a back pan.
- Enclosure shall be finished in ANSI 61 gray polyester powder coating inside and out over phosphatized surfaces.
- The enclosure shall be oversized to accommodate future racks and auxiliary devices as required.
- All outdoor enclosures shall be provided with a control panel heater and ventilation fan and filter with built-in thermostat to provide adequate climate control.

Fabrication

Panels should be completely fabricated, and instruments installed and wired in the manufacturer's factory (where possible). All wiring shall be completed and tested prior to shipment. All external connections shall be by way of numbered terminal blocks. Panel cutouts for instruments and devices shall be cut, punched or drilled and smoothly finished with rounded edges.

17.20 PANEL COMPONENTS

[CSI 40 78 00]

Part 1 - General

Design Requirements

All components shall be suitable for installation inside the I&C and Telemetry system panel enclosure.

17.20.3 Terminal Blocks

[CSI 40 78 71]

Part 1 - General

Design Requirements

Terminal blocks shall be one-piece molded plastic blocks with screw-type terminals and barriers rated for 600 volts. Terminals shall be double-sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, and be clearly visible with the protective cover removed.

Fusible terminal blocks shall be provided with a LED blown fuse indicator for each terminal.

Part 3 - Execution

Installation

All wires between panel-mounted equipment and other equipment shall be terminated at terminal blocks. Switches shall be terminated at the terminal blocks with crimp-type, pre-insulated, ring-tongue lugs. Lugs shall be of the appropriate size for their terminal block screws and for the number and size of the wires terminated.

17.21 Power Supply and Protection

17.21.2 Normal Power Supply

[CSI 40 78 59]

Part 1 - General

Design Requirements

All equipment panels shall be provided with 120-volt, 60-Hz power. Make provisions for conduit entry and provide a terminal block for termination of the circuit wires. All electronic

control panel components shall require a 120 VAC-24 VDC power supply. DC power supply shall be sized to provide at least 50 percent more current than the peak current demands of the control panel. DC power supply shall have UPS backup power capabilities as identified in Section 17.21.3. Protection equipment shall consist of circuit breakers and fuses to protect electrical circuits from short circuits and overloads.

Part 2 – Products

Manufacturers

DC power supplies shall be Puls Inc., Sola Inc., Allen-Bradley, or approved equal.

Fuses shall be Bussmann Manufacturing Model ABC or MDA rated for Branch circuit or approved equal. Fuses provided shall match the fuses installed on the owner's existing telemetry system.

Circuit Breakers shall be Allen-Bradley rated for Branch circuit or approved equal. Circuit breakers provided shall match the circuit breakers installed on the owner's existing telemetry system.

Part 3 – Execution

Construction

Branch circuits shall be individually fused with an indication of fuse opening. All fuse holders for the panel shall be grouped on a single sub-panel. They shall be so situated that when the panel door is opened there is a clear view of the indicators and clear access for replacement of the fuses.

Provide DC power supplies as required to power instruments requiring external DC power of the appropriate voltages, with sufficient voltage regulation and ripple control to assure that the instruments being supplied can operate within their required tolerances. The power supplies at all RTUs shall include batteries for a backup power supply and charging equipment.

17.21.3 Backup Power Supply

[CSI 40 67 63]

Part 1 - General

Design Requirements

All equipment panels shall have an Uninterruptable DC Power Module that interfaces with the Normal DC Power Supply. The Uninterruptable DC Power Module shall be capable of powering the control panel equipment for a period of not less than 24 hours after normal power failure. Transfer shall be a non-mechanical, non-interruptible, smooth transfer to battery backup. Power Transition shall be a maximum of 5 milli-seconds of transfer time.

Remote equipment batteries shall be Gel Cell batteries of sufficient ampere hour capacity for at least 24 hours of battery backup power supply.

Performance Requirements

The master console shall display power failure, and also a low battery condition alarm for the new equipment. A power failure alarm shall occur in the format currently used by the system. A low battery condition alarm shall cause the alarm indicator to flash but will not sound the audible alarm. The indicating light shall go off when the alarm condition is clear.

Part 3 – Execution

Installation

Batteries, battery chargers, and necessary wiring shall be installed to meet the above specifications.

17.21.4 RTU Uninterruptible Power Supply

[CSI 40 67 64]

Part 1 - General

Design Requirements

The RTU power supply shall be connected to a UPS unit for power protection in the event of a utility power failure. The UPS shall be a smart on-line UPS.

The UPS VA rating shall be a minimum of 1,000 VA, or double the nominal operating VA of the equipment for which it serves.

Part 2 - Products

Manufacturers

The UPS shall be an APC Smart On-Line series, Minuteman CPE series, Tripp-Lite SmartOnline series, or equal.

17.21.5 Line Protection Units – Low Current

[CSI 40 78 56.15]

Part 1 - General

Design Requirements

The line protection unit shall isolate and protect the I&C electronics from current and voltage surges in the transmission lines. Each protection unit shall have:

- An isolation transformer with a minimum of 1,500 volts AC isolation, primary to secondary, and a minimum saturation current of 100 milliamps (ma) S.C. or as required to protect the I&C equipment from damage.
- Separate line-side and equipment-side terminal blocks.
- Two clip-mounted, replaceable gas discharge tubes rated at 90 volts striking voltage and 5,000 ampere peak pulse current capacity and suitable ground strap.

Part 2 - Products

Manufactured Units

The line protection unit shall be a complete unit, mounted on a separate chassis, and be field replaceable without soldering. The chassis shall be a 1/4-inch thick plate.

17.21.6 Line Protection Units – High Current

[CSI 40 78 56.17]

Part 1 - General

Design Requirements

The line protection unit shall isolate and protect the I&C electronics from current and voltage surges in the transmission lines. Each protection unit shall have:

- A minimum continuous operating current rating of 30 amps or larger as required to protect the telemetry equipment from damage.
- A minimum peak surge current rating of 80 KA.
- Separate line-side and equipment-side terminal blocks.
- LED indicator for circuit diagnostics.
- A response time less than or equal to 1 nanosecond.

The line protection unit shall be a complete unit available as a surface mount or DIN rail.

Part 2 - Products

Manufacturers

The line protector shall be an Allen-Bradley Model 4983-DC120-20 or equal.

17.21.7 Voltage Transducer

[CSI 40 78 13.21]

Part 2 - Products

Manufacturers

The voltage transducer shall be a CR Magnetics, Model No. CR5320.50, or equal.

Materials

The voltage transducer shall measure a DC input voltage on a scale of 0-50 Volts and shall have a 4-20 mA output.

17.22 Wire and Cable

[CSI 40 67 33]

17.22.2 Wiring

[CSI 40 67 33]

Part 1 - General

References

All electrical wiring shall be in accordance with the NEC.

Design Requirements

Wires shall be 600-volt class, PVC insulated, stranded copper and shall be the sizes required for the current to be carried but not less than No. 14 AWG conductor size.

Wires for signal circuits shall be twisted shielded pairs not smaller than No. 18 AWG.

Part 3 – Execution

Installation

All power wiring shall be supported on a sheet metal raceway or enclosed in a plastic wiring duct. Wiring for signal circuits shall be separated at least 6-inch from any power wiring.

17.22.3 Cables

[CSI 40 67 33]

Part 1 - General

Design Requirements

Cables and connectors shall be industry standard, shielded, and shall be provided to connect all peripherals and equipment.

17.24 Switches and Relays

[CSI 40 78 19, 40 78 53]

17.24.2 Selector Switch

[CSI 40 78 19.21]

Part 2 – Products

Manufacturers

Heavy-Duty, Oil-Tight Type: Eaton/Cutler-Hammer, Type 12350T; Square D Co., Type K; Allen Bradley, Type 800T; General Electric Co., Type CR 104P.

Heavy-Duty, Watertight, and Corrosion-Resistant Type: Eaton/Cutler-Hammer, Type E34; Square D Co., Type SK; Allen Bradley, Type 800H; General Electric Co., Type CR 104P.

Manufactured Units

Selector switches shall be NEMA type 4/4X/13, corrosion-resistant/watertight/oil-tight, type selector switches with contacts rated for 10 amperes continuous at proper operating voltage.

Operators shall be black knob type. Units shall have the number of positions and contact arrangements and spring return function (if any) as shown on Plans. Units shall be single-hole mounting, accommodating panel thicknesses from $\frac{1}{16}$ -inch minimums to $\frac{1}{4}$ -inch maximum.

17.24.3 Pushbuttons

[CSI 40 78 19.23]

Part 2 – Products

Manufacturers

Heavy-Duty, Oil-Tight Type: Eaton/Cutler-Hammer, Type 12350T; Square D Co., Type K; Allen Bradley, Type 800T; General Electric Co., Type CR 104P.

Heavy-Duty, Watertight, and Corrosion-Resistant Type: Eaton/Cutler-Hammer, Type E34; Square D Co., Type SK; Allen Bradley, Type 800H; General Electric Co., Type CR 104P.

Manufactured Units

Pushbuttons shall be NEMA type 4/4X/13, corrosion-resistant/watertight/oil-tight, type push buttons with momentary contacts rated for 10-ampere continuous at proper operating voltage. Button color shall be as specified in control panels and shall have a full guard. Pushbutton contact arrangements shall be as shown on Plans. Size of pushbuttons as indicated on the Plans.

Special Functions

Pushbutton for “Emergency Help” applications shall have maintained contacts and red mushroom head operators.

17.24.4 Panel Relays

[CSI 40 78 53]

Part 1 – General

Design Criteria

Relays shall be provided as necessary to perform switching functions required of control panels and other control circuits as shown on the Plans and described in the technical specifications. Appropriate relay type and associated contacts shall be selected based on the application from the control wiring diagrams or the functional description. Where timing relays and control relays require additional contacts, provide auxiliary control relays properly sized for the application.

All contacts and relays shall be NEMA rated and UL recognized.

The electrical life expectancy for the relay shall be over 500,000 operations at 120V AC, 10 amps; (over 200,000 operations at 120V AC, 10 amp for SPDT, 3PDT, and 4PDT). The mechanical life expectancy for the relay shall be over 50,000,000 operations.

Part 2 – Products

Manufacturers

Control Relays

Square D Class 8501, Type K or R; Allen Bradley 700 Type HA or HB; IDEC RH Series; or equal.

Time Delay and Timing Relays

Allen Bradley 700 Type HR; IDEC GE1, RTE or GT3 Series; or equal.

Manufactured Units

Control Relays

Relays for general purpose use shall be DPDT or 3PDT, 10-amp contacts with the appropriate coil voltage for the application. Relays shall be plug-in type with matching socket. All relays have LED indicators to signal when the coil is energized. Relay coils shall be rated for continuous duty.

Time Delay Relays

Time delay relays shall be multi-function, multi-range with plug-in base, pin style terminations timing and timed out LED indicators, and calibrated scales. Relays shall have minimum 0.5 seconds to 60 minutes, 8 selectable timing ranges, 5 amp contacts. Select coil voltage for the application. Units shall be sealed to prevent entry of contamination in the form of dust, dirt, or moisture.

Appropriate relay shall be selected based on application from the control wiring diagrams.

Minimum accuracy (plus or minus) shall be as follows:

1. Repeat accuracy – ½ percent.
2. Timing change over full voltage range – ½ percent change over full temperature range.
3. Scale tolerance – 5-percent.

Timing Relays

Timing relays shall be machine tool industrial relay with solid-state timer and external adjustment dial. Range shall be 0 to 120 seconds unless indicated otherwise on the Plans. Relay shall include an LED indicator and instantaneous and time-delay contacts rated at 10 amps, meeting NEMA A600 designation. Timing relays shall be “on delay” or “off delay” as indicated on the Plans. Units shall be sealed to prevent entry of contamination in the form of dust, dirt, or moisture.

Appropriate relay shall be selected based on application from the control wiring diagrams.

Minimum accuracy (plus or minus) shall be as follows:

1. Repeat accuracy – ½ percent.
2. Timing change over full voltage range – ½ percent change over full temperature range.

3. Scale tolerance – 5 percent.

Part 3 – Execution

Installation

Provide adjustable time relays on all alarm and shut down circuits to prevent nuisance tripping of other alarm points. Time delay relays for these functions may not be shown on the Plans; however, provide as required on all circuits.

Provide additional form C contacts over and above the number indicated on the Plans for all relays provided.

120 VAC relays shall not be interchangeable with other voltages to prevent a hazardous interchange of relay voltages.

Provide DIN mounted or panel mounted type depending on application.

17.25 Indicating Lights and Readouts

[CSI 40 78 13, 40 78 16]

17.25.2 Pilot Lights

[CSI 40 78 16.21]

Part 2 – Products

Manufacturers

Heavy-Duty, Oil-Tight Type: Eaton/Cutler-Hammer, Type 12350T; Square D Co., Type K; Allen Bradley, Type 800T; General Electric Co., Type CR 104P.

Heavy-Duty, Watertight, and Corrosion-Resistant Type: Eaton/Cutler-Hammer, Type E34; Square D Co., Type SK; Allen Bradley, Type 800H; General Electric Co., Type CR 104P.

Manufactured Units

Indicating lights shall be NEMA type 4/4X/13, corrosion resistant, water-tight, oil-tight, full voltage, push-to-test, high visibility 28 chips LED type. Pilot lights shall be rated for the proper operating voltage. Appropriate lens caps shall be provided as shown on Plans.

17.25.5 Run Time Meters

[CSI 40 78 13.22]

Part 2 – Products

Manufacturers

HECON GO series, or equal.

Manufactured Units

Hour meter (elapsed time meters) shall be 2-inch by 1-inch nominal size, rectangular case type for flush panel mounting. The meter face shall be of the style that most closely resembles the panel indicating instruments if provided and shall have black trim with white or aluminized

face. The meters shall have a 6-digit non-resettable register with the last digit indicating tenths of an hour.

17.25.6 Operational Counters

[CSI 40 78 13.23]

Part 2 – Products

Manufacturers

HECON GO series, Redington Model 3400-2010, or equal.

Manufactured Units

Operational counters shall be 2-inch by 1-inch nominal size, rectangular case type for flush panel mounting. The meter face shall be of the style that most closely resembles the panel indicating instruments if provided and shall have black trim with white or aluminized face. The meters shall have a 6-digit resettable register.

17.50 SENSORS AND CONTROLS

[CSI 40 70 00]

17.50.1 Common Work for Sensors and Controls

[CSI 40 70 05]

Part 1 – General

Design Requirements

Provide sensors and controls scaled and rated for their intended application.

Part 3 – Execution

Installation

All devices shall be installed to be field serviceable without taking the facility out of service. Readouts shall be positioned to be easily read from a standing position, central to the room unless allowed otherwise by the Engineer.

17.51 Emergency Sensors and Controls

17.51.2 Smoke Detectors

[CSI 28 46 11]

Part 1 - General

Design Requirements

Provide all components suitable for installation in the environment where installed. Detector shall be provided complete with sensing head and mounting base.

The photoelectric smoke detector shall be 24-volt powered with a local audible alarm and Form C contacts for remote annunciation through two-wire connection to telemetry panel. The voltage requirement is dependent of the power source available at the telemetry panel. The detector shall detect both smoke particles and heat. The detectors shall have a latching alarm feature that resets only by a momentary power interruption.

Part 2 – Products

Manufacturers

The smoke detector shall be a System Sensor 4WTAR-B, or equal.

Part 3 – Execution

Examination

The Contractor shall verify power supply before selecting the appropriate model.

Site Testing

Test each smoke detector with artificial smoke in a can per manufacturer's instructions. Test the thermal sensing units with a heat gun or blow dryer per manufacturer's instructions.

Other testing methods will only be acceptable if approved by the manufacturer. Each failed smoke detector shall be replaced.

17.51.3 Intrusion Alarm Switch

[CSI 28 31 11.23]

Part 1 – General

Design Requirements

The switch shall be two-pole side plunger type switch with one normally open and one normally closed set of contacts. The switch shall be a Type C and NEMA rated.

Part 2 – Products

Manufacturers

Intrusion switches shall be as specified on the Plans, or equal.

Components

Provide with a standard plug-in box and connecting cable of significant length to reach a junction box located near the switch.

Part 3 – Execution

Installation

The Contractor shall install intrusion alarm switches on all entrance doors and access hatches as shown on the Plans. All components shall be suitable for installation in the environment where installed.

Mount the switch as shown on the Plans to detect the opening of each entrance door and access hatch identified on the Plans. Connect to normally open contacts so that the switch is closed when the door is closed and open when the door is open. A factory provided cord shall be of significant length to reach from the device to a junction box.

17.51.4 Operator in Trouble (Panic) Alarm Button

[CSI 40 78 19.25]

Part 2 - Products

Manufacturers

Allen-Bradley, Eaton, Siemens, Square-D, or equal.

Materials

The pushbutton shall be heavy duty, oil-tight, push-pull mushroom type with contacts rated for 10 amps continuous at 24 VDC. Button color shall be red. Each pushbutton shall be furnished with a permanently mounted “Operator in Trouble – Push to Alarm” sign above the button. A junction box shall be provided for mounting.

Part 3 – Execution

Installation

The contractor shall install operator in trouble alarm buttons as shown on the Plans. Unless otherwise noted, mount device is 48 inches above the floor. The alarm button when pushed shall transmit a signal into the telemetry for remote and local enunciation of an alarm condition. Each alarm button shall be wired in series to the input point at the telemetry panel.

17.52 Pressure and Level Sensors and Controls

[CSI 40 72 00, 40 73 00]

17.52.1 Clean Water Level Float Switches

[CSI 40 72 76.15]

Part 2 – Products

Manufacturers

The float switch shall be an NSF Standard 61 rated Model SJE Milliamp Master Float as manufactured by SJE Rhombus, or equal.

Manufactured Units

Float switch body shall be constructed of high impact, corrosion resistant, polypropylene housing measuring not less than 2³/₄-inch in diameter. A long life, high reliability, potted SPST magnetic reed switch rated for not less than 100 VA at up to 250 Volts shall be mounted inside the float and connected to a multi-stranded, two (2) conductors plus ground, 18 gauge, CPE jacketed cable. The cord shall have fine strand conductors (Not more than 34 Gauge) made especially for heavy flexing service. The cable connection point shall be potted in epoxy providing a strong bond to the float and reed switch forming a water/moisture tight connection.

Part 3 – Execution

Installation

Level switches shall be normally closed type and provided for the following:

- Overflow level sensing

The Contractor shall provide a high-level backup float. A flexible Neoprene sleeve, not less than 1/8-inch thick, shall be provided over the CPE jacketed cable extending not less than 5 inches from the top of the mounting bracket extending down through the cable mounting bracket hinge point to the top of the float switch body, providing cable stress point relief and extended operational life.

17.52.3 Pressure Switches

[CSI 40 73 36]

Part 1 – General

Design Requirements

Provide pressure switches that are surface mount type with 1/4-inch or 1/2-inch NPT bottom fittings (or as shown on the plans if different) and completely suitable for operation when connected to potable water. All wetted parts shall be brass or stainless steel; no aluminum will be allowed. Provide unit with clear Lexan cover over trip settings that are screwdriver adjustable and displayed in psi. Housings shall be NEMA 4 rated with waterproof conduit connections.

Select switches to provide suitable over-pressure protection for specific pressure range involved at each location. Sensors shall be seamless brass or stainless steel. Setpoints shown are estimates and may require adjustment at startup.

Location	Scale Range	High Setpoint	Low Setpoint	Run Setpoint
Pump 03B Discharge Header	0-250 psi	150 psi	N/A	N/A
Pump 05B Discharge Header	0-250 psi	150 psi	N/A	N/A

Part 2 – Products

Manufacturers

United Electric 400 series, or equal.

Part 3 – Execution

Installation

Install switches as shown on the Plans. If not shown, securely install and mount in a location approved by the Owner.

17.52.4 Gauge Pressure Transmitter

[CSI 40 73 26]

Part 1 – General

Design Requirements

Provide transmitter with 1/4-inch or 1/2-inch process connections or as shown on the plans if different, and completely suitable for measuring pressure in potable water. Select ranges to provide a system that utilizes the largest percentage of available span for each transmitter. Transmitter shall transmit in pounds per square inch displayed at the device screen and through the 4-20mA output.

Location	Low end of range	High end of range (minimum)	High end of range (maximum)
Discharge pressure	0 psi	200 psi	400 psi

Part 2 – Products

Manufacturers

Pressure transmitter shall be Foxboro IGP10, Endress+Hauser Cerabar S PMP71, Siemens Sitrans P DS III, or equal.

Manufactured Units

Pressure transmitters shall be all solid state with a 4-20ma output. All wetted parts shall be stainless steel. Transmitter shall be hermetically sealed to withstand submergence or an operating environment of 100 percent humidity for an indefinite period of time. Total error band shall not exceed 0.25 percent of full scale over a temperature range of 0-100 degrees Celsius. Voltage input shall be 9 to 20 VDC without more than a 0.12 percent change in output. Volumetric displacement of bridge from 0 psi to max-rated pressure shall be less than

0.01 cubic inches. Provide electronics with built-in protection against AC line transients and lightning spikes, and an R/F filter to reject external electrical and internal noise. Zero and span adjustments shall be non-interacting.

A digital indicator with on-board pushbuttons shall be provided to display the measurement with a choice of units. The pushbuttons shall allow zero and span adjustments and local configuration without the need for a hand-held terminal.

Part 3 – Execution

Installation

Transmitter installations shall be equipped with drain and bleed and isolation valves to remove air from transmitter diaphragm. Contractor shall be completely responsible for proper operation and interface of transmitter with other electronics provided on the project.

17.52.5 Well Level Transducers

[CSI 40 72 43.23]

Part 1 – General

Design Requirements

The transduction principle shall be an integrated silicon strain gauge bridge with a two-wire 4-20 mA output signal. Voltage input shall be 9 to 30 VDC. The electronics shall have built-in protection against AC line transients and lightning spikes and an RFI filter to reject internal electrical and internal noise.

Transducer shall have a maximum OD of 0.39-inch and a maximum length of 10-inches. The transmitter shall be provided with enough submergence-proof cable to allow for an unspliced run from the transmitter mounting depth to the control electronics plus 10 percent. The submergence-proof cable shall be constructed of polyurethane sheathed cable with integral vent tube and Kevlar strain cord.

The transmitter shall have stainless steel or titanium housing and shall be drinking water approved (NSF 61).

Performance Requirements

The operating pressure range of the device shall be up to 900 feet with an overpressure acceptance of two times the rated pressure. Total error band shall not exceed 0.25 percent of full scale over a temperature range of 30 degrees to 86 degrees Fahrenheit. The accuracy shall be 0.1 percent of full scale for 1 psi to 900 psi range.

Part 2 – Products

Manufacturers

The submersible well level transmitter shall be an PMC MTM3000 or equal with cable hanger and either aneroid bellow or terminal box with filter. Terminal boxes shall be of the same manufacturer as the level transducer.

Part 3 – Execution

Installation

Insert transducers between well casing and pump column in sounding tube.

17.52.6 Flow Switch

[CSI 40 71 79]

Part 1 – General

Related Sections

- Division 1.82 Pressure Ratings

Performance Requirements

Flow switch shall indicate presence of flow in a domestic water pipeline at 80 psi pressure. Flow setpoint shall be adjustable down to 0.05 feet per second (fps). Switch shall have no moving parts. Response time shall be no more than 5 seconds after flow has initiated.

Submittals

Provide documentation showing pressure rating, flow sensitivity, electrical connections, process connections, and applicability to the fluid being measured.

Part 2 – Products

Manufacturers

Flow switch shall be Ameritrol FX Series, or approved equal.

Manufactured Units

Probe length shall be 0.75-inches or as recommended by the Manufacturer for this installation based on pipe diameter, wall thickness, and mounting hardware.

All parts in contact with fluid shall be stainless steel.

Part 3 – Execution

Installation/Construction

The switch shall be installed in a brass fitting in line with the incoming domestic water line. Unit should be inline and removable as an entire assembly.

Field Quality Control

Electrician shall verify operation of switch to the Engineer under flowing conditions. Owner will establish a flow during the test.

17.53 Environmental Sensors and Controls

17.53.1 Wall-Mounted Cooling Thermostat

[CSI 23 09 13.13]

Part 1 – General

Related Sections

- Division 11.95.34 Fans

Design Requirements

All components shall be suitable for installation in the environment where installed. The thermostat shall be a snap action, SPDT line voltage air switch controller rated for a 16-amp inductive load at 120 VAC.

Part 2 – Products

Manufacturer

The Wall-Mounted Cooling Thermostat shall be a Honeywell Model No. T775A2009 or equal with a 40 to 100-degree Fahrenheit range.

Part 3 – Execution

Installation

Furnish and install wall-mounted cooling thermostat as shown on the Plans. Mount thermostat 4 feet above finished floor in location shown on the Plans. Set thermostat at 75 degrees Fahrenheit.

17.53.2 Wall-Mounted Heating Thermostat

[CSI 23 09 13.13]

Part 1 – General

Related Sections

- Division 11.95.83.33 Radiant Space Heater

Design Requirements

Provide a 24 volt, SPST wall mounted heating thermostat. All components shall be suitable for installation in the environment where installed. Thermostat shall be as recommended by the space heater manufacturer. Thermostat shall have an adjustable range from 40 to 100 degrees Fahrenheit. Set thermostat at 60 degrees Fahrenheit unless specified otherwise on the plans.

Part 2 – Products

Manufacturer

The wall-mounted heating thermostat shall be a Honeywell TH6110D1005, or equal.

Part 3 – Execution

Installation

Furnish and install wall-mounted thermostat as shown on the Plans. Mount thermostat 4 feet above finished floor in location shown on the Plans.

17.53.3 Temperature Transmitter

[CSI 23 09 13.23]

Part 1 – General

Design Requirements

All components shall be suitable for installation in the environment where installed.

Part 2 – Products

Manufacturers

Dwyer, Model No. RHP-W, or equal.

Materials

The temperature transmitter shall measure room temperature and shall be a wall mounted 4-20 mA loop power device with 2 percent accuracy.

Part 2 – Products

Installation

Furnish and install temperature transmitter as shown on the Plans.

17.53.4 Atmosphere Monitoring

[CSI 23 09 13.23]

Part 1 – General

Design Requirements

All components shall be suitable for installation in the environment where installed.

Part 2 – Products

Manufacturers

RKI Instruments M2A-XL Standalone Transmitter or approved equal.

Materials

The atmospheric monitor shall be suitable for the environment in which it is installed and be corrosion proof. This element shall be suitable for a service life of at least 2 years before maintenance or replacement. Detectors shall be capable of detecting LEL and H2S gases and output detected gas concentrations via a 4-20 mA loop power device with 2 percent accuracy.

Part 2 – Products

Installation

Furnish and install atmospheric monitor as located on the plans and interconnect with the systems as shown on The Contract Drawings.

17.90 TESTING, STARTUP, AND TRAINING

17.90.1 Common Work for Testing, Startup, and Training

[CSI 40 61 21, 40 61 26, 40 80 00]

Part 1 – General

Summary

Total system hardware start-up is the responsibility of the Control System Integrator.

Maintenance

The Control System Integrator shall be solely and completely responsible for all hardware maintenance of the system from time of start-up to the date of acceptance, by formal action of the Owner, of all work under the contract. The Control System Integrator shall perform all such work required or considered to be required by the Owner to cause and maintain proper operation of the system and to properly maintain the system.

Warranty

The Contractor shall cause the Control System Integrator to make all repairs, replacements, modifications and adjustments required to eliminate all defects in design, materials and workmanship which are disclosed within the one-year guarantee period. The Control System Integrator shall begin all repairs, replacements, modifications and adjustments within twenty-four (24) hours of notification by telephone by the Owner and shall complete such repairs, replacements, modifications and adjustments within forty-eight (48) hours of notification. Should the Control System Integrator fail to begin the work within 24 hours or complete the work within 48 hours, the Owner may proceed to undertake or complete the work. In such event, the Contractor and his surety shall be liable for all costs incurred by the Owner.

Part 3 – Execution

Field Quality Control

Equipment Manufacturer's Support

1. The Control System Integrator shall pay for services of equipment manufacturer's field service representative(s) to:
 - a. Inspect equipment covered by these Specifications.
 - b. Supervise adjustments and installation checks.
 - c. Conduct start-up of equipment and perform operational checks.
 - d. Provide Owner with a written statement that manufacturer's equipment has been installed properly, started up and is ready for operation by Owner's personnel.

Repairs

The Control System Integrator shall correct all deficiencies and defects and make any and all repairs, replacements, modifications, and adjustments as malfunctions or failures occur.

The Contractor and the Control System Integrator shall anticipate that the Owner may delay acceptance of all work under the contract if, in the judgment of the Owner, malfunctions or failures in operation of the control system repeatedly occur after start-up. Both the Contractor and the Control System Integrator shall not be entitled to an extension of time or to any claim for damages because of hindrances, delays or complications caused by or resulting from delay by the Owner in accepting the work because of malfunctions or failures in operation of the control system.

17.91 Tests and Inspections

[CSI 40 61 21, 40 80 13]

Part 1 - General

Summary

Materials, equipment, and construction included under this specification shall be inspected in accordance with the specifications. Testing shall be performed by the Control System Integrator in accordance with Division 16, and this and subsequent sections of this division. Testing shall be required to determine if installed equipment and system(s) will operate in the manner in which they are intended to operate. The decision of the Owner upon the acceptability of the test procedures and conformance shall be final. The work will not be accepted until all testing has been satisfactorily performed.

Scheduling

The Contractor shall prepare factory and field test procedures to demonstrate conformance of the complete system to this specification. The Contractor shall submit the detailed test procedures within four weeks after the notice to proceed for the Engineer's review and approval.

The Contractor shall furnish all labor, materials, tools, equipment, instruments and services necessary to perform all specific functional testing of all installed equipment and systems at no additional cost.

The Control System Integrator and Contractor shall notify the Owner and Engineer (Control System Programmer) of the factory testing date 30 days before testing.

The Contractor and Control System Integrator shall include in the schedule 10 consecutive working days as part of the factory testing for the Control System Programmer to test the control system software with the hardware supplied by the Control System Integrator at the Control System Integrator's shop.

The Control System Integrator and Contractor shall submit to the Engineer (Control System Programmer) a detailed field-testing schedule identifying each day that both the Control System Integrator and Control System Programmer will need to be on site for field testing of equipment. A preliminary schedule shall be submitted to the Engineer for review 60 days before testing. A final schedule shall be submitted to the Engineer for review 30 days before testing.

The Contractor and Control System Integrator shall include in the construction schedule 10 consecutive working days between the completion of field testing and the startup phase for

the Control System Programmer to perform field software testing. Startup shall not proceed until the software field testing is complete.

Part 2 – Products

Factory Testing

All factory testing of control panels and computer systems shall be performed at the Control System Integrator's shop.

The completed control system shall be tested in the shop by the Control System Integrator and the Control System Programmer. All motor control centers and VFD's supplied by the Control System Integrator shall be interconnected with the control system and powered with rated incoming voltage. Testing shall be conducted in two phases. The initial hardware testing shall include, but not be limited to, operation of all input and output (I/O) points, control devices and motor controllers. The subsequent testing shall include, but not be limited to, testing of RTU programming and Operator Interface provided by the Control System Programmer.

The initial hardware testing of the control system shall include the following:

1. The entire assembled panels shall be meggered and tested to be free from grounds and shorts.
2. Energize each discrete input and output and simulating each analog input and output using a loop simulator and calibrator. Circuits not energized shall be tested for continuity. Discrete input signals shall be tested in both the "on" and "off" state. Analog signals shall be tested at a minimum of three values (4 mA, 12 mA, and 20 mA). The test results shall be documented by the Control System Integrator in checklist format. The final test results shall be signed by both the Engineer and Control System Integrator prior to shipment of equipment to the job site.
3. Provide signal generators, multimeters, and other test equipment as required to verify proper operation of the assembled panels.
4. The Control System Integrator shall interconnect the control panels with the motor control centers and VFD's for both hardware and software testing phases. Control panels shall initially be hardware tested in one group. Similarly, the motor control centers and VFD's shall be hardware tested in another group. After both groups of hardware are confirmed to be operating correctly, the Control System Integrator shall interconnect the equipment with Ethernet cables and analog and discrete wiring as shown on the Plans. The equipment shall remain connected for the remainder of the factory testing period.
5. Correct, replace, or repair control panel and motor control center wiring, and/or components until testing demonstrates proper operation. Control panels and motor control centers shall not be shipped to the job site until testing has demonstrated complete operation of the panels.
6. Provide updated and complete as-built drawings for the control panels and motor control centers at the time of final factory testing. The Engineer shall review the drawings against the panel construction at the time of final factory testing. Drawings

which do not reflect the actual construction of the panel shall be revised and reviewed again by the Engineer. As-built drawings that require revisions shall be submitted to the Engineer for review prior to shipment of equipment to the job site. This review process shall be repeated as necessary so that as-built drawings reflect the actual construction of the panels and motor control centers at the time of shipment. Panels and motor control centers shall not be shipped to the job site until the as-built drawings are updated, complete, and reflect the actual as-shipped status of the equipment.

Upon completion of the initial hardware testing, Control System Programmer shall conduct software testing for final inspection by the Owner. The Control System Integrator shall provide for time, equipment and support in their shop for Control System Programmer to completely demonstrate the functions of the entire control system. All control functions and all status and alarm monitoring and indication shall be demonstrated under simulated operating conditions. Simulating equipment shall be provided and wired into the control system for this testing. Testing shall be continued for the period required by the Owner to observe and verify any revisions as described above in the scheduling portion of this specification.

Part 3 – Execution

Field Quality Control

Following installation by the Contractor, the Control System Integrator will verify the correctness of the interconnecting wiring and energize all control equipment in the field. Each point at the controller(s) shall be checked for proper functional operation through communication with the central computer.

Field Tests

The Control System Integrator in conjunction with the Contractor shall conduct field tests of all panels, motor control centers, VFD's, and instrumentation in the presence of the Engineer after installation of the equipment at the site. Testing shall be conducted by physically actuating signaling devices, installing temporary jumpers, or artificially imposing signals on the field wiring. This shall be done to establish proper operation of the field devices, the integrity of the field wiring, and the proper connection of field devices to the panels. The Contractor and Control System Integrator shall coordinate with the Engineer to provide for as complete testing of the control system as is practical prior to placing the equipment online for actual control and monitoring. The Contractor and Control System Integrator shall make corrections or repairs to the wiring and/or devices as necessary to provide proper operation of the system.

After the initial testing is complete, commissioning shall be accomplished by the Control Systems Integrator, Control System Programmer, and Contractor, with the Owner and Engineer present. Commissioning shall include operation and verification of all control components and features of the entire control system. Each function shall be demonstrated to the satisfaction of the Owner.

Repairs

Should any part of the system fail during the test, the test shall be rescheduled and repeated to the satisfaction of the Owner after repairs.

17.92 Startup

[CSI 40 80 15]

Part 1 – General

Summary

All testing, startup and operation shall not be cause for claims for delay by the Contractor, and all expenses accruing therefrom shall be deemed to be incidental to this contract. The Contractor shall make arrangement for all materials, supplies and labor necessary to efficiently complete the testing, startup and operation.

Startup shall consist of testing, by a simulated operation, all operational equipment and controls. The purpose of these tests shall be to check that all equipment will function under operating conditions, that all interlocking controls and sequences are properly set, and that the facility will function as an operating unit.

Scheduling

Factory representatives of all major units shall be present for the startup phase. The test shall continue until it is demonstrated that all functions of controls and machinery are correct.

Part 3 - Execution

Field Quality Control

When the installation of the Control System is substantially complete, the Contractor shall commence with calibration and field testing. Testing shall determine that all system components connect up correctly to each other so that the system works as designed. Refer to section 17.91 for field testing requirements.

All components of the control system shall be calibrated by the Control System Integrator after completion of installation. Each component shall be adjusted to be within the Manufacturer's required range and for the specific application.

Components that cannot be properly calibrated or that are found to exceed the Manufacturer's specified range or accuracy shall be removed and replaced at no additional cost to the Owner.

The control system shall be placed into operation by the Control Systems Integrator and Control System Programmer.

The Control System Integrator shall calibrate all instruments, indicators, recorders, loops, etc. and shall provide a five-point calibration test results sheet for each calibrated instrument supplied by the Control System Integrator. The five-point calibration shall include one point at: Minimum input range value, Maximum input range value, Midrange input value, no other point less than 25 percent of span to any other point. Test forms shall identify each instrument tested, input conditions vs. output signal results in tabulated form, and shall be submitted to the Engineer prior to final commissioning.

Repairs

All deficiencies observed during the start-up will be corrected by the Contractor.

17.93 Training

[CSI 40 61 26]

Part 1 – General

Submittals

The Control System Integrator shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least 2 weeks prior to the time of the training.

Part 3 – Execution

Hands-On Training

The Control System Integrator shall conduct specifically organized training sessions in operation and maintenance of the control system for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in maintenance and operation of all components of the control system. Training shall include, but not be limited to, the following:

1. Preventative maintenance procedures
2. Trouble-shooting
3. Calibration
4. Testing
5. Replacement of components

At least two separate training sessions, each at least 4 hours in duration, shall be conducted at the facility after start-up of the system.

17.94 Documentation

17.94.2 Operations and Maintenance Manuals

[CSI 40 80 23]

Part 1 – General

Summary

Two types of operation and maintenance manuals (O&M) will be required for the contract:

1. General manuals for use by the Water Department staff for daily operation, maintenance and troubleshooting.
2. Technical manuals for use by trained electronics technicians for technical and “board level” maintenance and repair.

Submittals

Prior to the receipt of payment for more than 50 percent of the work, the Contractor shall deliver to the Owner five sets of acceptable manufacturer's operating and maintenance

instructions covering each piece of mechanical and electrical equipment, or equipment assembly, furnished under this contract. Each set of instructions shall be bound into multiple volumes; each volume to be complete with an index and bound in a suitable hard-cover binder. Manuals shall be assembled and indexed so that information on each piece of equipment can be readily found. Any additional operating and maintenance instructions from the Control Systems Programmer will be submitted separately.

Quality Assurance

Manuals shall be purposefully made for this installation, and general manuals which are vague or have limited applicability will not be accepted. The manuals shall be written in a non-technical format suitable for reading by water system operators with no previous automatic control equipment experience. The decision of the Owner on the acceptability of the manual shall be final.

Part 2 – Products

Materials

The Control System Integrator shall prepare and assemble detailed operation and maintenance manuals in accordance with the project general requirements. The manuals shall include, but not be limited to, the following:

1. Name, location and phone number of nearest supplier and spare part warehouse.
2. Step by step operating procedures.
3. Narrative of overall system performance and operation.
4. Listing of all equipment setpoints.
5. Preventative maintenance procedures
6. Troubleshooting of master and remote equipment.
7. Calibration
8. Testing
9. Replacement of components
10. System schematics / shop drawings
11. As-built elementary and one-line diagrams
12. Catalog data and complete parts list for all equipment and control devices
13. Listing of recommended spare parts.
14. Listing of recommended maintenance tools and equipment.
15. Warranties.
16. Disassembly and reassembly instructions.

All plans shall be provided on hard copy and in electronic form on disk. Electronic drawing files shall be provided in AutoCAD .DWG format with all “xrefs” bound. If “xrefs” are not

bound, all “xref”.DWG files shall be provided unlinked with instructions to reestablish the links. Files shall be in AutoCAD 2010 or later format.

Division 18

Measurement and Payment

18.0 GENERAL

It is the intention of these specifications that performance of work under bid items shall result in complete construction, in proper operating condition, of improvements identified in these written specifications and accompanying plans. Work and material not specifically listed herein but required according to the plans and specifications and general practice shall be included in Contractor's bid price in the most closely applicable bid item.

If a minimum bid amount has been established for any item and the bidder's entry is less than the minimum specified amount, the Owner will unilaterally revise the price to the minimum specified amount and recalculate the total. The recalculated total will be used by the Owner for award purposes and to fix the contract price amount and the amount of the contract bond.

If a maximum or fixed bid amount has been established for any item and the bidder's entry exceeds the maximum or fixed specified amount, the Owner will reduce the bid item price to the maximum or fixed specified amount and relocate the offsetting amounts to bid items of the Owner's choosing.

Bid Item 1– Mobilization, Demobilization, Site Preparation, and Cleanup

Lump sum price covers complete cost of furnishing, installing and testing, complete and in-place, all work and materials necessary to: move and organize equipment and personnel onto the job site; secure job site; traffic control for deliveries; provide and maintain necessary support facilities; obtain all necessary permits and licenses; prepare site for construction operations; maintain site and surrounding areas during construction; move all personnel and equipment off site after contract completion; cleanup site prior to final acceptance; and accomplish all other items of work not specifically listed in other divisions.

No more than 70-percent of bid amount for this item will be paid before final payment request, and this bid amount may not be more than 10-percent of value of total contract.

Bid Item 2– Excavation Safety and Shoring

Lump sum price shown shall cover the complete cost of excavation safety and shoring including: all labor, materials, and equipment for the installation of the safety and shoring work as shown on the Plans, and detailed in the contract specifications, or as required by governing safety codes. Price includes design of the shoring system as required by applicable codes and standards, whether shown on the Plans or not.

Bid Item 3– Staking and Project Control

Lump sum price shown shall cover the complete cost of providing all surveying and staking control necessary to construct the improvements and provide permanent control references. Also included is the cost to survey and replace any existing monuments or markers disturbed during construction.

Bid Item 4– Site Work

Lump sum price shown shall cover the complete cost of providing all site work relating to construction of improvements as shown on the Plans and specified herein. Work includes, but is not limited to: clearing and grubbing; structure excavation, backfill, and compaction; site grading; paving; temporary construction fencing; temporary erosion and sedimentation control; disposal of excess material; control of water; landscaping and seeding; trenching; excavation; removal of unsuitable materials; select bedding; backfill; appurtenances; dewatering; restoration for underground utilities; and chain-link fencing and gates; and all other work necessary for a complete installation of all site work and underground utilities.

Bid Item 5– Site Utilities

Lump sum price shown shall cover the complete cost of providing all materials, equipment and labor necessary for construction of the underground utilities as shown on the Plans and specified herein. Work includes, but is not limited to: trenching; disposal of excess material; control of water; select bedding; backfill; compaction; vaults; materials and appurtenances for water, stormwater, telemetry, electrical, other underground utilities; and all other work necessary for a complete installation of all underground utilities. The cost associated with coordination with utility companies shall be included in this bid item.

Bid Item 6– Structural

Lump sum price shown shall cover the complete cost of providing all materials, equipment and labor necessary for constructing the two wellhouse structures complete as shown on the Plans and detailed in the contract specifications including: cast-in-place concrete, pre-cast concrete, masonry, grating and supports, miscellaneous metal work, doors and windows, ceilings, insulation, carpentry, roof, waterproofing, patching, repairing, and testing.

Bid Item 7– Mechanical

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the mechanical work shown on the Plans, and detailed in the contract specifications, including all mechanical work and equipment not listed in the other bid items. Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the mechanical work shown on the Plans, and detailed in the contract specifications. This includes: well casing modifications; pumps and motors; facility piping, valves, fittings, and appurtenances; pipe supports; flow meters; minor mechanical and plumbing fixtures; HVAC; finishes associated with Mechanical Work; equipment not covered elsewhere; specialties not covered elsewhere; seismic restraint and anchorage of all equipment, piping, conduits, and machinery, etc.; and all mechanical work and equipment not listed in the other bid items

Bid Item 8 – Electrical

The lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the electrical work shown on the Plans, and detailed in the contract specifications.

Bid Item 9 – Automatic Control

Lump sum price shown shall cover the complete cost of providing all labor, materials, and equipment necessary for the automatic control system as shown on the Plans, and detailed in the contract specifications.

Bid Item 10– As-builts and O&M Manuals

Lump sum price shown shall cover the complete cost of providing all mark-up plans necessary for the Owner to create accurate as-built records as detailed in the specifications. The work includes surveying all structures and utilities to determine their as-constructed locations and elevations, records of all mechanical and electrical equipment for maintenance purposes, and operation and maintenance manuals. The price for this work will be \$10,000. Failure to comply with the as-built requirements and furnish acceptable as-built records will result in the deletion of this bid item by change order.

Payment for this work will not be made prior to the final payment. Payment shall be lump sum.

Bid Item 11– Testing, Startup and Training

Lump sum price shown shall cover the complete cost of providing all labor and materials necessary for testing and startup of the project as shown on the Plans, and detailed in the contract specifications. Payment shall be lump sum. Partial payment of up to 50 percent of the total bid item cost is allowed no earlier than first Contractor initiated testing date. Final 50 percent of payment shall not be paid until testing of the station is complete, and the pump station is completely operational, and staff trained as determined by the Owner and Engineer. Minimum cost for this bid item shall be \$10,000.